ANNUAL REPORT 2022

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN
CSIC
Consejo Superior de Investigaciones Científicas

CSIC

CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

ANNUAL REPORT **2022**

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CSIC
Consejo Superior de Investigaciones Científicas

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Front cover:
Pyramidal neuron in the cerebral cortex (1904) by Santiago Ramón y Cajal (Instituto Cajal)

Design and layout:
Dioni Martín

Translation:
Fabiola Barraclough

LETTER FROM THE PRESIDENT

Dª ELOÍSA DEL PINO MATUTE
PRESIDENT OF THE CSIC

The CSIC is the largest public research organisation in Spain and part of the MICIN (Ministry of Science and Innovation). In 2022 the CSIC achieved excellent results, which are fruit of the efforts made by all those working here. The fourth largest public research institution in Europe and the seventh largest in the world, the CSIC issues this annual report with the aim of being accountable to the citizens, who generously support science in our country through their taxes. This funding enables our institution to maintain its staff (13,888 people throughout Spain, Rome and Brussels) and finance 146 centres, as well as acquiring and maintaining first-class scientific facilities and equipment, such as oceanographic vessels, laboratories, astronomical observatories, sophisticated microscopes and computers. All this is essential for undertaking our research and providing scientific services (almost 7,000 per year) to public administrations and to companies.

Here, in this annual report, we explain the content of some of the CSIC's research work. These investigations are reflected in current national and international projects, now exceeding 5,500 in number; over 17,000 high-impact articles and first-rate books published; more than 8,500 advisory reports provided to different governmental departments; and almost 800 Doctoral theses successfully presented. This report also reflects the great effort made to obtain competitive funding from both the private sector and the European Union and to transfer our research results (including 218 protected assets and the creation of 10 Technology-Based Companies). Here too we recount some of the 18,000 dissemination initiatives, among which we should highlight those held to commemorate Santiago Ramón y Cajal during the Año Cajal celebrated in 2022, in addition to others carried out at numerous science outreach centres such as the Museo Geominero and the MNCN (National Museum of Natural Sciences), as well as in towns and cities countrywide.

At first glance, the public is likely to be intrigued by the CSIC's discoveries in the fields of biomedicine, such as new biomarkers to diagnose different types of cancer, neurodegenerative conditions or even COVID-19; our advances in medicines, materials and technologies (optical, nanotechnological or computational, among others) to prevent or to treat numerous diseases affecting Earth's inhabitants; or again of great interest, research seeking not just to cure diseases, but also to stay healthy by eating a healthy diet, for example, or safe and functional foods.

In the current context, in which the public is becoming more aware of extreme climatic events, the CSIC has carried out analyses that shed light on the keys to conserving biodiversity in Doñana and our National Parks in general, or to restoring it in places like the Mar Menor. Efficient and sustainable food production in our oceans, fields and farms has been the subject of some important discoveries made by researchers taking a wide variety of approaches, who are also working on different facets of the circular

economy. Studies are also addressing the evaluation of the presence and reuse of critical minerals in Europe, the revaluation of biomass or the degradation of plastic and the manufacture of bioplastics. Significant progress has also been made in designing technology to address complex fossil-fuel challenges and, for example, to advance in the production, storage and use of green hydrogen from renewable energy sources.

Artificial intelligence and quantum technology are no longer just future promises and, in 2022, CSIC researchers have tried to identify the determining factors that make our data processing, our analysis capabilities and our results more robust in all scientific areas as well as in everyday life. Work has also been underway to gain insight into how the universe works, by photographing black holes, studying dark matter or the stars of the Milky Way, or contributing to the design of CSIC technology that has travelled into space. Likewise, we have continued our efforts to learn about the past of humanity in El Turuñuelo, Egypt or Las Médulas and to answer the question of how these societies were organised politically, socially and economically in order to gain a better understanding of our own present and future. The diverse cultures of our planet, understood in all their forms of expression, gastronomy, dance, music, language and literature, have also been the object of analysis.

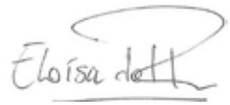
The CSIC has remained attentive to the challenges facing old Europe, such as ageing, addressed from the perspectives of biomedicine, robotics, demography and the analysis of social policies. Our research scope encompasses: dependency and health; the quality of democracy, and the concern to move towards models in which the continent is more autonomous from the perspective of scientific and industrial policy. All in all, for another year running, the CSIC has endeavoured to challenge the frontiers of knowledge in practically all disciplines.

Despite all these important achievements, here at the CSIC we aspire to become an even more relevant institution both scientifically and socially, and so we are launching numerous programmes to achieve this. These efforts are aimed at improving our European Research Council results, attracting international talent, improving transfer, increasing our institutional presence in the forums where scientific policy decisions are made, and taking advantage of the increased resources made available to science in recent years by the Spanish government and the European Union.

Between 2009 and 2016, the Agency lost around 400 scientific staff members, a figure that will be recovered between 2019 and the end of 2023. However, to improve our performance and respond to the growing number of scientific challenges, we need to strengthen our workforce and improve working conditions. The CSIC is also addressing the challenge of correcting the lack of promotion of women; improving the employment situation of pre-doctoral staff and career support, for example with programmes such as iMOVE for placements abroad; further recruiting and consolidation of post-doctoral research staff; and increasing scientific and technical staff exchange initiatives with third countries. Progress is also ongoing in strengthening the management staff and in designing programmes to attract managers and technicians and to offer them decent professional career prospects.

The CSIC aspires to be an exemplary organisation in terms of its governance model, and thus we are working to become more accountable, transparent and to embrace a more participatory decision-making model. We need to be more efficient and effective in our management and, for this reason, several administrative simplification programmes and the reorganisation of our information systems are being implemented.

At the time of writing this letter, the Institution is in the midst of negotiating a new version of the Management Contract, pending approval since 2009, which is expected to come into force in 2023. This will help us to respond to one of the most important challenges facing the Institution: namely, strengthening a structure capable of dealing with the sophisticated management of modern, internationalised and competitive science. Let us hope that this will be the first thing that the CSIC President can write about in the 2023 Annual Report.



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JA

FEBRUARY

MARCH

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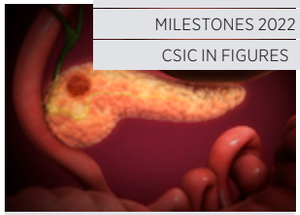
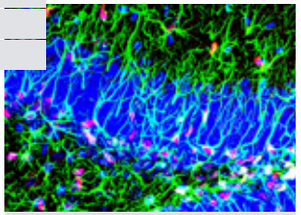
MAY

JUNE

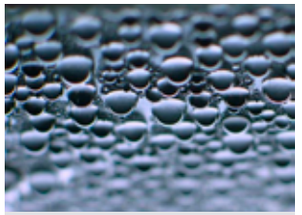


New biomarker identified for early diagnosis of pancreatic cancer. **[+]**

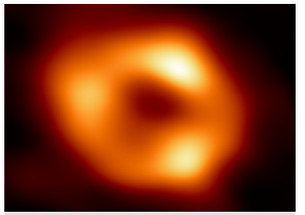


Discovery of novel mechanism to activate stem cells in the adult brain. **[+]**

CSIC presents its vanadium battery prototype for large-scale electrical energy storage. **[+]**



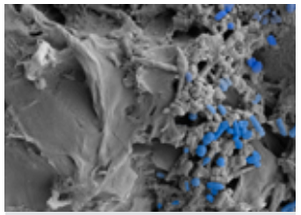
Industrial hydrogen production using a new protonated ceramic membrane-based system. **[+]**



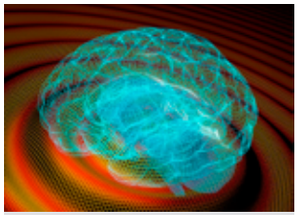
First ever image captured of the black hole at the centre of the galaxy. **[+]**

Eloísa del Pino, named new president of the Spanish National Research Council (CSIC). **[+]**

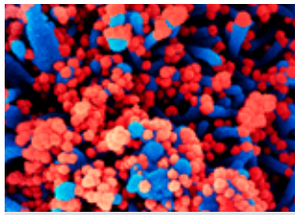
CSIC researchers promote the first public service hydrogen plant to use green hydrogen generated on site with solar energy. **[+]**



Study shows that ingestion of microplastics alters gut microbiota. **[+]**

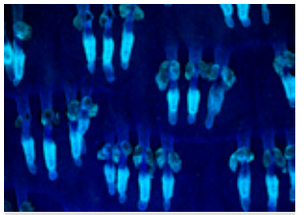


A company uses CSIC technology to develop graphene transistors to treat neurological diseases. **[+]**

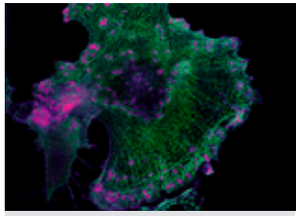


CSIC team produces effective covid-19-neutralising antibodies. **[+]**

Wax worm saliva contains enzymes capable of breaking down plastic. **[+]**

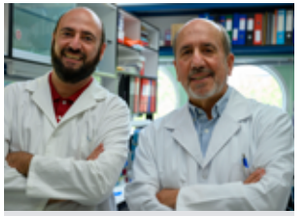


Two proteins identified that modulate skin stem-cell behaviour. **[+]**

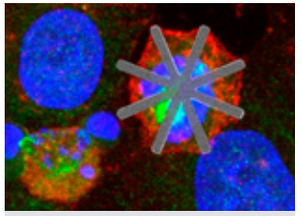


Novel nanotechnology-based technique developed by CSIC enhances cancer drugs. **[+]**

Nanocapsules with microRNAs designed for insertion inside cells to treat diseases such as cancer. **[+]**



CSIC's covid-19 vaccine concludes preclinical trials. **[+]**

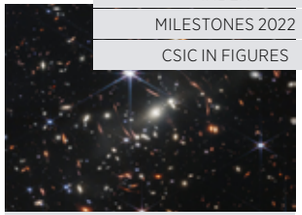


CSIC researchers insert chips inside living cells as "mechanical" drugs. **[+]**

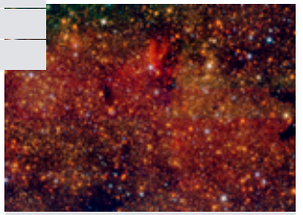
CSIC starts building the largest oceanographic vessel in the Spanish fleet, to be named 'Odón de Buen'. **[+]**

CSIC deposits 1,000 seed varieties in Arctic-based Noah's Ark seed vault. **[+]**

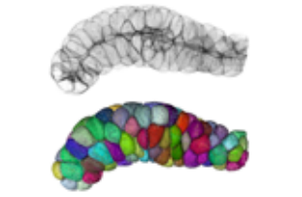
AUGUST



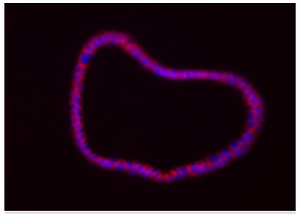
James Webb Space Telescope starts its scientific operations. [+]



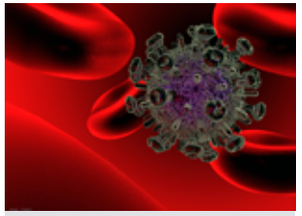
Study reveals how stars formed at the centre of the Milky Way. [+]



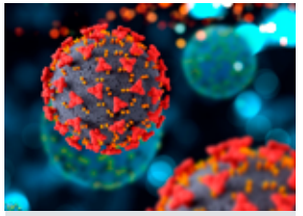
Mathematical principle discovered explaining how cells connect to each other to form tissues and organs. [+]



CSIC scientists identify new risk markers for colon cancer and ulcerative colitis. [+]

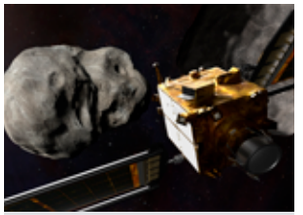


A CSIC team uses macaques to show that vaccine combinations are key to achieving a good immune response to HIV. [+]



Discovery of 11 new genetic regions involved in covid-19 susceptibility and severity. [+]

SEPTEMBER

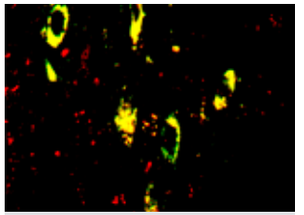


CSIC participates in the first mission to deflect the trajectory of a potentially hazardous asteroid. [+]

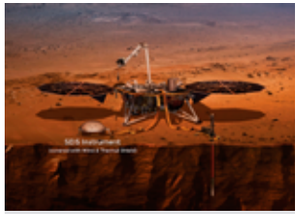
Drought and aquifer overexploitation dry up Doñana's last permanent lagoon. [+]

Finis Terrae III, the supercomputer that can forecast the weather, analyse the genome and monitor covid-19 evolution. [+]

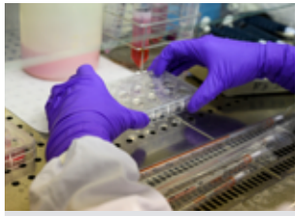
OCTOBER



Software tool performs in-depth analysis of genetic modifications in cancer-cell genomes. [+]



Surface seismic wave propagation on Mars detected for first time. [+]



CSIC presents an anti-covid-19 spray and therapeutic antibodies at the Patents for Innovation fair. [+]

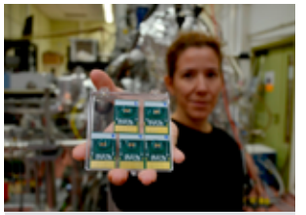
NOVEMBER

CSIC leads the ESA's major mission to study dark matter in the universe. [+]

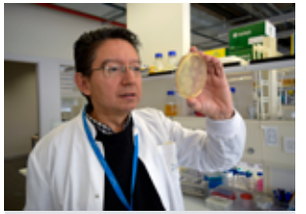
European project aims to decarbonise major industrial sectors. [+]

CSIC participates in a project assessing the potential of critical raw materials in Europe. [+]

DECEMBER



Novel graphene-based biosensor enables ultra-sensitive detection of hepatitis C virus. [+]



CSIC scientists teach bacteria to 'read' Morse code. [+]

CSIC scientists develop a robotic dog able to guide dependent or disabled people. [+]

2022 CSIC IN FIGURES

STAFF

		W	M
RESEARCHER	4,489	1,781	2,708
RESEARCHER IN TRAINING*	1,334	674	660
TECHNICIAN/ SUPPORT	6,705	3,732	2,973
MANAGEMENT/ ADMINISTRATION/ SERVICES	1,360	799	561
TOTAL	13,888	6,986	6,902

* Predoctoral.

ECONOMIC DATA

INCOME € 1,120,838,444.36

- STATE € 568,679,117.29
- COMPETITIVE € 531,696,541.18
- ESF/ERDF € 20,462,785.89

EXPENDITURE € 1,035,984,002.66

- STAFF € 653,742,457.93
- OTHER EXPENSES € 283,381,492.11
- INVESTMENTS € 98,860,052.62

RESEARCH AND RESEARCH SUPPORT STRUCTURES

EXCELENCIA SEVERO OCHOA
9 CENTRES

EXCELENCIA MARÍA DE MAEZTU
3 UNITS

NATIONALLY FUNDED PROJECTS

4,683
NATIONAL PROGRAMME PROJECTS

FUNDED WITH
€ 905,081,960.89

INTERNATIONALLY FUNDED PROJECTS

EUROPEAN
612
FRAMEWORK PROGRAMME

FUNDED WITH
€ 322,775,803

146
NON FRAMEWORK PROGRAMME

FUNDED WITH
€ 47,692,252

NON-EUROPEAN
66
INTERNATIONAL

FUNDED WITH
€ 12,474,866

CURRENT INDIVIDUAL ERC PROJECTS UNDER FP

70
PROJECTS

AMOUNTING TO
€ 103,895,955

16	ADVANCED GRANT	€ 28,431,920
24	STARTING GRANT	€ 33,006,687
22	CONSOLIDATOR GRANT	€ 41,402,348
8	PROOF OF CONCEPT	€ 1,055,000

KNOWLEDGE TRANSFER

218
PROTECTED ASSETS

156
PRIORITY PATENTS

108
INTERNATIONAL PCT APPLICATIONS

1,855
NEW CONTRACTS AND AGREEMENTS SIGNED

108
LICENSED ASSETS

10
TECHNOLOGY-BASED COMPANIES (TBCS) CREATED

€46.4M
CONTRACT FINANCE

€3.1M
ROYALTIES

TRAINING

290
JAE INTRO GRANTS

197
JAE INTRO ICU GRANTS

36
JAE INTRO SOMdM GRANTS

212
BACHELORS THESES (BsTh)

512
MASTER'S THESES (MsTh)

780
PhD THESES (PhDTh)

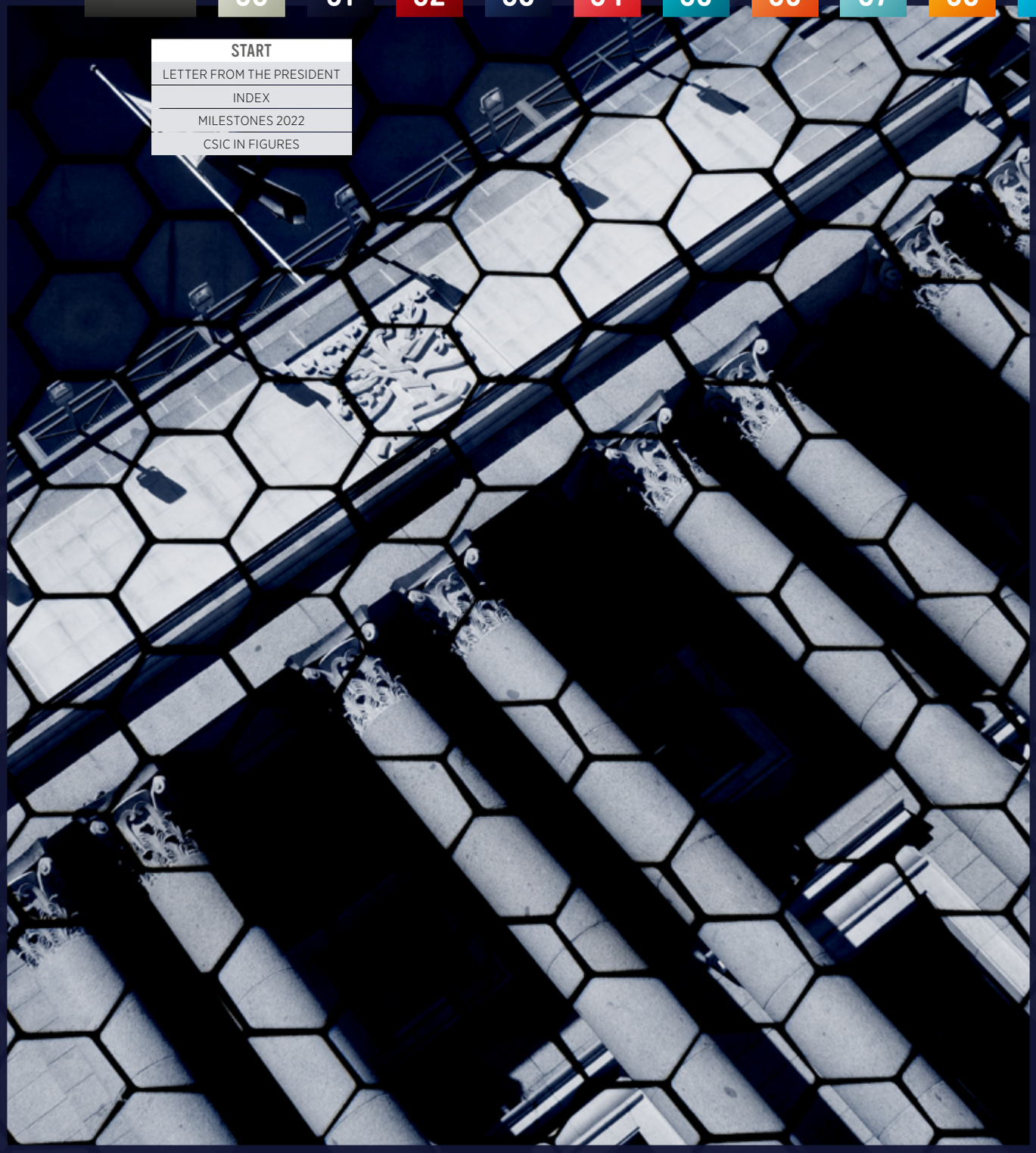
SCIENTIFIC PRODUCTION

16,284
INDEXED ARTICLES

709
NON-INDEXED ARTICLES

1,045
BOOK CHAPTERS

219
BOOKS



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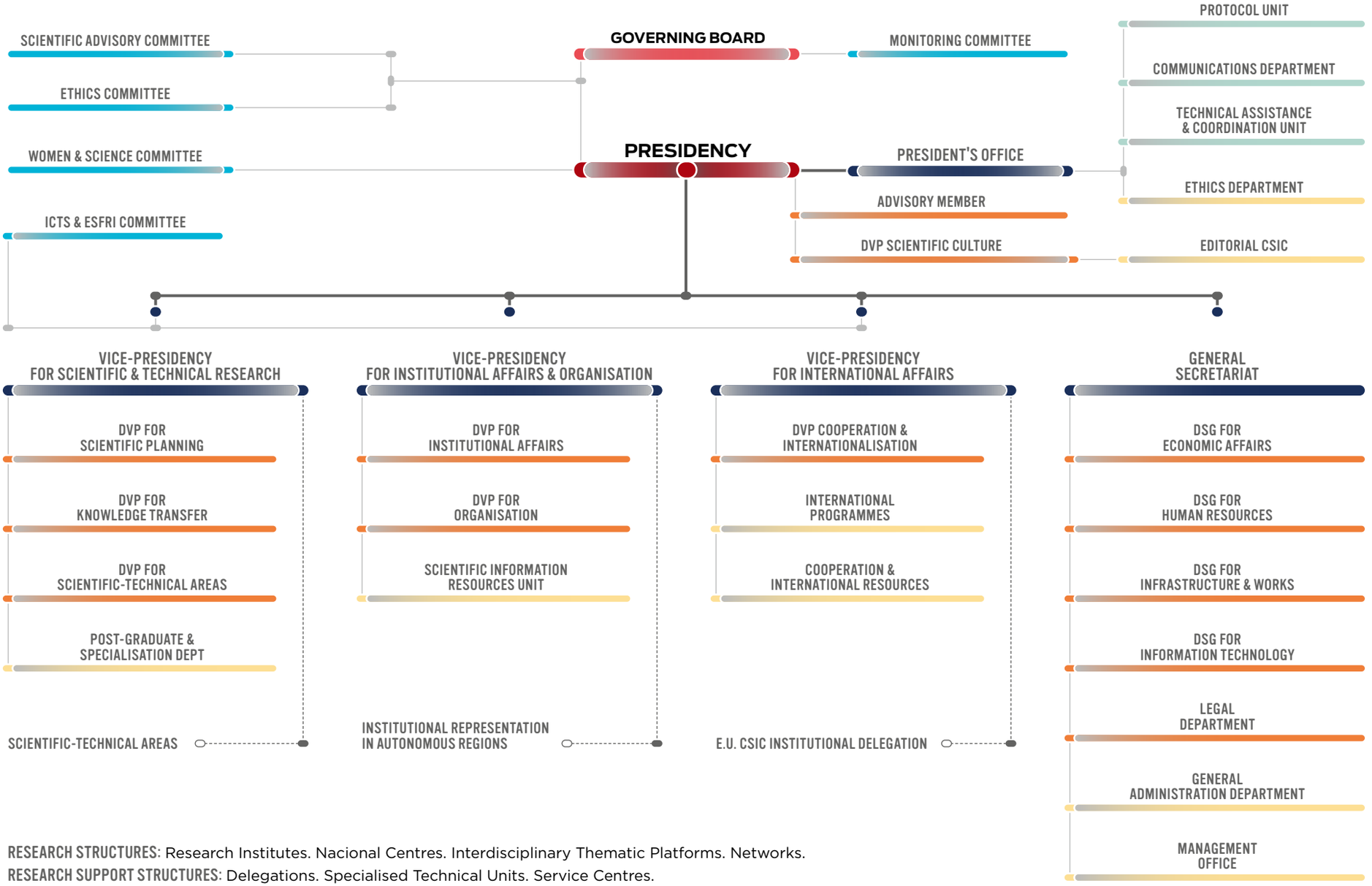
CSIC CORPORATE ORGANISATION

GOBIERNO DE ESPAÑA · MINISTERIO DE CIENCIA E INNOVACIÓN

CSIC
Consejo Superior de Investigaciones Científicas



RESEARCH STRUCTURES: Research Institutes. Nacional Centres. Interdisciplinary Thematic Platforms. Networks.
RESEARCH SUPPORT STRUCTURES: Delegations. Specialised Technical Units. Service Centres.

GOVERNING AND EXECUTIVE BODIES

CSIC PRESIDENCY

PRESIDENT
ELOÍSA DEL PINO MATUTE

Appointed by agreement of the Council of Ministers on 22 June 2022 (Royal Decree 498/2022 of 21 June. BOE No. 148, 22 June 2022).

Ms Rosa Menéndez López held the CSIC Presidency for the first half of 2022.

The Presidency is the unipersonal **governing** and **executive** body of the CSIC Agency. It is regulated under Chapter II, sections one and two, of the CSIC State Agency's Articles of Association, approved by Royal Decree 1730/2007, of 21 December.

The person holding the post is appointed and removed by Royal Decree passed by the Council of Ministers, at the proposal of the MICIN (Spanish Ministry for Science and Innovation), by persons with accredited experience in research and R&D management.

The Presidency is responsible for exercising the functions established in article 11 of the aforementioned Articles of Association, some of which may not be delegated. With regard to the rest of the functions, the Presidency may delegate those deemed appropriate to the Vice-Presidencies, the General Secretariat and other dependent bodies. In order to exercise these functions, requests can be made for as many reports and opinions as may be necessary from all the bodies regulated by the Articles of Association.

Presidency decisions take the form of circulars and resolutions and are the endpoint of the administrative procedure.

The Presidency has an Office that undertakes advisory and support functions.

GOVE

The Governing Board is the CSIC's **collegiate governing body** regulated in Chapter II, sections one and two, of the CSIC State Agency's Articles of Association, approved by Royal Decree 1730/2007, of 21 December. It is responsible for approving relevant matters, such as the Agency's Strategic Plan, the preliminary draft budget, the annual accounts, the activities report and the creation of research institutes, among other functions.

COMPOSITION

It is chaired by the President of the CSIC, and composed of 14 other members appointed by the Minister for Science and Innovation: six representing different ministerial departments, five from among professionals of recognised prestige in the field of research appointed by the Minister him/herself, one of them proposed by the Universities Council, and three appointed by the most representative trade-union organisation.

MONITORING COMMITTEE

The Monitoring Committee is constituted within the Governing Board (Art. 14 Art. of Association CSIC State Agency) and is composed of the following members:

CHAIR
MONTSERRAT TORNÉ ESCASANY

MEMBERS
JUAN JOSÉ HERRERA CAMPA
GONZALO ARÉVALO NIETO
ISABEL BOMBAL DÍAZ
ALICIA DURÁN CARRERA

2022. Renewal of members of the Monitoring Committee, resignations:
Miguel Ordozgoiti de la Rica, Francisca Vilches de Frutos (Resolution of the Governing Board 30/11/2022).

CHAIR OF THE PRESIDENCY

ELOÍSA DEL PINO MATUTE
President of CSIC

BOARD MEMBERS REPRESENTING DIFFERENT MINISTRIES

Ministry for Science and Innovation

GONZALO ARÉVALO NIETO
Director General for Research Planning

Ministry for Finance and Civil Service

JUAN JOSÉ HERRERA CAMPA
Director-General for Personnel Costs and Public Pensions

Ministry of the Presidency, Parliamentary Relations and Democratic Heritage

RAFAEL OÑATE MOLINA
Director of the Minister's Cabinet

Ministry for Health

SILVIA CALZÓN FERNÁNDEZ
State Secretary for Health

Ministry for Ecological Transition and Demographic Challenge

Mª JESÚS RODRÍGUEZ DE SANCHO
Director General for Biodiversity, Forests and Desertification

Ministry for Agriculture, Fisheries and Food

ISABEL BOMBAL DÍAZ
Director General for Rural Development, Innovation and Agri-Food Training

ADVISERS OF RECOGNISED PRESTIGE IN THE FIELD OF SCIENTIFIC RESEARCH AND TECHNOLOGICAL DEVELOPMENT

AMPARO MORALEDA MARTÍNEZ
Independent Director of Airbus Group SE, Caixabank SA, Vodafone Plc. and A.P. Moller-Maersk A/S.

MARGARITA DEL VAL LATORRE
Research Scientist at a Public Research Organisation

JUAN ROMO URROZ
Rector of the Universidad de Carlos III Madrid

MONTSERRAT TORNÉ i ESCASANY
OPI Research Scientist

DANIEL RAMÓN VIDAL
Biópolis, S.L.

BOARD MEMBERS ON BEHALF OF THE MOST REPRESENTATIVE TRADE UNIONS

CCOO

ALICIA DURÁN CARRERA
Research Professor at a Public Research Organisation

UGT

FRANCISCO JAVIER SÁNCHEZ ESPAÑA
Senior Scientist at a Public Research Organisation

CSIF

RICARDO PEDRO MARTÍNEZ MURILLO
Senior Scientist at a Public Research Organisation

SERVES ON THE SECRETARIAT OF THE GOVERNING BOARD (non-member)

IGNACIO GUTIÉRREZ LLANO
Secretary General of the CSIC

2022. Renewal of members of the Governing Board, resignations:
Rosa Menéndez López (RD 497/2022 of 21 June); Jorge Luis Marquínez García (MICINN Order 5/8/2022); Miguel Ordozgoiti de la Rica (MICINN Order 14/11/2022); Jose Carlos Gómez Villamandos and Francisca Vilches de Frutos (MICINN Order 30/6/2022).

COLLEGIATE SUPPORT AND ADVISORY BODIES

STEERING COMMITTEE

The Steering Committee is a collegiate body made up of the CSIC Presidency, the unipersonal management bodies established in Articles 18 to 21 of CSIC State Agency's Articles of Association (the holders of the Vice-Presidencies, the Deputy Vice-Presidencies, the General Secretariat, the Deputy General Secretariats and the Directorate of the President's Office), the Director of the Postgraduate and Specialisation Department and two advisory members.

The Committee meets on a regular basis with the aim of ensuring that the Agency's well-coordinated direction and strategies are followed by all its members, informing and being informed of those issues deemed appropriate.

PRESIDENT

ELOÍSA DEL PINO MATUTE

Vice-President for Scientific and Technical Research
JOSÉ MARÍA MARTELL BERROCAL

Vice-President for Institutional Affairs and Organisation
CARLOS CLOSA MONTERO

Vice-President for International Affairs
FRANCISCO JAVIER MORENO FUENTES

Secretary General
IGNACIO GUTIÉRREZ LLANO

Director of the President's Office
ISABEL Mª MARTÍNEZ SIERRA

Deputy Vice-President for Scientific Programming
JAIME JUAN CARVAJAL GARCÍA-VALDECASAS

Deputy Vice-President for Knowledge Transfer
ANA CASTRO MORERA

Deputy Vice-President for Scientific and Technical Areas
ELENA CARTEA GONZÁLEZ

Director of the Postgraduate and Specialisation Department
CARMEN SIMÓN MATEO

Deputy Vice-President for Institutional Affairs
ANA ISABEL CRIADO CONTRERAS

Deputy Vice-President for Organisation
INÉS GALINDO JIMÉNEZ

Deputy Vice-President for Internationalisation and Cooperation
ISABEL DÍAZ CARRETERO

Deputy Vice-President for Scientific Culture
PURIFICACIÓN FERNÁNDEZ RODRÍGUEZ

Deputy Secretary-General for Human Resources
BEATRIZ ESTEBAN AÑOVER

Deputy Secretary-General for Economic Action
M. ESTHER VAQUERO REDONDO

Deputy Secretary-General for Works and Infrastructure
Mª CARMEN GONZÁLEZ PEÑALVER

Deputy Secretary General for Information Technology
CLARA CALA RIVERO *[until 01/11/2022]*

Principal Officer General Administration Department
JUAN MANUEL RODRÍGUEZ QUINTANA

Director of the Management Office
AMOR SUÁREZ MUÑOZ

Advisory Member of the CSIC Presidency
M. ISABEL VARELA NIETO

Advisory Member to the Legal Consultancy Department
JOSÉ LOPEZ CALVO

2022. Renewal of the Steering Committee, outgoing members:
Rosa Menéndez López, Jesús Marco de Lucas, Rosina López-Alonso Fandiño, Mª Ángeles Gómez Borrego, Alberto Sereno Álvarez, Luis Miller, Carlos Andrés Prieto de Castro, Mª Victoria Moreno Arribas, Jose Mª Calleja Rovira, Carlos González Ibáñez, Carmen Sanabria Pérez, Clara Cala Rivero, Valentín García Baonza.

SCIE RY COMMITTEE

The Scientific Advisory Committee is a collegiate **support** body to the **CSIC Presidency** and the **Governing Board**, pursuant to articles 7 and 15 of the CSIC State Agency's Articles of Association, approved by Royal Decree 1730/2007, of 21 December, responsible for advising on scientific and technological issues.

COMPOSITION

It is currently formed by the CSIC Presidency, whose president holds the Chair, the members holding the three CSIC Vice-Presidencies and two Deputy Vice-Presidencies (for Scientific-Technical Areas and Scientific Programming), as well as nine other members appointed by the CSIC Governing Board, at the proposal of the Presidency, from among scientific and technological personnel and those of relevance in the different knowledge areas within the scope of the CSIC's scientific activity.

CHAIR

ELOÍSA DEL PINO MATUTE

SECRETARY

JAIME JUAN CARVAJAL GARCÍA-VALDECASAS

MEMBERS

JOSÉ MARÍA MARTELL BERROCAL

CARLOS CLOSA MONTERO

FRANCISCO JAVIER MORENO FUENTES

ELENA CARTEA GONZÁLEZ

MEMBERS APPOINTED BY THE GOVERNING BOARD:

ANTONIO ALCAMÍ PERTEJO

TERESA BUSTO DEL CASTILLO

JOAN FONT FÀBREGAS

EMMA HUERTAS CABILLA

LUIS M. LIZ-MARZÁN

ÁNGELA NIETO TOLEDANO

ESTEBAN RODRÍGUEZ SÁNCHEZ

ALBERTO SANFELIU CORTÉS

MONTSERRAT VILÀ PLANELLA

2022. Renewal of the members of the Scientific Advisory Committee, outgoing members:
Rosa Menéndez López, Carlos Prieto de Castro, Jesús Marco de Lucas, Rosina López-Alonso Fandiño, Ángeles Gómez Borrego, Mª Victoria Moreno Arribas. By Resolution of the CSIC Board of Governors of 30/11/2022, the following cease to hold office: Susana Alemany de la Peña, Gemma Fabriás Domingo, Mercedes García-Arenal Rodríguez, Juan Ramón González Velasco, Ceferino López Fernández, Consuelo Martínez López, Rafael Pardo Avellaneda, Carmen Peláez Martínez, Carlos Abanades García.

ETHI

The Ethics Committee is a collegiate **support** body to the **CSIC Presidency and the CSIC Governing Board**. It is a consultative and permanent body regulated by articles 7 and 17 of the CSIC State Agency's Articles of Association, approved by Royal Decree 1730/2007, of 21 December. The Committee is responsible for reflecting on ethical and deontological principles relating to research activity, issuing reports and making recommendations thereon.

COMPOSITION

The composition of the CSIC Ethics Committee is heterogeneous and interdisciplinary. It is currently made up of 11 members appointed by the CSIC Governing Board, at the proposal of the CSIC Presidency. The Chair and Vice-chair are elected form among its members.

CHAIR

FRANCISCO JOSÉ AUSÍN DÍEZ

VICE-CHAIR

CARME TORRAS GENÍS

MEMBERS

CARMEN ASCASO CIRIA

CARMEN AYUSO GARCÍA

MARÍA JOSÉ CAMARASA RIUS

JOSÉ VICENTE GARCÍA RAMOS

RODOLFO GUTIÉRREZ PALACIOS

JOSÉ JAVIER LUCAS LOZANO

ANANDA PASCUAL ASCASO

YOLANDA SANZ HERRANZ

MANUEL VILLORIA MENDIETA

COMMITTEE SECRETARY (non-member)
Mª LUISA SALAS GARCÍA
Director of the Research Ethics Department

2022. Renewal of members of the Ethics Committee, resignations:
Lluís Montoliu José (Resolution of the CSIC Board of Governors of 31/1/2022). Antonio Almagro Mendieta and Víctor Ramón Velasco Rodríguez (CSIC Board of Trustees Resolution of 30/11/2022).

COMMITTEE FOR THE COORDINATION AND RATIONALISATION OF ICTS AND PARTICIPATION IN ESFRI*

The Commission is the body in charge of organizing, coordinating and prioritizing the research infrastructures in which the CSIC participates directly or indirectly. It acts in a specialized, objective and transparent way, pursuant to the "Regulation for creation and operation" approved on July 4, 2018 by resolution of the CSIC Presidency.

* COMMITTEE FOR THE COORDINATION AND RATIONALISATION OF UNIQUE SCIENTIFIC AND TECHNICAL INFRASTRUCTURES (ICTS) AND PARTICIPATION IN EUROPEAN RESEARCH INFRASTRUCTURES (ESFRI)

CHAIR

MONTSERRAT TORNÉ I ESCASANY

VICE-CHAIR

JOSÉ LUIS DE MIGUEL ANTÓN

MEMBERS
Representing:

Environment and Earth Sciences
JOAQUÍN TINTORÉ SUBIRANA

Biology, Health and Food
JOSÉ MARÍA CARAZO GARCÍA

Physics and Engineering
CARMEN GARCÍA GARCÍA

Society
DIEGO RAMIRO FARIÑAS

Data Science and Artificial Intelligence
ISABEL CAMPOS PLASENCIA

ACTING AS SECRETARY
MÓNICA MARTÍN-LANUZA OLMEDA
Vice-Presidency for International Affairs

VICE-SECRETARY
Mª ÁNGELES LÓPEZ VÁZQUEZ
Vice-Presidency for Scientific & Technical Research

2022. Renewal of the members of the Committee, outgoing members:
Jose Vicente García Ramos, Julio Pérez Díaz.

WOM CE COMMITTEE

The CSIC Women and Science Committee is a collegiate **support** body to the **CSIC Presidency** on gender issues established in article 15.3 of the CSIC State Agency's Articles of Association, approved by Royal Decree 1730/2007, of 21 December. The Committee's mission is to promote equality between men and women in the course of the CSIC's research activity.

COMPOSITION

The Committee is made up of the CSIC Presidency, which holds the Chair, an Executive Vice-Chair, and 12 members appointed by the Presidency, eight representing the three CSIC Core Areas and four from among CSIC staff.

CHAIR

ELOÍSA DEL PINO MATUTE

EXECUTIVE VICE-CHAIR

CARMEN MAYORAL GASTÓN

MEMBERS

ELECTED BY SCIENTIFIC-TECHNICAL AREAS

Core Area SOCIETY

ANA MARÍA LÓPEZ SALA

REMEDIOS ZAFRA ALCARAZ

Core Area LIFE

TERESA SUÁREZ GONZÁLEZ

ESTHER GARCÉS PIERES

Mª ÁNGELES DEL POZO BAYÓN

Core Area MATERIA

NURIA CAMPILLO MARTÍN

ASCENSIÓN DEL OLMO OROZCO

SOLEDAD FARALDOS IZQUIERDO

CSIC-LINKED STAFF COMMITTEES

PENÉLOPE GONZÁLEZ SAMPÉRIZ

FELIPE CRIADO BOADO

TERESA VALDÉS-SOLÍS IGLESIAS

JOSÉ Mª CALLEJA ROVIRA *[until 18/10/2022]*

COMMITTEE SECRETARY
(non-member)

MARÍA CUESTA RUÍZ

2022. Renewal of the Women and Science Committee members, outgoing members:
Rosa Menéndez López, Francisca Puertas Maroto and Jose Mª Calleja Rovira.

CSIC INSTITUTIONAL REPRESENTATION IN THE AUTONOMOUS REGIONS OF SPAIN AND THE EUROPEAN UNION

ANDALUCÍA
MARGARITA ISABEL PANEQUE SOSA

ARAGÓN
MARÍA JESÚS LÁZARO ELORRI

CANARIAS
MANUEL JULIO NOGALES HIDALGO

CANTABRIA
CELSO MARTÍNEZ RIVERO

CASTILLA-LA MANCHA
RAFAEL MATEO SORIA

CASTILLA Y LEÓN
MAR SILES LUCAS

CATALUÑA
LUIS CALVO CALVO

COMUNIDAD DE MADRID
MARINA VILLEGAS GRACIA

COMUNITAT VALENCIANA
JUAN FUSTER VERDÚ

GALICIA
JAVIER REY CAMPOS

ILLES BALEARS
ANA Mª TRAVESET VILAGINES

LA RIOJA
JOSÉ MIGUEL MARTÍNEZ ZAPATER

PAÍS VASCO
FRANCISCO JAVIER AIZPURUA IRIAZABAL

PRINCIPADO DE ASTURIAS
MARÍA FERNÁNDEZ GARCÍA

REGIÓN DE MURCIA
CARLOS JAVIER GARCÍA IZQUIERDO

CSIC INSTITUTIONAL DELEGATION TO THE EUROPEAN UNION
ELENA DOMÍNGUEZ CAÑAS

STRUCTURE OF THE SCIENTIFIC-TECHNICAL AREAS

AREA COORDINATORS

SOCIETY
LIFE
MATERIA

ELENA CASTRO MARTÍNEZ
Coordinator

IGNACIO MONTERO RUIZ
Deputy Coordinator

SOCIETY
LIFE
MATERIA

Mª ISABEL MEDINA MÉNDEZ
Coordinator

BLAS VALERO GARCÉS
Deputy Coordinator

ÁNGEL RUIZ MANTECÓN
Deputy Coordinator

JORDI PÉREZ TUR
Deputy Coordinator

SOCIETY
LIFE
MATERIA

MARÍA SOLEDAD MARTÍN GONZÁLEZ
Coordinator

FRANCISCO JAVIER GARCÍA LABIANO
Deputy Coordinator

AREA COMMITTEES

FORMED BY
7
MEMBERS

FORMED BY
20
MEMBERS

FORMED BY
7
MEMBERS

2

RESEARCH AND RESEARCH-SUPPORT STRUCTURES

02 RESEARCH AND RESEARCH-SUPPORT STRUCTURES

The CSIC State Agency is an institution with the status of a Public Research Organisation pertaining to the General State Administration, with a sole legal status. It pursues its mission through a multiplicity of organisational structures that lack their own legal status, classified according to the following typology:

2.1 RESEARCH STRUCTURES

The CSIC's scientific activity is carried out within **two** research structures:

RESEARCH INSTITUTES

They form the core structure around which the CSIC is organised and in which the research staff carry out their activity. They cover all scientific disciplines and are linked to the scientific-technical areas according to their subject matter.

They are organised internally into research groups, departments and other units that may be approved.

Depending on their ownership, they are classified *as CSIC-owned, joint* (ownership shared with other institutions) or associated (with independent legal status).

NATIONAL CENTRES

These are research centres and technical services providing reference and support for certain government policies and, in this capacity, exercise the functions and "service obligations" established by sectoral regulations and by the CSIC's Governing Board.

They are organised internally into research groups, departments, territorial headquarters and other units that may be approved, and may comprise thematically related research institutes and specialised technical units.

The incorporation into the CSIC structure, in 2021, of INIA, IEO and IGME, with the status of national centres (NCs), has been a challenge for the CSIC and for the NCs themselves, which are jointly facing a highly complex process. Notwithstanding, this has progressed at a good pace towards structural, governance, scientific and managerial integration. **Main milestones in the incorporation process achieved in 2022:**

- Adaptation of the research structure of the NCs to the research structure defined by departments and research groups. Consequently, the CSIC has 19 new departments and 106 new research groups.
- Governance of the National Centres.
  - Creation of a Scientific Faculty.
  - Creation of the IGME and INIA Board as a new collegiate internal coordination body to undertake the centre's management.
- Implementation of improvements in management by adopting the CSIC's internal management tools, including the labour pool.

- Impr

  - Promotion of projects for the construction, reform and modernisation of NC facilities.
  - Transfer of the territorial unit of the IGME in Zaragoza to the Aula Dei campus of the CSIC.

- Scientific integration.

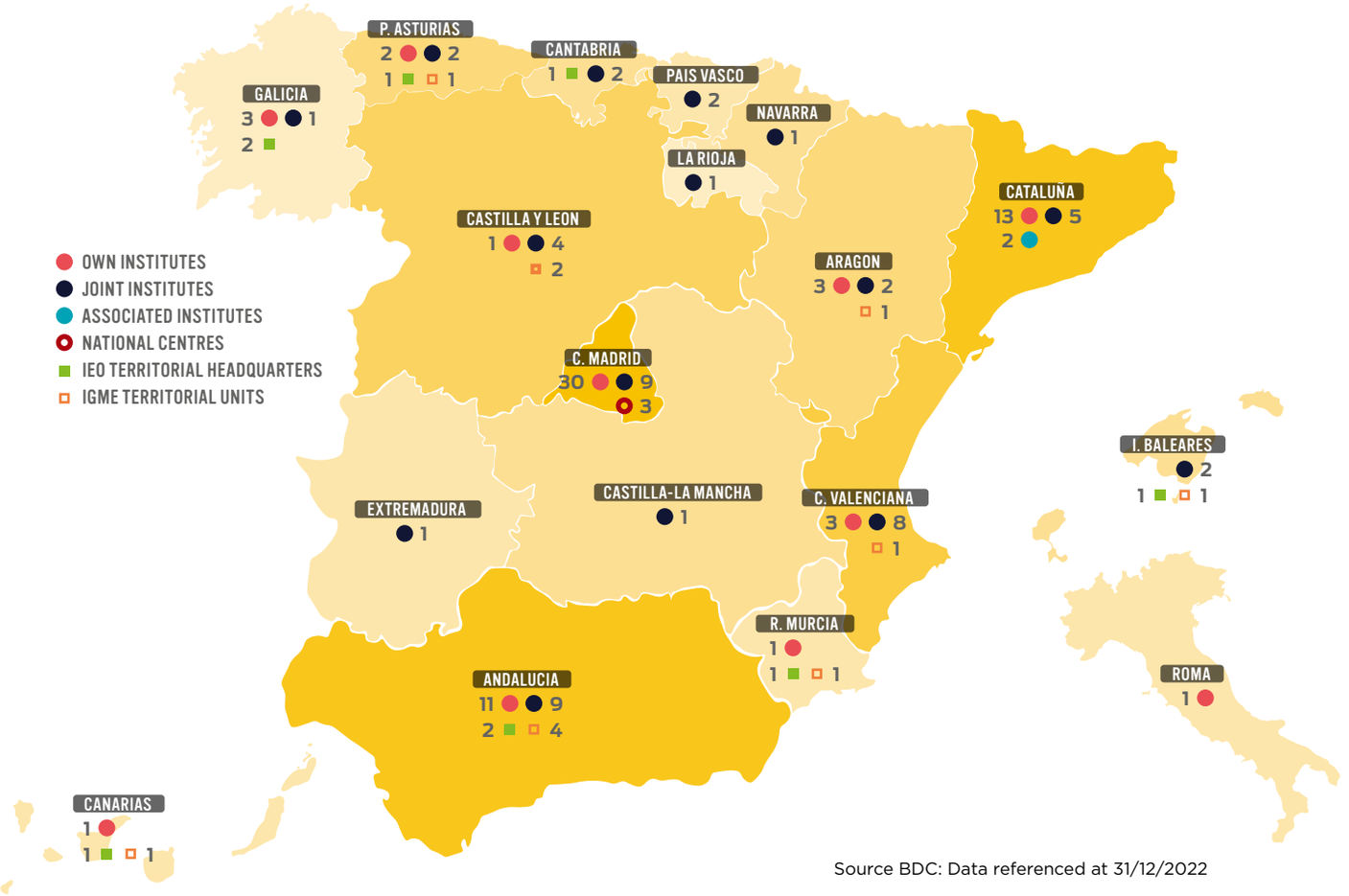
  - Participation of NC research staff in scientific collaboration instruments: *Connexiones* (Archaeology) and Interdisciplinary Thematic Platforms (*PTI*): OCEANS+, TELEDETECT, Agriambio and Horizonte Verde.
  - IGME and IEO meetings with institutes specialised in geosciences in order to share research lines and create synergies.

- Transfer from National Centres

  - The CSIC's research results transfer activity has increased significantly by including the activities performed by the NCs as research centres and technical reference and support services for government policies. In 2022, around 8,000 reports were issued, mainly for the MITECO (Spanish Ministry of Ecological Transition and Demographic Challenge) and the MAPA (Ministry for Agriculture, Fisheries and Food).

121 RESEARCH INSTITUTES
2 ASSOCIATED
69 OWN
50 JOINT

3 NATIONAL CENTRES
INIA
IGME 12 TU
IEO 9 TH



Source BDC: Data referenced at 31/12/2022

RESEARCH SUPPORT STRUCTURES

These are the organisational elements of the CSIC whose mission is to assist and provide the services entrusted to the different research structures, and also to each other.

CSIC INSTITUTIONAL DELEGATIONS

These are the decentralised structures of the CSIC, reporting to the Vice-Presidency for Institutional Affairs and Organisation, which act as **territorial support and coordination offices** for the institutes, national centres and other units located in their territorial area.

The CSIC has institutional delegations in Andalucía, Aragón, Asturias, Castilla y León, Cataluña, Canarias, Galicia, Madrid and Valencia. It also has a Delegation in Brussels, which reports to the Vice-Presidency for International Affairs. The delegations assist the institutional delegate who leads them and, where appropriate, also the delegates of the regions lacking their own delegation.

Regarding its **role of promoting scientific culture innovation, knowledge transfer, and the visibility of the CSIC**, it is committed to making the knowledge generated by its research staff available to society and the productive sector countrywide. This is done through events such as conferences, exhibitions, lectures, seminars and workshops, organised in coordination with the Deputy Vice-Presidency for Knowledge Transfer and Scientific Culture and Citizen Science.

In relation to **delegation-linked infrastructures**, mention should be made of the residences for researchers, which provide accommodation to the scientific community for temporary research stays and serve as a location for the organisation of activities to promote outreach.

SPECIALISED TECHNICAL UNITS

Their function is to **provide specialised and/or transversal services** of a technical or technological nature to the research structures and, where appropriate, they are also responsible for providing services to the State. They may carry out research activities on a complementary basis.

SERVICE INTEGRATION CENTRES

These are structures set up to serve two or more CSIC institutes or structures. Their purpose is to **unify the management and administration** of common administrative and general services and of the technical services determined in each case. They also undertake the internal **coordination** with the institutes and structures to which they provides services.

Researchers' Residence and Library in Sevilla.

10 INSTITUTIONAL DELEGATIONS

ANDALUCIA
ARAGON
ASTURIAS
CASTILLA Y LEON
CATALUÑA
CANARIAS
GALICIA
MADRID
VALENCIA
BRUSSELS

9 SERVICE INTEGRATION CENTRES

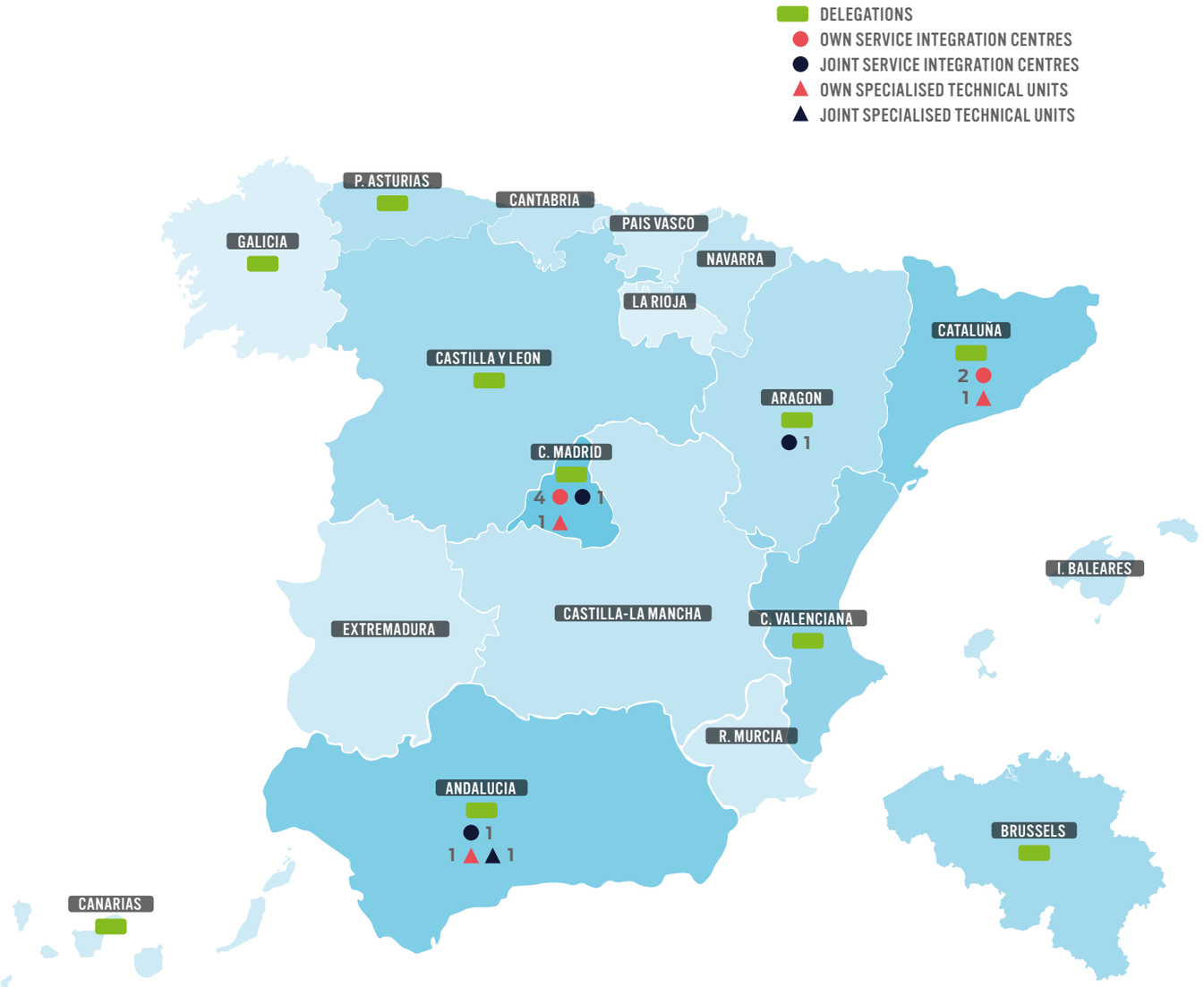
3 JOINT
CICCARTUJA
CEQMA
CFTMAT

6 OWN
CID
CMIMA
CCHS
CFMAC
CI2A
CENQUIOR

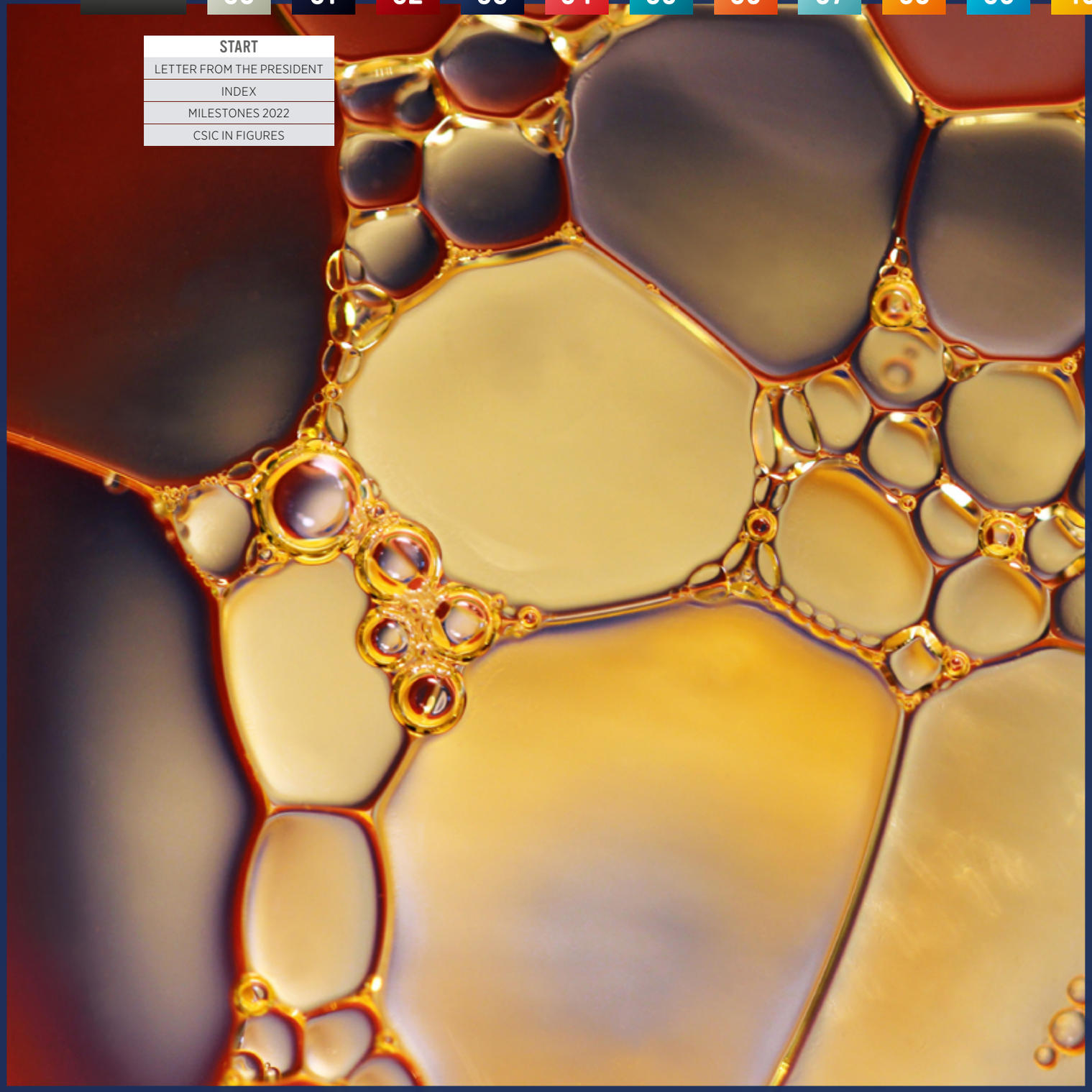
4 SPECIALISED TECHNICAL UNITS

1 JOINT
CNA

3 OWN
UTM
CRF
REBIS



Source BDC: Data referenced at 31/12/2022



3

SCIENTIFIC AND TECHNICAL ACTIVITY

3.1 SCIENTIFIC-TECHNICAL AREAS

CORE AREA SOCIETY (CAS)

The scientific activity pursued by CAS focuses on studying how people have organised and currently organise their social, political and economic relations and their individual and collective behaviour when faced with day-to-day realities. To do so, innovative theoretical and empirical approaches are adopted, which are increasingly multidisciplinary and international.

CORE AREA LIFE (CAL)

An integrated vision of research in life sciences makes it possible to establish priority areas and design new cross-cutting strategies for action in important areas such as sustainable development, climate change, precision and personalised medicine, food of the future and healthy ageing. These tasks are undertaken bearing in mind that this activity converges and complements that carried out in the core areas of Society and Materia.

Core Area Life encompasses the following sub-areas:

- Biology and Biomedicine
- Natural Resources
- Agricultural Sciences
- Food Science and Technology

CORE AREA MATERIA (CAM)

CAM is concerned with scientific and technological development, generating basic and applied knowledge stemming from chemistry, physics and mathematics. This knowledge makes it possible to tackle new scientific challenges at a global level and to promote sustainable development in diverse fields such as biology, medicine, energy, nanotechnology and environment.

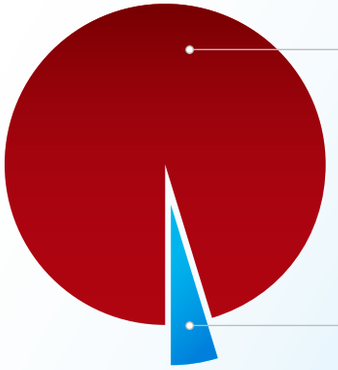
Core Area Materia encompasses the following sub-areas:

- Materials Science and Technology
- Physical Science and Technologies
- Chemical Science and Technologies

CORE AREA SOCIETY | DATA 2022

STAFF

RESEARCHER	336	W 138 / M 198
RESEARCHER IN TRAINING (pre-doctoral)	62	W 35 / M 27
TECHNICIAN/ SUPPORT	196	W 109 / M 87
MANAGEMENT / ADMIN / SERVICES	70	W 46 / M 24



NATIONAL PROJECTS AND ACTIONS

	No.	TOTAL FUNDING
IN FORCE*	253	14,481,420.22 €
APPROVED	81	4,002,210.24 €
COMPLETED	266	49,326,888.46 €

INTERNATIONAL PROJECTS
(EU PM, EU non-PM and INTERN)

	No.	TOTAL FUNDING
IN FORCE*	45	25,512,382 €
APPROVED	15	1,945,196 €
COMPLETED	18	3,202,294 €

* Data including the number of approved and completed projects.

KNOWLEDGE TRANSFER

1
TRADEMARKS

2
MUSICAL OR
AUDIOVISUAL WORKS

SCIENTIFIC PRODUCTION

531
INDEXED ARTICLES

125
NON-INDEXED ARTICLES

322
BOOK CHAPTERS

88
BOOKS

49
PhD THESES

AWARDS

SEE
ANNEX

The ... d by the Core Area Soci... nging and has **largely progressed towards multi- and inter-disciplinary studies**, both between groups from different institutes in the area, and in collaboration with other areas. CAS addresses socially relevant problems such as health, energy, information, artificial intelligence, sustainability, environment, agri-food, cultural heritage, etc., incorporating the human and social perspectives of the corresponding challenges.

MILESTONES 2022

- Celebration of the anniversary of two institutes:
  - The **EEA**, located in Granada, celebrated its 90th anniversary. Founded on 27 January 1932 with the mission to "promote and protect Arabic studies in Spain", it was launched in November that same year. To commemorate this anniversary, a programme of activities was organised throughout 2022, which can be consulted on the EEA website.

Authorities seated at the ceremony commemorating the 90th anniversary of the EEA (School of Arabic Studies).

  - The **IPP** celebrated its 15th anniversary as a benchmark institute in research on public policy and its impacts. This commemoration event was held at the CSIC's central campus in Madrid and featured three round table events discussing its history and evolution.

- Occupation and start-up of the new **INCIPIT** headquarters in Santiago de Compostela. The facility covers 2,600 m^2, half of which is dedicated to scientific-technical facilities and rooms for processing material and information. It includes the construction of the first archaeology observatory.

- Organisation of the conference entitled: **"Dimensión social y de género de la salud, la enfermedad y el dolor"**, (Social and gender dimension of health, illness and pain) at the **IESA**, within the framework of a project on the social legitimacy of pain, exploring a key element of its social dimension (Ref. RTI2018 - 099485 - B - 100). They received support from the State Research Agency, the AAS (Sociology Association of Andalucía) and the AMIT (Association of Women Researchers and Technologists), and the collaboration of other associations.

- Organisation of workshops by **IAE** research staff in collaboration with other academic institutions, including two international conferences in collaboration with the Universidad Autónoma de Barcelona (UAB) and the Barcelona School of Economics: *'25th conference of the Coalition Theory Network'*, 20-21 May 2022 and *'BSE Summer Forum Workshop in Migration'*, 13-14 June 2022 (CREI, IAE, UPF and UAB).

- The **IPP** project *'AUTODEMO. The stealth side of participatory democracy: process preferences towards automated decision-making'* presented by José Luis Fernández Martínez was one of the 15 proposals selected by the Social Observatory of la Caixa (SR21-00329). The project involves an interdisciplinary team of 6 researchers from the CSIC of the IESA, IPP and IIIA and the Universidad de Barcelona. Its main objective is to analyse citizens' preferences towards different collective decision-making processes. A novelty is the analysis of attitudes and opinions towards an emerging actor: Artificial Intelligence. Also, the ENCAGEn-CM R&D Activities Programme, coordinated by Gloria Fernández-Mayoralas from the **IEGD**, held the final results transfer seminar on 23 and 24 November on active ageing, quality of life and gender, which pursues the analysis of age and gender discrimination. The event, open to the public and free of charge, marked the end of the project, which began in 2016, and aimed to present the results obtained by its research, as well as to promote debate and outreach on active ageing and ageism, addressed from a gender perspective. On 24 November at 12 noon, the RNE radio programme *'Juntos paso a paso'*, dedicated to older people, was recorded live.

- Presentation in Murcia of the new CSIC R&D Associated Unit known as BESO, addressing Biolaw, Ethics, Health and Organisations, made up of research staff from CEBES of the Universidad de Murcia. This unit is associated with the CSIC through the **IFS**.

- A stu[illegible]together with the Universit[illegible]nd the Università degli studi di Urbino Carlo Bò, based on data from the African continent between 1990 and 2016, concludes that climate change influences the likelihood and duration of armed conflicts in Africa. These results, which have been widely reported in the press, were published in the journal **Economía Política**.

- Consolidation of the IMF's Open Access digital platform **'Traditional Music Holdings'**, which stores more than 20,000 melodies copied on paper and collected between 1944 and 1960 from all over Spain. Most of them were compiled through the 65 Folklore Missions and 62 notebooks submitted to Competitions organised by the Folklore Section of the CSIC's former Spanish Institute of Musicology, in which 47 compilers participated. The platforms 'Fondo de Música Tradicional IMF-CSIC' and ***Libros de Polifonía Hispánica IMF-CSIC*** are leading educational and musicological research resources for the dissemination of Spain's rich musical heritage.

The IMF Traditional Music Holding and the group El Portal de Carmen on the radio programme 'La riproposta', Radio Clásica.

- The **IMF** organised the second edition of the course entitled: 'Archivos para la Historia I: claves para no perderse en el Archivo Apostólico Vaticano y en el Archivo de la Corona de Aragón' (Archives for History I: keys to not getting lost in the Vatican Apostolic Archive and the Archive of the Crown of Aragon). The course covers the historical development of these institutions and focuses on the study of the documentation they possess and its typology. It takes a practical approach, emphasising the resources available to researchers interested in these archives, given the difficulty of working with them without prior training.

- The **EEA**, the **EEHAR** and Universidad Complutense de Madrid organised the International Congress *'Early Medieval Monasteries in Western Europe. Individual Approaches for a Common Methodological Vision'*, held in Rome. It gathered together recent archaeological studies on monastic sites in Spain, Italy, France, England, Ireland and Central Europe, with the aim of reflecting on the methodologies applied, their interpretation and the strategies for future knowledge.

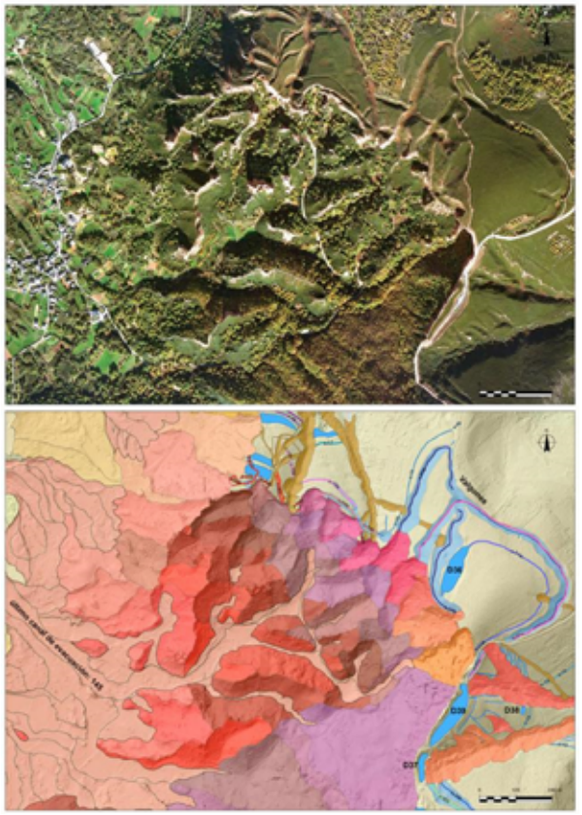
- To mark the anniversary on which the first 18 circumnavigators of our planet returned (6 September 1522), the Spanish Secretary of State for Trade of the Ministry of Industry, Trade and Tourism published the monograph **Imperios, hegemonías y comercio. 500 años de la primera vuelta al mundo** (Empires, hegemonies and trade. 500 years since the first round-the-world voyage) in the journal *Revista de Economía ICE*, coordinated by Alfredo Alvar Ezquerra of the **IH** and Jorge Alvar Villegas (commerce technician and state economist). To commemorate this centenary, the monographic issue deals with various topics, such as how to navigate in unknown territory, what they traded with, how they managed to understand each other without speaking the same language, and even how transoceanic trade developed.

- Researcher Manuel Lucena Giraldo from **IH** has been appointed director of the Chair of Spanish and Hispanic Heritage Studies of the universities of Madrid. The Chair aims to promote the efforts of the university and research organisation of the Comunidad de Madrid regarding Spanish as a global language and Spanish cultural diversity. The Chair, which will run a programme of academic and dissemination activities, depends on the Fundación Madrimasd.

- Leonor Peña-Chocarro, from the **IH**, obtained an ERC Advance Grant with the project entitled: *'Medieval Appetites: food plants in multicultural Iberia'* (500-1100 CE) (MEDAPP), whose main objective is to study plant resources in medieval times in the Iberian Peninsula. A multidisciplinary team made up of archaeobotanists, historians, philologists, archaeologists, agronomists and geneticists will study, among other locations, the granary caves distributed throughout the eastern half of the Iberian Peninsula, where botanical remains are exceptionally well preserved. The final aim is to understand the impact of the political, economic and social system imposed by the Arab conquest on agriculture, as well as on the eating habits and culinary practices of the medieval communities of the Iberian Peninsula.

- Research staff from **ILC** obtained funding from the MICIN (Spanish Ministry for Science and Innovation) call for proposals *'Proyectos de Transición Ecológica y Transición Digital'* on ecological and digital transition within the framework of the Recovery, Transformation and Resilience Plan (Spanish acronym PRTR), to run the Digital Humanities projects: *'Diccionario Digital de Griego Antiguo'*, *'Deciphering Qur'anic Dynamics in Spain'* and *'Digitalización, descripción y puesta en línea de la colección de manuscritos griegos de El Escorial'* (Digitising, describing and putting online the Greek manuscript collection at El Escorial).

- Resea[illegible]d the most comprehensive c[illegible] network of the site at Las Médulas. Working in collaboration with the Junta de Castilla y León the project prepared the groundwork for a redefinition of Las Médulas, site of cultural heritage, as a cultural landscape representative of other areas of the Roman world. The project has reconstructed 781 km of the hydraulic network of Las Médulas and reveals, for the first time, the detailed phases through which the three sectors of the mine passed.



Aerial photo of the main sector of the Roman gold mine located at Las Médulas and interpretation (by means of ArcMap 10.8, by IH-CSIC) of its immediate hydraulic network, the exploitation of the gold-bearing material and the evacuation channels.

- A study in which research staff from **IH** and the Universidad de Burgos have participated has demonstrated that the document considered previously to be the oldest of those held in the Archivo Histórico de la Nobleza is in fact a forgery from the 12th century, and not from the year 943, as its date indicates. The document – known as *OSUNA, CP.37, D.9* - is a parchment written in round Visigothic script. It records a donation to the monastery of San Pedro de Cardeña. However, its value lies not in the anecdotal fact of whether or not it is the oldest document in the archive, but in showing how technical skills and moral and religious authority combined in this case to construct a credible truth, capable of prevailing in a judicial setting.

Document OSUNA CP.37, D.9 forged in the 12th century by the monks of San Pedro de Cardeña monastery.

CAS TRANSFER ACTIVITIES

- Almost 900 people, including the general public and schoolchildren, enjoyed yet another year of **scientific outreach** by CSIC research staff in the area of human and social sciences. The **CCHS** participated in organising 20 activities, 65% of which took place in emblematic places such as the Museo Naval (Naval Museum), Real Jardín Botánico (Royal Botanical Garden) and the Archaeological Park of Segóbriga, among others.

- Restoration of the Bastion of Alhambra's Arrabal Gate, promoted by the Patronato de la Alhambra y Generalife was awarded to the **EEA** technical team, coordinated by Antonio Orihuela Uzal, undertaking both project management and archaeological intervention. This is one of the six bastions that the Catholic Monarchs ordered to be built in 1492 in order to guarantee the defence of the gates and other strategic points through the use of artillery. It is an important and innovative element in the defensive architecture marking the transition from the Middle Ages to the Modern period.

- Parti ff in the exhibition entitled *acuático al alcance de todos'* (Underwater Cultural Heritage within everyone's reach) at the Museo de América. It provided an in-depth approach to maritime and underwater archaeology, comprising a photographic exhibition, a detailed model of a galleon designed for the occasion and multiple research instruments (the skeleton of a ship's structure, historical documents, diving equipment, and various excavation tools). The event afforded a good opportunity to raise awareness among the general public and, above all, among the younger generations, of the importance of safeguarding and protecting our historical and archaeological heritage related to human-ocean interactions.

Arnau Cazanave de la Roche (IH) explaining the history of the Mortella III wreck (France) to first year high-school students (Nuestra Señora de la Merced, Madrid).

- Participation of the research staff of **IH** and the Universidad de Salamanca in the design and contents of the travelling exhibition *'Cuando la diplomacia científica de Estados Unidos llegó a España'* (When US scientific diplomacy came to Spain), which shows how scientific and technical assistance from the United States was a fundamental support for accessing channels for spreading knowledge and training human resources, for modernising its R&D system and for joining specialised international organisations. In coordination with the exhibition, the conference *'Diplomacia científica en España entre 1959 y 1986 en el contexto de la Guerra Fría'* (Scientific diplomacy in Spain between 1959 and 1986 in the context of the Cold War), organised by **INGENIO** researcher Oscar J. Martín, was held in Valencia.

- Inclusion of the educational project *'Ponte nas Ondas!'* in the UNESCO list of best practices in Intangible Cultural Heritage. **INCIPIT** participates in this radio programme, which gives a voice to 200 schools in Galicia and Portugal, using Intangible Cultural Heritage as a tool for heritage education, understanding and intercultural dialogue.

- Pilar García Mouton of **ILLA** continued her collaboration with the linguistic section, *'Palabras moribundas'* (Dying words), on the RNE radio programme *'No es un día cualquiera'*. This section rediscovered terms that may have been forgotten, are no longer in use or are barely known in some places.

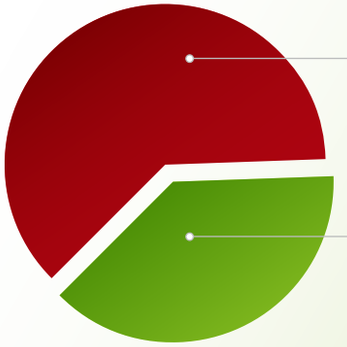
- The project entitled *'Nueva Economía de la Lengua'* (New Language Economy) was approved under PERTE (strategic projects for economic recovery and transformation). This project aims to mobilise public and private investment to maximise the value of Spanish and the co-official languages in the process of digital transformation worldwide. The project's advisory board will be formed by 36 well-known people from institutions related to language promotion and representatives of culture, the performing arts, the audiovisual world, science and technology, including **ILLA** researcher Esther Hernández.

- Elea Giménez Toledo of **IFS**, coordinator of the Interdisciplinary Thematic Platform PTI-ESCIENCIA. CSIC.ES, has coordinated the preparation of the Regional Technical Report for the visibility of Ibero-American science. The work was promoted by the Ibero-American General Secretariat and presented at the Meeting of the Ibero-American Knowledge Space, in the framework of the 5th Meeting of Ministers and High Authorities of Science, Technology and Innovation of Ibero-America, which took place in Santiago de Compostela. The Commissioner of the PERTE *Nueva Economía de la Lengua del Gobierno Español* (Ministry for Economy) participated in the meeting, supporting the work and results of the group.

CORE AREA LIFE | DATA 2022

STAFF

RESEARCHER	2,502	W 1,049	M 1,453	
RESEARCHER IN TRAINING (pre-doctoral)	827	W 486	M 341	
TECHNICIAN/ SUPPORT	4,418	W 2,632	M 1,786	
MANAGEMENT / ADMIN / SERVICES	727	W 398	M 329	



64 RESEARCH INSTITUTES
1 PARTNER
33 OWN
30 JOINT
1,045 RESEARCH GROUPS

NATIONAL PROJECTS AND ACTIONS

	No.	TOTAL FUNDING
IN FORCE*	2,712	458,488,276.23 €
APPROVED	1,094	152,305,165.65 €
COMPLETED	197	16,094,821.95 €

INTERNATIONAL PROJECTS
(EU PM, EU non-PM and INTERN)

	No.	TOTAL FUNDING
IN FORCE*	439	182,351,860 €
APPROVED	95	47,439,265 €
COMPLETED	132	40,238,258 €

* Data including the number of approved and completed projects.

KNOWLEDGE TRANSFER

1 TRADEMARKS	**3** UTILITY MODEL	**12** BIOLOGICAL MATERIAL	**1** SOFTWARE	**11** PLANT VARIETIES
1 BUSINESS SECRET	**68** PATENT APPLICATIONS (PRIORITY)	**44** PCT INTERNATIONAL PATENTS (NON-PRIORITY)	**52** OUT-LICENCING CONTRACTS	**71** NUMBER OF LICENSED OBJECTS
	3 TBCs OR SPIN OFFs	**4** MUSICAL OR AUDIOVISUAL WORKS	**3** DATABASES	

SCIENTIFIC PRODUCTION

8,715 INDEXED ARTICLES

536 BOOK CHAPTERS

426 PhD THESES

321 NON-INDEXED ARTICLES

92 BOOKS

+8,500 REPORTS NATIONAL CENTRES INIA, IEO AND IGME

ABOUT 8,000 REPORTS AS TECHNICAL REFERENCE SERVICES AND GOVERNMENT POLICY SUPPORT

AWARDS

SEE ANNEX

The C[illegible]he largest national research [illegible]mbining capacities and strengths that make it internationally unique. Its comprehensive structure allows it to address important issues such as **sustainable development, climate change, precision and personalised medicine, food of the future and healthy ageing**.

Throughout 2022, work has been done to consolidate an **integrated vision and approach to research**. To achieve this mission a concerted effort has been made by the Interdisciplinary Thematic Platforms *(PTI)* and the cross-cutting strategies hub *Conexiones CSIC* (CSIC-HUBs) addressing the fields of Life, Cancer and Nanomedicine.

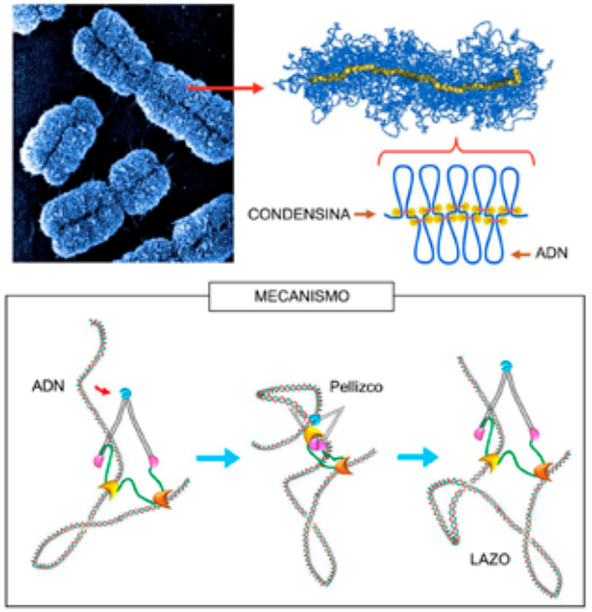
MILESTONES 2022

BIOLOGY AND BIOMEDICINE

In relation to outstanding scientific findings published in high-impact journals, research in the areas of cancer, infectious diseases, structural biology, genomics or neurosciences demonstrate the CSIC's unique capabilities and potential in basic, applied and clinical biomedical research. Four research areas in Biology and Biomedicine in 2022 are highlighted below.

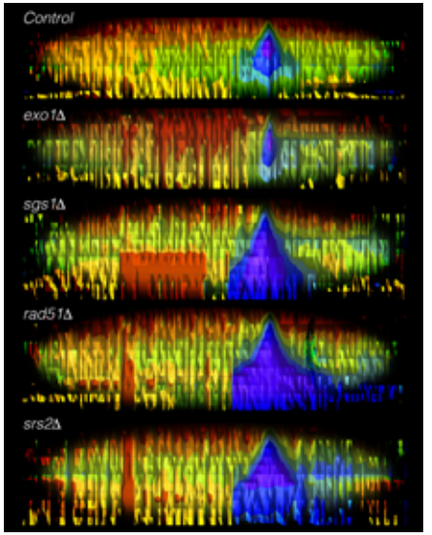
Gene expression regulation, biotechnology and structural biology

- To form chromosomes, DNA is folded into thousands of loops by multi-protein SMC (structural maintenance of chromosomes) complexes that have the ability to bind to any point on the DNA to extrude a DNA loop from that point. **IBMB** researchers have revealed that condensin contributes to loop extrusion by interacting with the DNA via three binding sites: one of them anchors one end of the loop, while the others make the loop grow by repeatedly moving towards and away from each other to pinch the DNA. Each pinch can span tens or hundreds of DNA base pairs. This mechanism of DNA extrusion has been evolutionarily conserved (*The EMBO Journal, 42*, e111913, 2022).



In chromosomes, DNA (blue) is arranged in folded loops, which are formed by the activity of condensins (yellow). In this mechanism, the condensin binds to the DNA at three points, pinching it to progressively extrude a DNA loop.

- **CABIMER** researchers have published a study showing that the HMG20A protein forms a complex with the PHF14 protein via a coiled-coil structural motif. This complex regulates processes such as migration and invasion in the metastatic breast cancer line MDA-MB-231. Their results indicate that these proteins control gene expression mediated by the Hippo and TGFbeta signalling pathways (*Nucleic Acid Res, 50(17):9838-9857*, 2022). At the **IBFG**, researchers have studied DNA double-strand break repair by homologous recombination as an essential aspect of maintaining genome integrity. They have applied massive sequencing techniques to quantitatively measure the dynamics of resection, repolymerisation and gene conversion during double-strand break repair *in vivo* and identify the specific role played by the proteins Exo1, Sgs1, Rad51 and Srs2 in the different stages of the repair process (*Cell Reports, 38(2)*:110201, 2022).



Quantitative analysis and direct genome-wide visualisation of DNA repair by homologous recombination.

Molecula… micro-or…

- Antimicrobial resistance (AMR) in bacteria is a serious threat to public health and is caused by conjugative plasmid transfer. Research led by **CNB** scientists has studied in depth the factors driving plasmid-mediated AMR evolution *in vivo* in a large collection of enterobacterial clones, isolated from the gut of hospitalised patients. Combining genomic and experimental approaches, they have characterised plasmid diversity and plasmid mutation effects. Subsequently, using state-of-the-art genomic editing in wild-type multidrug-resistant enterobacteria, they dissected three cases of plasmid-mediated AMR evolution within the same patient. This study highlights the necessity to develop new evolutionary-based approaches to address the spread of plasmid-mediated AMR (*Nature Ecology & Evolution, 6*: 1980-1991, 2022).

- **I2SysBio** researchers have developed PaintOmics 4, a web server for integrative analysis and visualisation of multi-omics datasets using biological pathway maps. PaintOmics 4 features several notable updates that improve and extend previous analyses (*Nucleic Acids Research, 50*: W551-W559, 2022).

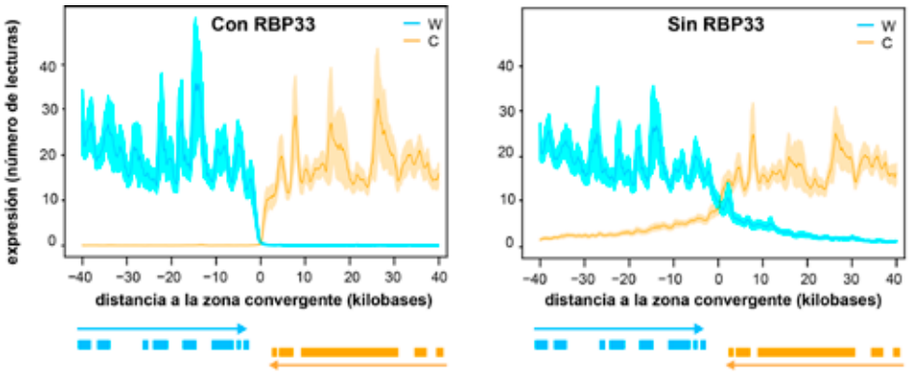
- A study led by **IBV** researchers has shed light on the molecular basis of an arbitrium communication system used by bacteriophages (bacterial viruses) to decide their life cycle after infection, opening up the prospect of communication between different viral species. This work represents an important step towards the manipulation and use of these elements in the control of pathogenic or antibiotic-resistant bacteria (*Nat Commun, 13(1)*: 3627, 2022).

- Research undertaken by the **IPBLN** has characterised the function of an RNA-binding protein called RBP33 in *Trypanosoma brucei*. Silencing RBP33 expression leads to significant changes in the expression of almost half of the parasite's genes, with an increase in non-productive and antisense RNA molecules (transcripts) from genomic areas that are silenced under physiological conditions. The change in the rate of degradation of these RNAs indicates that RBP33 is responsible for marking them for destruction. This, together with the specificity in trypanosomes and leishmaniasis, make RBP33 a promising target for therapy and an attractive field of study for understanding the evolution of RNA processing in eukaryotes (*Nucleic Acids Research, 50*: 12251-12265, 2022).

Neurosciences, cell and developmental biology

- A study performed at **IN** shows that the neuronal circuits of touch and sight are not independent in the embryo, but intermingled. It is at birth that these circuits separate and responses to sensory stimuli become independent. This work, performed *in vivo* in mice, is the first to show that during embryonic development, a tactile stimulus not only triggered the expected response in the primary somatosensory cortex (one of the areas of the brain that deals with the sense of touch) but also gave rise to a response in the primary visual cortex of both hemispheres (*Science 377 (6608)*: 845-850. 2022).

- **IN** research has identified new regulatory proteins involved in neuronal circuit formation. Multi-omics analysis has recognised several dozen new regulators involved in guiding neuronal axons to reach the neurons they need to connect with, a key process during the development of the nervous system for the formation of neural circuits or networks (*Adv Sci 9(29)*: 2200615. 2022).



Genes are organised in polycistronic units in trypanosomes. Under physiological conditions ("with RBP33", left) no transcripts are detected from regions where two units "collide" (convergent zones). However, on silencing RBP33 expression (right) these transcripts are detected, significantly increasing the expression of antisense RNAs. W, Watson strand; C, Crick strand.

- The A -mutated) protein is an impo NA damage response pathway. Loss-of-function variants of ATM are associated with a two-fold increased risk of breast cancer. **IBGM** researchers have identified and classified spliceogenic ATM variants detected in subjects from the BRIDGES large-scale sequencing project. A total of 381 variants were identified at intron-exon boundaries, 128 of which were predicted to be spliceogenic. Following various analyses, researchers have developed an analysis and classification system that integrates ATM minigene data to help classify variants in this gene as a likely pathogen (*J Pathol; 258*: 83-101. 2022).

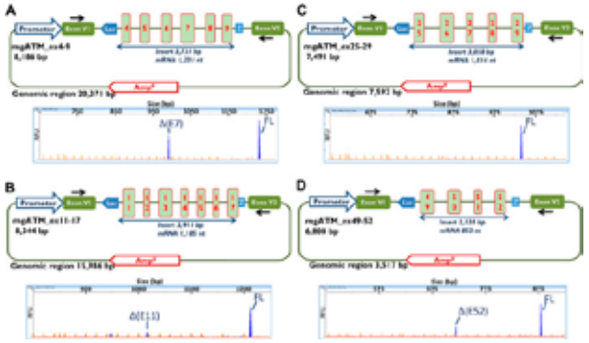
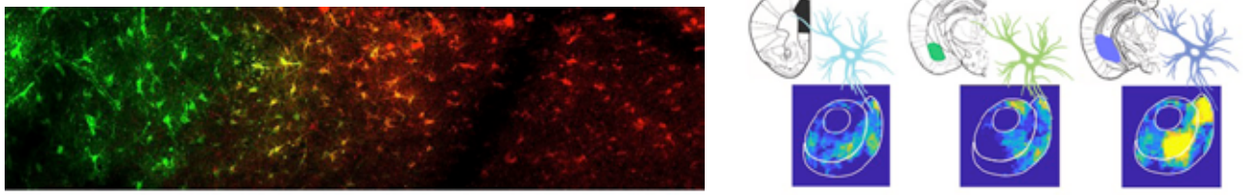


Figure representing the structure of the different ATM minigenes (A-D). The lowers section shows, the electrophoresis of the different transcripts (FL: full size; Δ(E11) or Δ(E52) transcripts without exon 11 or 52, respectively).

- There is increasing recognition of the role of astrocytes in neuronal synaptic communication. However, to date information on how they integrate information is scarce. Researchers at **IC** have identified complete neuron-astrocyte circuits in the *nucleus accumbens* (NAc, a central component of the limbic system), demonstrating that their activity is key to this integration. Furthermore, they have tested for spatial differences in the way astrocytes interact with afferent areas between the main glutamatergic pathways. Taken together, the results reveal a novel map of astrocyte activities in response to major NAc afferents where the astrocyte shows the ability to discern the source of the input and also to integrate glutamatergic signals. These results expand our current understanding of the cellular basis underlying fundamental mechanisms of NAc function, such as those in addiction or mood disorders (*Nat Commun 13*: 5272 2022).

- Cognitive function relies on a balanced interaction between excitatory and inhibitory neurons (INs), but oestradiol impact on IN function is not fully understood. Scientists at **IC** have studied the regulation of hippocampal INs by aromatase (the enzyme responsible for estradiol synthesis) using a combination of molecular, genetic, functional and behavioural tools. Their research results show that CA1 parvalbumin-expressing INs (PV-INs) contribute to brain estradiol synthesis. Brain aromatase regulates synaptic inhibition through a mechanism that involves modification of perineuronal networks involving PV-INs. In the female brain, aromatase modulates the activity of PV-INs, the dynamics of network oscillations and hippocampal-dependent memory. Aromatase regulation of PV-INs and inhibitory synapses is determined by the gonads and is independent of sex chromosomes. These results suggest that PV-INs mediate estrogenic regulation of behaviourally relevant activity (*Nat Commun 13*, 3913 2022).



Activity patterns in response to incoming information to the nucleus accumbens. A coloured marker shows active astrocytes (red) which serves to map the transmission of information in different activity patterns in response to incoming information, proceeding from different brain regions (lower panel, prefrontal cortex (mPFC), Amygdala (Amyg) and ventral hippocampus (vHip)).

Molecula… …ogy of cancer

- A missense change in RRAS2 (Gln^{72} to Leu), analogous to the Gln^{61} to Leu mutation of the RAS oncoproteins, was identified as a long-tailed hotspot mutation in cancer and Noonan syndrome. An **IBMCC** study using an inducible knockin mouse model, has shown that R-$Ras2^{Q72L}$ triggers the rapid development of a broad spectrum of tumours when somatically expressed in adult tissues. These tumours, with limited overlap with those originating from classical Ras oncogenes, can be classified into different subtypes according to therapeutic susceptibility. Importantly, the most relevant R-$Ras2^{Q72L}$-driven tumours are mTORC1-dependent, but independent of phosphatidylinositol 3-kinase, MEK- and Ral guanosine diphosphate (GDP) dissociation stimulator. This pharmacological vulnerability is due to extensive reconfiguration by R-$Ras2^{Q72L}$ of pathways that orthogonally stimulate mTORC1 signalling. These findings demonstrate that R-$Ras2^{Q72L}$ is a bona fide oncogenic driver and reveal therapeutic strategies for cancer and Noonan syndrome patients with RRAS2 mutations. (*Cell Rep; 38(11)*:110522, 2022).

- Other studies into this same gene, RRAS2, by researchers at the **CBMSO** have found that overexpression of RRAS2 promotes the development of B-cell chronic lymphocytic leukaemia (CLL) without requiring oncogenic mutations in 100% of mice. This finding correlates with at least 2-fold overexpression of RRAS2 mRNA in 82% of human CLL samples analysed. The paper highlights that a single nucleotide polymorphism (rs8570) in the 3′ untranslated region of the mRNA is associated with increased RRAS2 expression and worse prognosis. The researchers propose that overexpression of RRAS2 is an early phase in the development of CLL, which is the most frequent leukaemia in humans (*Molecular Cancer, 21*, 35, 2022).

- A study at **IBBTEC** has identified Toll-like receptor 2 (TLR2) as a key regulator of the innate immune response controlling oncogene-induced cellular senescence in early-stage non-small-cell lung cancer. This study demonstrates that TLR2 is active in its pre-invasive stage, where it correlates with improved survival and clinical regression. TLR2 hinders early lung cancer progression through activation of cell cycle arrest pathways and induction of the pro-inflammatory senescence-associated secretory phenotype (SASP). Specifically, TLR2-mediated SASP regulates non-autonomous anti-tumour immune surveillance responses of premalignant cells through recruitment of myeloid cells in early lung tumours. Administration of a TLR2 agonist in preclinical models reduced tumour growth at the onset of tumour genesis, positioning TLR2 as a potential therapeutic target in pre-invasive lung cancer (*Cell Reports 41(6)*:111596, 2022).

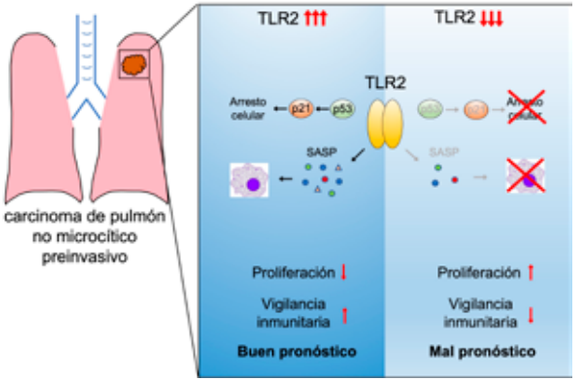
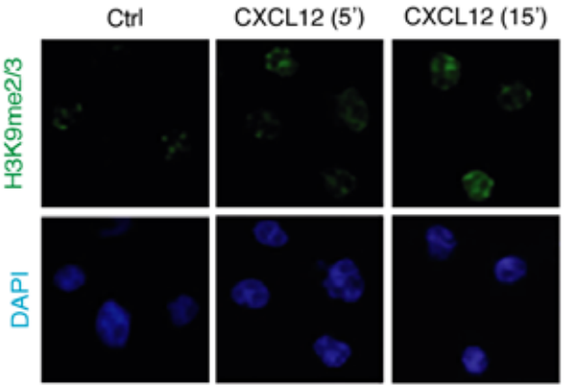


Diagram showing the consequences of Toll-like receptor-2 (TLR2) levels in pre-invasive non-small cell lung carcinoma.

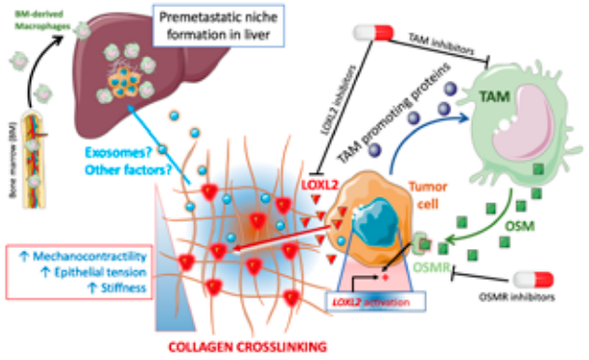
- An **IIBB** study has shown that using ELISA to determine circulating levels of sAXL is an accurate and non-invasive method for the early detection of pancreatic cancer and the discrimination of chronic pancreatitis. This finding may represent a breakthrough in improving the treatment and prognosis of patients with this tumour, which is the third most deadly cancer after lung and colon cancer (*EBioMedicine, 75*, 103797, 2022).

- Scientists at **CIB** have described how T-type acute lymphoblastic leukaemia cells respond to the chemokine CXCL12 by increasing the chromatin levels of H3K9me3. This marker is responsible for regulating the mechanical and functional response of the nucleus, favouring tumour migration and invasion. Their results show how blocking this effect reduces the invasion capacity of leukaemia cells both *in vitro* and in animal models *in vivo* (*Oncogene. 41(9)*:1324 2022).



Acute T leukaemia cells with increased levels of the heterochromatin marker H3K9me3 (green) due to the effect of the chemokine CXCL12.

- The l (LOXL2) contributes to tumo asis in diverse tumour entities. **IIBM** researchers have used pancreatic ductal adenocarcinoma (PDAC) patient datasets, patient-derived xenografts in vivo and in vitro models and genetically engineered mouse models (GEMMS) to reveal the role of LOXL2 in PDAC. They have shown that while *Loxl2* ablation had little effect on primary tumour development and growth, its loss significantly reduced metastasis and increased overall survival. This effect was attributed to non-cell autonomous factors, mainly ECM remodelling. On the other hand, overexpression of Loxl2 favoured the growth of primary and metastatic tumours and reduced overall survival, which could be related to increased EMT and stemness. They have also identified oncostatin M (OSM) secreted by tumour-associated macrophages as an inducer of Loxl2 expression and demonstrated that targeting macrophage *in vivo* affects the expression of *Osm* and *Loxl2* and collagen fibre alignment. These findings have potential use to treat metastatic disease in PDAC (*Gut, 72(2)*:345-359, 2022).



LOXL2 Function in PDAC.

ENVIRONMENT

The year 2022 has witnessed outstanding contributions of the research groups on frontier issues and synergies between biological, geological and human processes in all spheres of the planet. CSIC research has advanced our knowledge of some of the fundamental processes of our planet's evolution, environmental risk assessment and the impacts of climate and global change on continents and oceans, environmental resources and ecosystem services assessment, and the use of new artificial intelligence technologies. Four environmental topics resulting from research in 2022 are highlighted below.

Environmental resources

CSIC research improves policies on environmental protection and geological resource extraction. Research scope covers the Southern Ocean (**IACT**), critical minerals (**IGEO**), soils (**MNCN**, **IGME**), volcanic landscapes (**IRNAS**) as well as biological resources using DNA techniques (**IREC**, **ICM**), Artificial Intelligence (**CIDE**), characterisation of CO_2 storage structures2 (**IGME**) and Deep Learning (**IIM**).

- The combination of non-invasive DNA sampling, together with state-of-the-art quantitative methods (spatial capture-recapture SCR models), has enabled **IREC** to accurately estimate the current population size of the capercaillie, grouse, throughout the Cantabrian mountains (*Science of the Total Environment 821*, 153523, 2022).

- The **IRNAS** biogeochemical study of speleothems from lava tubes of Galapagos (*iScience, 25*, 104556, 2022) has identified environmental and anthropogenic changes (agriculture, human waste and cave visitation) in these unique subterranean resources, which will help in the design of new protection policies.

- At **IGME**, methodologies combining geophysical methods such as seismic sections, gravimetry and passive seismic techniques have been applied to characterise CO_2 geological storage structures. This has resulted in high impact publications and technology transfer contracts. Novel methods have also been proposed for the mapping of Kfs (topsoil saturated hydraulic conductivity) at catchment scale, based on low-cost and rapidly determined auxiliary data.

- The **MNCN** has participated in the first global estimation of hotspots for soil conservation identifying the spots that should have the highest priority for soil nature conservation (the tropics, northern Europe and America, and Asia). The study concludes that most of the soils supporting the highest levels of biodiversity and ecosystem services are inadequately protected globally (*Nature, 610(7933)*, 693-698, 2022).

- CSIC research has provided a better understanding of mineral resource genesis. A team involving **IGEO** has performed modelling of magnetite deposit formation from the crystallisation of an iron-rich magma on the slopes of El Laco volcano (*Nature Communications, 13*, 6114, 2022), while the most detailed mapping - to date- of the seabed of the southern ocean surrounding Antarctica has been done with the collaboration of an **IACT** team (*Nature Scientific Data, 9*, 275, 2022).

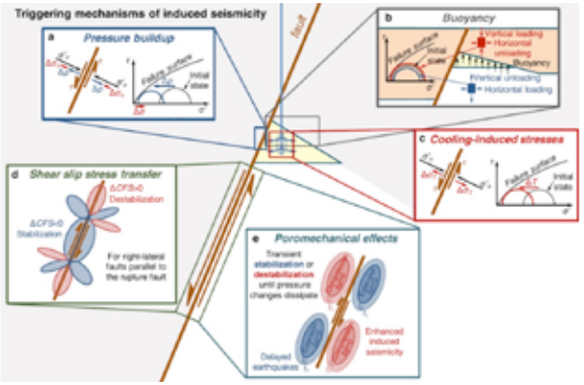
- The main scientific contributions of the activity performed at **CN-IEO** include two publications in the most prestigious multidisciplinary scientific journals: *Science (Seventy years of tunas, billfishes, and sharks as sentinels of global ocean health)* and Nature *(Post-extinction recovery of the Phanerozoic oceans and biodiversity hotspots)*.

Geologic ts

Research in this field is fundamental for the assessment and identification of potential hazards to human health and the environment (**IPNA**, **GEO3BCN**, **IDAEA**, **ICM**), including the effects of pollution on birds (**IREC**), marine (**ICMAN**, **IIM**) and terrestrial environments (**IDAEA**), and sub-terrestrial waters in the context of climate change (**IGME**).

- An **IPNA** team has been involved in the numerical and analytical modelling of the tsunami that followed the huge explosion of the Hunga Tonga-Hunga Ha'apai volcano (*Nature, 609*, 734-740, 2022) and the source mechanisms of these volcanic tsunamis to enable better assessment of the potential hazard of such events.

- Investigations at **IDAEA** and **ICM** have addressed the processes triggering human-induced seismicity caused by the Castor gas storage facility (*Nature communications, 13*, 2022). This research is relevant to tackle various problems associated with energy transition (geothermal, fluid storage, etc.).



Mechanisms triggering induced seismicity at the Castor gas storage facility.

- **GEO3BCN** has led a study dating the phenocrysts in Holocene-age volcanic rocks in the Canary Islands, highlighting the importance of placing magmatic processes in a time frame just before volcanic eruption (*Geology, 50(110)*, 1106-1110, 2022).

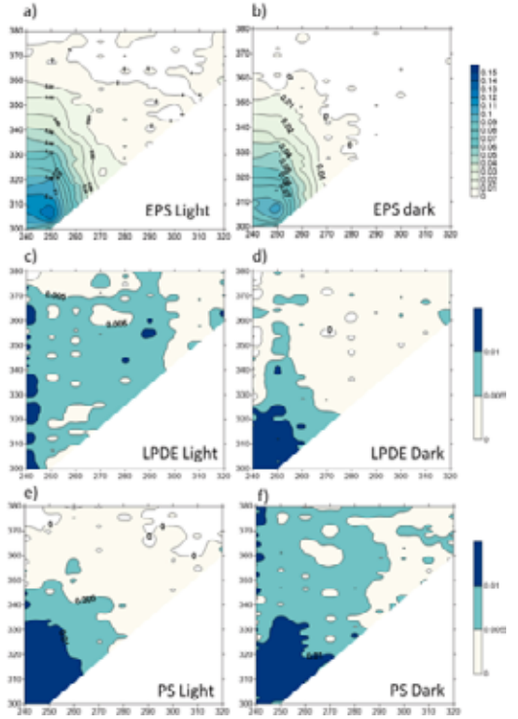
- **GEO3BCN** detected surface waves from two meteorite impacts on Mars using the InSight mission's seismometer by characterising the composition of the volcanic rocks traversed (*Science, 378 (6618) 417-421*, 2022).

- Researchers at **IREC** have shown that exposure levels to fungicides, such as tebuconazole, during the planting season could be sufficient to cause chronic toxic effects on reproduction of the red-legged partridge (*Environmental Pollution 292, Part A*, 118335, 2022).

- An **ICMAN** study has evaluated stress (cortisol levels) in zebrafish (Danio rerio) as a consequence of chemical contamination of habitats and has shown that unpolluted areas can be crucial because of their role as escape zones to alleviate such stress.

- A novel and integrated methodology for a semi-distributed analysis of the impact of climate change on potential future meteorological, hydrological, agronomic and operational droughts in a basin has been proposed at the **IGME**: 'The impact of climate change scenarios on droughts and their propagation in an arid Mediterranean basin. A useful approach for planning adaptation strategies' (*Science of The Total Environment, 820(1)*:153158).

- The **IIM** and **ICM** have analysed the degradation of biodegradable plastics and petroleum-based plastics (*Marine Environmental Research, 176*, 105607, 2022) and found that both leached similar amounts of DOC with similar microbial bioavailability, indicating that they degraded at the same rate in seawater.



Excitation-emission matrices (EEMs) in R.U. of the leachates of irradiated EPS (a), dark EPS (b), irradiated LDPE (c), dark LDPE (d), irradiated PS (e) and dark PS (f). These EEMs represent the variation between the final and initial time during the abiotic photodegradation experiment.

- The **IDAEA** has led a review of the occurrence, fate and risk of organic contaminants in European groundwater bodies (*Environmental Chemistry Letters, 20(5)*, 3313-3333, 2022).

Climate [illegible]narios

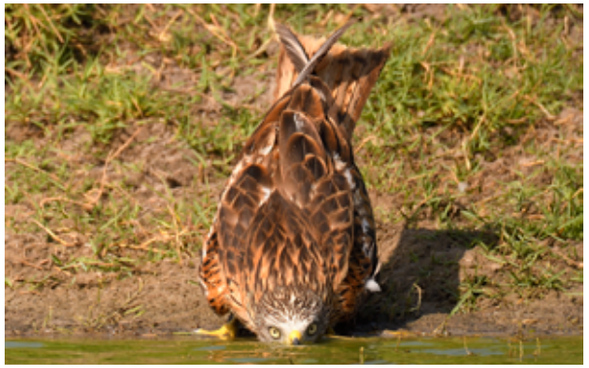
Recent climate changes and future scenarios continue to be an important part of CSIC research. **Climate dynamics** have been studied on both long-term (Pliocene, **IBB**, Quaternary glaciations, **IPE**) and recent (westerly winds, **CIDE**) time scales, as well as potential impacts on animal populations (**EBD**), lake ecosystems (**GEO3BCN**) and wildfires (**IMIB**).

- Paleoclimate research run at **IBB** has provided a set of high-resolution (*ca.* 5 km) global-scale maps based on a new Climate Stability Index (CSI) from the Pliocene (3.3 *Ma*) to the present and future projections up to the year 2100, customisable for each user (*Scientific Data 9: 48*, 2022).

- Scientists at **IPE** have collaborated on an Inclusive Connectivity and Development Project (ICDP) in which glaciations in the tropical Andes are reconstructed from soundings of Lake Junín (Peru) spanning the last 700,000 years, and their synchrony with changes in global ice volume, with a periodicity of approximately 100,000 years (*Nature 607(7918)*, 301, 2022).

- A **CIDE**-led study of westerly winds in the Southern Hemisphere has shown that they have intensified and shifted poleward in recent decades. The study provides different scenarios for the 21st century (*Atmospheric Research 270*, 106040, 2022).

- The **EBD** participates in an international scientific team that has shown how rising temperature extremes exacerbate the impact of an endemic disease (tuberculosis) on meerkat populations (*Nature Climate Change, 12(3)*, 284, 2022) and that drought negatively affects the probability of survival of red kite (*Milvus milvus*) populations in the Doñana National Park (*Nature Communications,13(1)*, 5517, 2022).



Red kite (Milvus milvus).

- **IMEDEA** has assessed the potential of plant communities to keep pace with climate change through long-distance seed dispersal by migratory birds (*Nature, 595, 75-79*, 2022). The study revealed that most of this critical northward dispersal service is provided by only a few Palearctic migratory species.

- A multidisciplinary study by **GEO3BCN** applied to a sediment core taken from a lake in the Azores shows how lake ecosystems have responded to natural and anthropogenic forcings over the last 1000 years. Results show that this is the most valid approach for developing effective adaptation and restoration strategies (*Science of The Total Environment, 830*, 154828, 2022).

- Scientists at **IMIB** have analysed global and regional trends in wildfires and found that the climatic risk of wildfires is increasing worldwide due to global warming (*Reviews of Geophysics*, e2020RG000726, 2022). Drier and hotter landscapes are becoming more frequent and more susceptible to burning, which is also more severe, increasing the risk of large wildfires (megafires or sixth generation fires). The impact of black carbon produced by fires on a global scale has been analysed in a review led by **IMIB**, in which its cycle in the land-ocean continuum is modelled (*Nature Reviews Earth & Environment, 3*, 516-532, 2022).

Researcher collecting data in a burned area.

Genomic techniques and the analysis of large amounts of data have facilitated progress in various fields of environmental studies and species conservation.

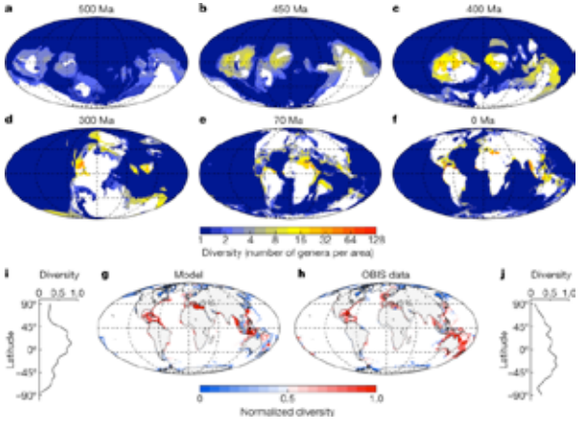
- The study of the palm genome in which **IBB** has participated has shown that water stress inhibits repeat expansion through the selection of maximum genome size (*New Phytologist 236*: 433-446, 2022). However, in arid-adapted palm species, elements that may be associated with stress response genes have been amplified.

- The **E**…enome analysis of Iberian a…at Iberian lynx populations have a lower burden of highly deleterious mutations (*PNAS, 119(11)*, e2110614119, 2022).

- Analysing large amounts of data in biodiversity is a challenge addressed by **CIDE** researchers, exploring state-of-the-art machine learning techniques of Generative Artificial Intelligence (GenAI) to predict patterns of species coexistence (*Methods in Ecology and Evolution, 13: 1052-1061*, 2022).

- The **IPNA** is involved in efforts to improve the standardisation and harmonisation of metazoan biodiversity inventories through metabarcoding, generating massive amounts of biological community data with a terrestrial arthropod module (*GigaScience, 11, 1-12*, 2022).

- The **IIM** has used different Deep Learning-based algorithms for species identification and fish size estimation that improve the ability to quantify catches on board commercial vessels (*Marine Policy, 139, 105015*, 2022).



Ocean re-diversification in the Phanerozoic.

Impacts of global change

The **relationships between species and habitats, their temporal evolution and the impacts of global change** have been investigated by analysing both trophic (**MNCN**) and mutualistic (**EEZA**) networks, edaphic endemisms (**IPE**) and the internal structure of mangroves (**IBB**), as well as temporal evolution (**IGEO**, **CIDE**, **RJB**, **ICM**) and spatial scale (**IPE**) changes.

- Research at **RJB** has analysed biodiversity in the Andes, the world's most biodiverse mountain range, and demonstrated extensive biotic exchange over time with the Amazon and other neotropical biomes (*Trends in Plant Science 27(4):364-378*, 2022). Another study on the evolution of grasses in the European steppes (*Nature Communication 13(1):1921*, 2022) has demonstrated the role of climate as a driving force underlying patterns of genetic variation at the biome level.

- A computational model of marine biodiversity diversification developed at the **ICM** has made it possible to reconstruct the history of marine animal diversity from the Cambrian explosion of life some 540 million years ago to the present day (*Nature 607, 507-511*, 2022). The work shows how today's biodiversity is the result of long periods of environmental stability on Earth, which enabled regions with a high number of species, known as biodiversity hotspots, to develop. The model is also able to recreate the geographical distribution of diversity in today's oceans, especially hotspots, and reveals the mechanisms that created them.

- A study with **IGEO** participation has focused on biomolecules in fossils, showing that some dinosaurs (sauropods and giant theropods) were endotherms and their metabolism was similar to that of birds (*Nature 606, 522-526*, 2022). In another study led by **IPE**, a phylogenetic investigation of 83 plant taxa from Iberian gypsiferous ecosystems (*New Phytologist 235: 2406-2423*, 2022) has shown that, despite the predominant phylogenetic effect, plant adaptation to gypsum soils had a strong effect on plant elemental composition, particularly sulphur concentrations, whereas climate and soil effects were minor.

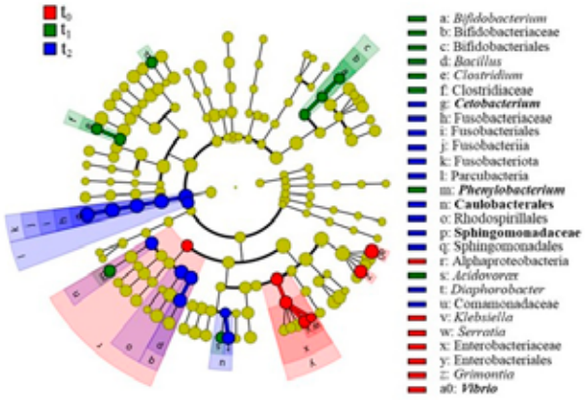
- Research by the **MNCN** has shown how human pressure modifies the topology of food webs (*Ecology Letters, 25, 2476-2488*, 2022). Thus, when the pressure is lower, the webs tend to be organised according to a power law, and when the impact is higher, the most common webs are organised randomly. Another study by **EEZA** researchers (*Ecology Letters 25: 264-277*, 2022) has shown that the evolutionary history of mutualistic interactions leaves an imprint. They have revealed the effectiveness of mutualistic networks and their ecological and evolutionary significance through an example of seed dispersal by animals.

- A study involving **IPE** (*Biological Conservation, 265:109428*, 2022) has quantified changes in the Normalised Difference Vegetation Index (NDVI) over the last 35 years at locations with endangered plant species and those in Natura 2000 (N2000) protected areas. Results show that endangered plants tend to be located at sites with less change in NDVI while sites within N2000 suffer less loss than unprotected sites, thus supporting the beneficial role of Natura 2000.

AGRICU

The research groups addressing research in Agricultural Sciences have undertaken studies seeking to respond to the scientific challenges set out in the CSIC White Papers.

- With the aim of improving competitiveness of aquaculture, promoting the production of robust and high-quality fish while minimising production-associated environmental impact, **IATS** researchers have evaluated gut microbiota changes in reference (REF) and genetically enhanced (GS) sea bream over a 12-month production cycle, within the framework of the PROGENSA programme. These fish were fed a control (CTRL) or FUTURE (no fish oil and half the fishmeal of the CTRL) diet. Analyses have highlighted the enhanced plasticity of the GS fish microbiota. This work confirms the important role played by gut microbiota in studying the impact of genetic selection programmes and revealing trends and specific taxa that could help in selective fish breeding management (*Biology 11:1744*, 2022).



Cladogram showing the temporal sequence of the gut microbiota of sea bream in aquaculture.

- Research staff from **IRNAS**, **CEBAS** and **MBG** have participated in a study aiming to identify critical points for to conserve the nature of soil. The global field study included observations of biodiversity (archaea, bacteria, fungi, protists and invertebrates) and functions (critical for six ecosystem services) of 615 topsoil samples from all the continents. Each of the different ecological dimensions of soils peaked in contrasting regions of the planet and was associated with different environmental factors. Temperate ecosystems showed the highest species richness, while community dissimilarity peaked in the tropics, and cooler latitudinal ecosystems were identified as ecosystem service hotspots (*Nature, 610 693-698*, 2022).

- Research staff from **MBG**, **ICA**, **CEBAS** and **IRNAS** have been involved in work on the drivers of impacts on ecosystem services, including grazing pressure, climate, soil properties and biodiversity, all addressed simultaneously. The paper, which includes data from 98 sites on six continents, maintains that considering the interactions between grazing and local abiotic and biotic factors is key to understanding the fate of arid ecosystems under climate change and increasing human pressures (*Science, 378, 6622, 915-920*. 2022).

- High light intensity and warm temperatures are two environmental cues exerting opposite morphogenic impact. The key components of this response are PHYTOCHROME B (phyB), EARLY FLOWERING 3 (ELF3), and CONSTITUTIVE PHOTOMORPHOGENIC 1 (COP1). Researchers from Biotechnology Department at **INIA** and **GRAG** have used single and double overexpression/mutant crop lines to fit a mathematical model that incorporates known interactions of these regulators. The thermal model developed provides a unique toolbox to identify the best allelic combinations, which improve climate change resilience of crops adapted to different latitudes (*Science Advances, vol. 8 (33)*, eabp8412, 2022).

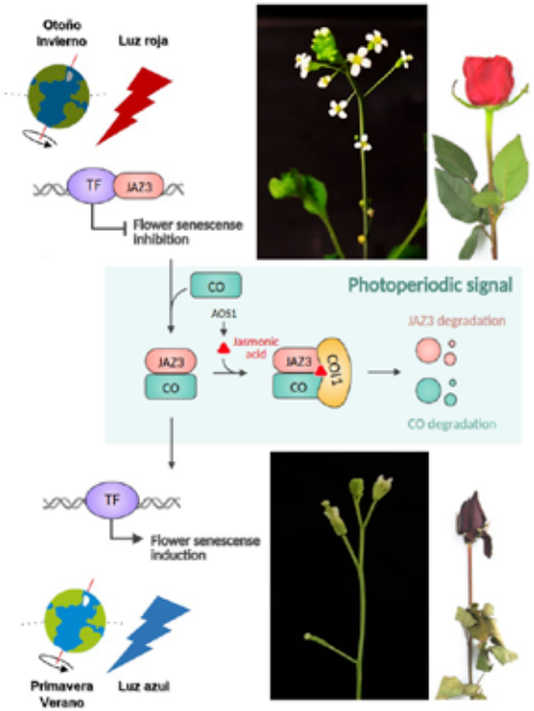
- Researchers at **IBMCP** have studied in-depth the factors controlling the duration of plants' reproductive phase, specifically the moment at which plants stop flowering, determined by the cessation of the activity of their inflorescence meristems. This work has revealed that the repression of cytokinin signalling is necessary for flower-production cessation in the model plant Arabidopsis, and that this repression depends on FRUITFULL, a previously identified gene with a relevant role in regulating the process (*Current Biology 32:749-762*. 2022).

- Research staff at **IdAB** have developed an open differential chamber system that can be used to measure the transpiration of grape berries/bunches based on the use of relative humidity sensors from Vaisala. This development will allow better control of grape transpiration during ripening (*Computers and Electronics in Agriculture, 196*, 106890, 2022).

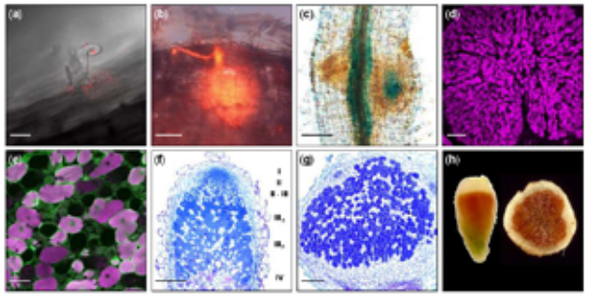
- The **I** ch to assess the effect of ho berculosis) or heterologous (against tuberculosis) vaccination on the immune response and protection of goat kids, experimentally infected with Mycobacterium avium sbsp. paratuberculosis (Map), and to discover the role played by each of the components of these vaccines. Homologous and heterologous vaccinated groups showed a significant reduction in the number and severity of lesions, accompanied by a high peripheral cellular and humoral response. The adjuvant is able to confer some protection against Map, not associated with the presence of a specific immune response, which could be mediated by a non-specific immunity mechanism requiring further clarification (*Frontiers in Veterinary Science, 8: 744568*. 2022).

- Olive crops can be devastated by Olive Verticillium (OV), caused by *Verticillium dahliae*. One of the best management measures against olive blight is the use of tolerant cultivars. **IAS** researchers have analysed eighteen functional traits of the olive root, the expression over time of nine defence-related genes, and evaluated lignin content and root membrane permeability in six olive cultivars with different levels of tolerance/susceptibility to OV. Tolerant and susceptible cultivars showed substantial differences in root system architecture and root lignin content, which could largely determine how the olive responds to fungal colonisation and invasion (*Frontiers in Plant Science, Volume 13, 863055*, 2022).

- Entomopathogenic nematodes (EPN) are widespread biological control agents in crop soils. **ICVV** researchers have evaluated the abundance and activity of native EPN and the abundance of potential natural enemies such as competing species of free-living nematodes (FLN), nematophagous fungi (NF) and ectoparasitic bacteria, in soils managed with different organic mulches or traditional practices in two commercial vineyards. Results show that organic mulches provide suitable conditions to increase nematofauna presence although, depending on mulch type, it can also negatively affect EPN, increasing the incidence of their natural enemies. The work shows the importance of studying alternative agricultural practices to unravel complex biotic interactions affecting beneficial soil organisms in agroecosystems (*Journal of Invertebrate Pathology 192, 107781*, 2022).



The photoperiod pathway senses daylength and light quality via the central regulator CONSTANS (CO, in green). Through the interaction of CO with the JAZ3 protein (in red), jasmonic acid signalling (in violet) is activated to signal the plant to initiate flower wilting (Modified from Serrano-Bueno et al., 2022, Molecular Plant, 15: 1710-1724, 2022).

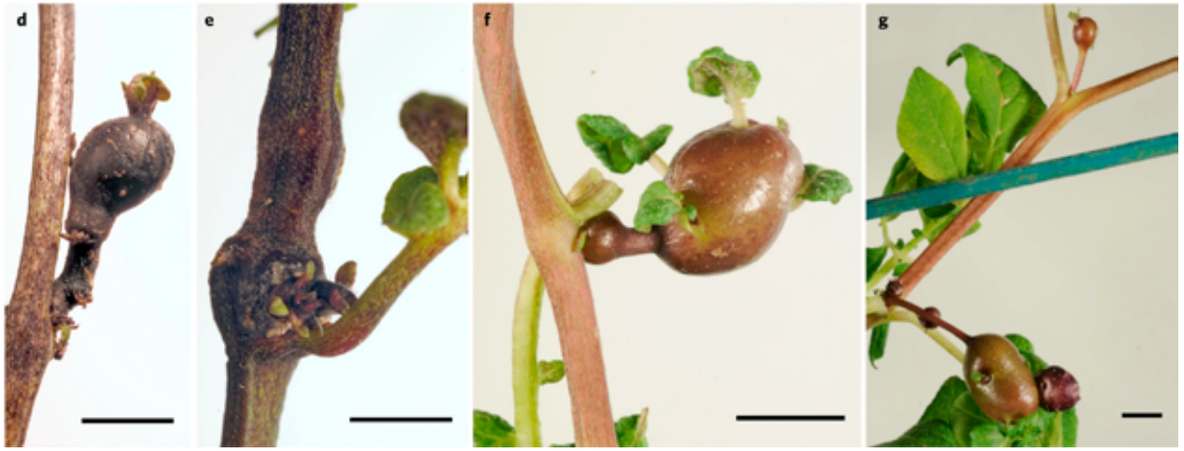


Formation and development of legume nodules and differential characteristics of indeterminate and determinate nodules.

Use of different types of mulching in a vineyard.

- A stu… earchers has analysed the s… d associative changes in the rhizospheric bacterial community of maritime pine (*Pinus pinaster*) under drought conditions, due to seasonal variations (spring and summer). Their results could reflect the future state of rhizospheric bacterial communities in a context of climate change, characterised by variable precipitation levels and high temperatures (*Science of the Total Environment, 832, 155007*, 2022).

- Changing climatic conditions are a threat to the agricultural sustainability of croplands in the Mediterranean region. Research staff from **ICA** and **CEBAS** have been involved in studying the effects of partial rainfall exclusion alone or combined with an increase in soil temperature on biochar-amended (20 t ha^{-1}) and unamended plots under crop rotation. They have assessed soil chemical properties, enzyme activities and microbial community activity, structure, composition, abundance and functions. The biomass, composition and activity of soil bacterial and fungal communities responded more to biochar addition than to climate manipulation. Interactions between amendment-related biochar addition and future climate change scenarios influence microorganism-driven ecosystem services linked to maintaining nutrient cycling and biodiversity in Mediterranean agroecosystems (*Geoderma 407:115536*, 2022).



Aerial tuber (d) and thickened node (e) of BRC1b RNAi plants grown under Long Days (16 hours of light). f,g, Aerial tubers of BRC1b RNAi plants grown under Long Days followed by six weeks under Short Days (8 hours of light). Scale bars, 1 cm.

- Patterns of dieback occur in natural situations in certain coniferous forests. While drought-induced dieback patterns in spruce have been explored previously, information on the role played by nutritional decline is lacking. **CEBAS** researchers have made a comparative analysis of radial growth, intrinsic water use efficiency (iWUE) and oxygen isotopes (δ^{18} O) in leaves of declining (DD) and non-declining (ND) spruce trees, located in four forests in the Spanish Pyrenees. This study provides new insights into the mechanisms driving spruce dieback and highlights the need to incorporate tree nutrition into forest dieback studies (Global Change Biology, 28, 4439- 4458. 2022).

- Control of carbon distribution, storage and utilisation is critical for plant growth and development and is exploited for both food production and CO_2 sequestration. Potato tubers are natural stores of carbon in the form of starch, having evolved to allow propagation and survival over winter. A group at **CNB** has studied the BRANCHED1b (BRC1b) gene that acts as a tuberisation repressor in aerial axillary buds, preventing the buds from competing in sink strength with stolons. Loss of BRC1b function leads to ectopic production of aerial tubers and reduced underground tuberisation. In aerial axillary buds, BRC1b promotes dormancy, abscisic acid responses and a reduced number of plasmodesmata. This limits sucrose accumulation and access of the tuber protein SP6A. BRC1b also interacts directly with SP6A and blocks its tuber-inducing activity in aerial nodes. Together, these actions help promote underground tuberisation (*Nat. Plants 8, 281-294*, 2022).

- Rese… …have studied the structural … …chemical properties of different Kraft lignins (KL) and how these can influence the electrospinning process to obtain nanostructures. In this work, eucalyptus/CA and poplar/CA solutions were found to be suitable to obtain nanostructures based on uniform cross-linked nanofibres with a few filamentary fibres (*International Journal of Biological Macromolecules, 214, 554-567*, 2022).

- A group of researchers from **CISA-INIA** has established that, after activation, teleost B lymphocytes undergo an expansion of the endoplasmic reticulum (ER) but do not experience significant changes in mitochondrial content. The results of this study shed new light on the process of B-lymphocyte differentiation in teleosts, providing new tools to study B-lymphocyte function in these species (*iScience, 26(1):105854*, 2022).

- A paper published in *New Phytologist* by **ICIFOR-INIA** researchers has confirmed the hypothesis that conservative resource use strategies, involving higher drought tolerance and lower phenotypic plasticity, have evolved in areas with more severe and longer dry seasons. The results suggest that contrasting precipitation and temperature regimes plays an important role in the adaptive evolution of phenotypes and their plasticity at the intraspecific level (*New Phytologist, 234, 462-478*, 2022).

- A research group at **CBGP-INIA** has developed a cloud-based platform, ***PhyloCloud***, aimed at hosting, indexing and exploring large collections of phylogenetic trees. The platform also provides access to common analyses and operations, such as node annotation, searching, topology editing, automatic tree rooting, ortholog detection and more. PhyloCloud offers a novel tree visualisation system in ETE Toolkit v4.0, which can be used to explore very large trees and enhance them with custom annotations and multiple sequence alignments. The platform enables the sharing of tree collections and views of specific trees through private links, or making them fully public, serving also as a repository of phylogenomic data.

- **CBGP-INIA** and Tradecorp have launched the joint research unit 'Biological Solutions for Sustainable Agriculture' to develop bio-based products and solutions to drive more sustainable agriculture worldwide.

- The **CRF-INIA** plant-resource bank has delivered a selection of one thousand plant varieties from the National Inventory of Plant Genetic Resources that have been deposited in the **World Seed Bank in Svalbard** (Norway). This advanced scientific infrastructure holds the largest secure collection of global agricultural biodiversity and safeguards the basis of the world's food supply.

- Addressing sustainable agricultural soils, **INIA** has strengthened healthy-soils R&D through the coordination of CSIC's EJP SOIL project, involving more than 16 CSIC institutes and 20 projects, and securing European funds (around €2 million). INIA represents Spain at the forefront of the Horizon Europe Soil Mission through the Mission Board and Mirror group. In addition, INIA is supporting the creation of new partnerships (HE) with greater involvement in Agroecology and Animal Health & Welfare.

FOOD SCIENCE AND TECHNOLOGY

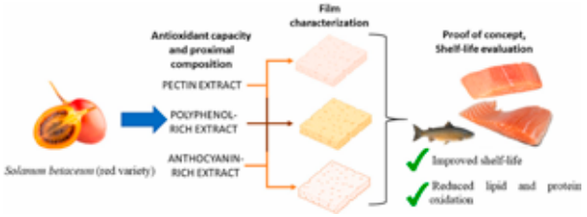
Research activity in Food Science has contributed to tackling the challenge of transition towards Sustainable Food Systems.

The growing demand for **healthy and quality** processed foods is a strong driver of the sector developing food ingredients, especially natural ingredients:

- Researchers at **CIAL** have been working on the formulation of ingredients that can control the hormonal response involved in satiety, food intake and glucose metabolism (*Food Hydrocolloids, 107505*, 2022). In this context, they have developed polysaccharide-casein gel-like structures and subjected them to in vitro gastrointestinal digestion so as to assess their potential to delay casein hydrolysis. Their research hypotheses and results have given rise to the ERC-2020-COG 101086483 (PRODIGEST) proposal, which obtained Score A in the latest ERC-Consolidator Grant 2022 call and is proposed for funding on the reserve list.

Focusing on the ***circular bio-waste*** economy, CSIC research [illegible] contributions based on food chemistry and the valorisation of by-products from the fishing, aquaculture and agri-food industries in a bid to provide more efficient ingredient designs. This aspect stands out as one of the CSIC's major contributions to the food industry and consumers:

- **IATA** researchers have used seeds and shells of red fruits from species native to northwestern Argentina to extract pectin and bioactive compounds with antioxidant properties for the manufacture of food packaging (*Food Hydrocolloids, 133, 107888*, 2022). Antioxidant films have proven to be highly effective in preventing the deterioration of food products that are highly susceptible to oxidation, such as fatty fish fillets.



Application of natural packaging from tamarillo processing by-products to increase the shelf life of fish.

- The **IIM** has proposed methodologies to recover waste from the cephalopod processing industry, based on extraction techniques using environmentally friendly solvents (*green solvents*) to obtain polar marine oils (*Foods 11(15), 2188*, 2022). These innovative oils have chemical and nutritional features that make them competitive with other commercial polar oils of high market value. The **IIM** has also proposed enzymatic processes to optimise collagen hydrolysates from the blue shark (Prionace glauca). The aim is to achieve the highest potential for collagen I synthesis in dermal cells and, therefore, of greater value for dermatological applications (*International Journal of Molecular Science 23(1), 32*, 2022).

The EU's farm-to-fork strategy, within its **food safety** policy, aims to ensure safe and nutritious food and clear information on the origin, content, labelling and use of food. Diverse CSIC groups are addressing different aspects of this strategic issue in their research:

- Taking a clearly multidisciplinary approach, **ICTAN** researchers have applied artificial intelligence to develop real-time methods for contaminant detection in food (*Food Chemistry, 386, 132832*, 2022). They have proposed mathematical models based on convolutional neural networks and transfer learning to identify the presence in legume flours of traces of potential risk for coeliac or nut-allergic populations.

- **IPLA** researchers have presented the most recent examples of the combined use of various antimicrobial strategies, barrier technology, to improve the effectiveness of food biopreservation. In particular, the combined use of bacteriocins and bacteriophages can extend the shelf-life of food and thus reduce the risks associated with the presence of pathogenic bacteria, which could be transmitted by food throughout the production chain (*International Journal of Food Microbiology, 368*, 109165, 2022).

- A crucial part of developing new foods and products of animal origin is related to their use as new protein sources, and the evaluation of their potential allergenicity. Researchers at **CIAL** and **IPLA**, in collaboration with the international INFOGEST network led by the CSIC, have approved an in vitro digestion model of the intestinal epithelium to study the first steps of de novo allergic sensitisation (*Comprehensive Reviews in Food Science and Food Safety, 13097*, 2022).

- Acrylamide is a low molecular-weight compound, formed during heat treatment of food under certain temperatures and low humidity conditions. Importantly, neurotoxic, carcinogenic and genotoxic effects have been described for acrylamide, and it is classified as a probable carcinogen in humans. **ICTAN** researchers have studied the bioaccessibility of acrylamide during in vitro gastrointestinal digestion of processed cereal- and potato-based foods (*Food Research International 161, 111820*, 2022). The results of this research establish the importance of considering whole meals and not just isolated foods, in order to establish a more accurate risk assessment through a better understanding of acrylamide bioaccessibility.

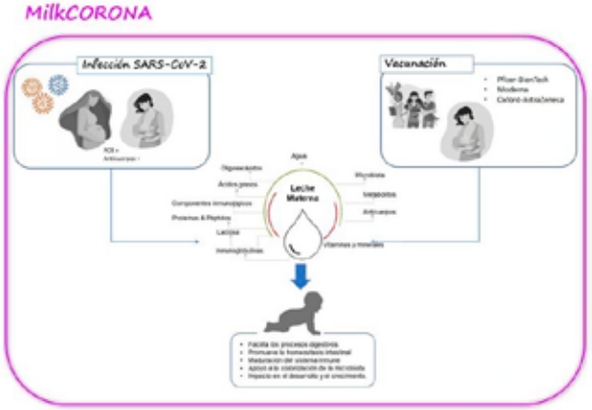
- Resea **CEBAS** have participated med at demonstrating the utility of combining environmental epidemiology and periodic sequencing of wastewater to track viral variants of concern. The results obtained demonstrate that metagenomic analysis of SARS-CoV-2 in wastewater can detect mutations, confirming that the technique is able to anticipate the detection of certain variants before they are detected in clinical samples. These analytical techniques can complement clinical evidence obtained from the population in order to aid decision-making and analysis of the evolution of pandemics (*Water Research, 211*, 118007, 2022).

Food, health and quality of life. Research in this area confirms its bid to be a national and international benchmark in matters related to food, health and personalised nutrition:

- **IG** researchers have demonstrated the role of dietary fatty acids on the adaptive immune system in the context of obesity (*Journal of Nutritional Biochemistry, 107*, 109057, 2022). The study reveals a critical underappreciated role for dietary fatty acids in the selective acquisition of T-cell subsets in bone marrow. One of the most significant findings links the presence of oleic acid to fatty-acid metabolism reprogramming, aimed at the specific maintenance of CD4+ T cells, and associated with obesity induced by hypercaloric diets.

- **IPLA** researchers have studied the impact of pre-operative low-calorie diets and bariatric surgery on the gut microbiota and faecal metabolome of severely obese individuals. Study results indicate that, despite not identifying a microbiota characteristic of severe obesity, bypass surgery had a greater impact on gut microbiota composition and increased gut putrefactive metabolism (*Gut Microbes, 14*, e2106102, 2022).

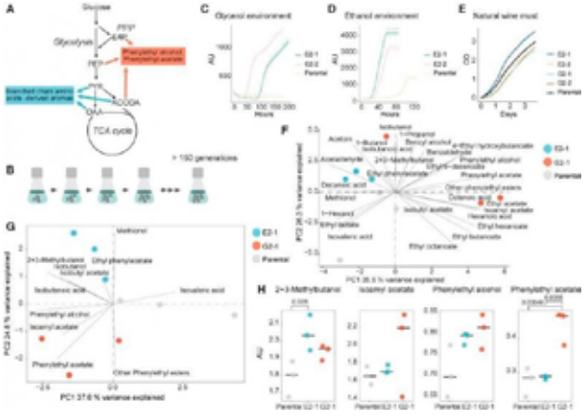
- The MilkCORONA initiative, led by **IATA**, has studied the impact of natural SARS-CoV-2 infection, as well as vaccination, on breast milk and breastfeeding. The aim is to determine the presence of antibodies in breast milk and the impact on the composition of other bioactive components that may influence the infant's microbiota (*Genome Med. 14(1):42*, 2022).



MilkCORONA studies the impact of natural SARS-CoV-2 infection and vaccination on breastfeeding.

Food biotechnology has a long tradition at CSIC, addressing the production and processing of foods, ingredients and formulations, and continues to be one of the Area's international strengths. One of the fundamental challenges facing our food system is the development of foods of high nutritional and sensory quality:

- In the area of food biotechnology, **ICVV** research staff have been working on the development of genome-scale metabolic models on Saccharomyces cerevisiae, with the aim of developing wine yeast strains with enhanced aroma secretion (*Molecular Systems Biology 18: e10980*, 1-18, 2022).



Changes in aroma production detected in the evolution of yeast strains.

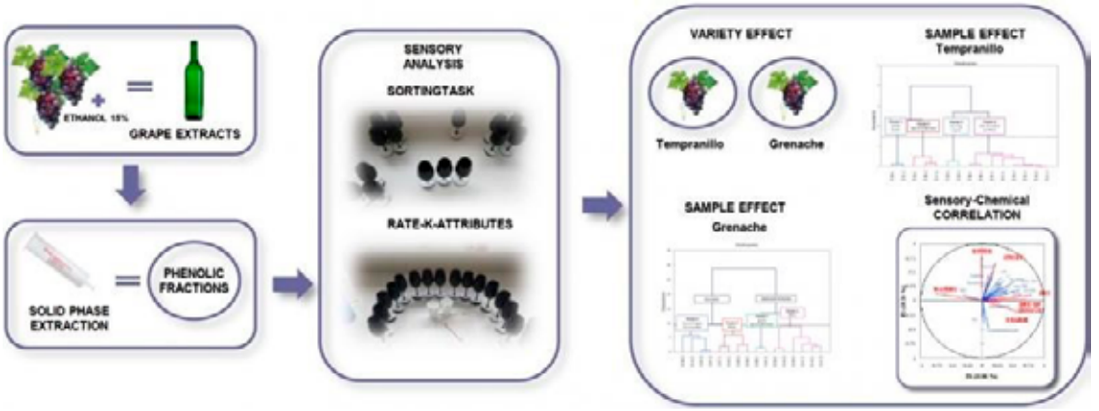
- Resea[illegible]etermined how water stres[illegible]oil synthesis (*Plant, Cell and Environment, 45*, 2366-80, 2022). To this end, they have investigated the relative contribution of carbon sources generated from leaf and fruit photosynthesis to triglyceride biosynthesis in the olive mesocarp and their interaction with water stress. Overall, the results indicate that oil content and fatty acid composition in the olive mesocarp are regulated by carbon supply and water status, factors that affect the transcription of key genes in both metabolic pathways.

- In the present context of high quality, resilient and safe food proposals, **ICVV** researchers have developed a new chemosensory strategy to characterise the sensory properties of phenolic fractions in grapes (*Food Chemistry 371*, 131168, 2022). This approach has proven to be effective in differentiating these fractions in terms of mouthfeel and taste properties, both inter- and intra-varietal. In addition to contributing to the knowledge of grape properties, this research suggests grape quality can be inferred by measuring chemical variables.

- **ICVV** researchers have also optimised the process of selective extraction of aromatic compounds found in very low concentrations in grapes, using thin-film microextraction techniques for the first time (*Analytica Chimica Acta 1226*, 340254, 2022). One of the fundamental challenges of instrumental determination of the composition of these aromas is the relatively low concentration of volatile compounds, which play a key role for the quality of the commercial product, since grape aroma is one of the most important attributes for determining the quality of musts and wines.

- The effects of technological processing on the nutritional quality and bioactive value of foodstuffs are fundamental for the production sector. **ICTAN** has studied the effects of processing technologies applied to orange juice production on the bioavailability of carotenoids (*Food Chemistry, 371: 13021*; 2022). Promising results have shown similar serum carotenoid concentrations in freshly squeezed and high-pressure processed orange juice, and thus a significant protective effect of processing technology on the absorption of bioactive compounds in the juice.

- Researchers at **IATA** have conducted a study of the phenotypic characteristics of the yeast Debaryomyces hansenii as a starter culture to improve the aromatic quality of meat products. Evaluation of phenotypic traits demonstrates that *D. hansenii* is a safe yeast, able to tolerate stress in meat fermentation and capable of generating desirable aromas. The results of this study confirm the suitability of selected D. hansenii strains to be applied as starters in meat products (*Journal of Applied Microbiology, 133 (1)*, 200-211, 2022).



Schematic representation of the strategy used in the modelling of taste and tactile mouthfeel from chemical composition.

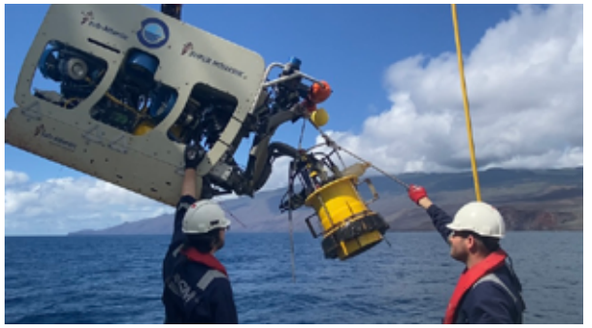
CAL TI[illegible]ES

BIOLOGY AND BIOMEDICINE

- **CABD** has licensed a European patent to a company to prevent and treat protein aggregation diseases.
- **CBMSO** has licensed a patent to One Chain Immunotherapeutics for the production of VDELAT1+ T cells.
- **CNB** has licensed two patents to Immunostep related to the detection and quantification of extracellular vesicles in biological fluid samples and the detection of a SARS-CoV-2 protease.
- **CIB** has licensed a patent to AnkarPharma on compounds inhibiting TTBK, a tau and tubulin kinase.
- **IBMCC** has licensed a patent for the simultaneous freeze-drying of various types of biological samples to 300K Biotech Solutions.
- **IBMCC** has registered and licensed a patent on a method for monitoring the disruption of tissue homeostasis at the whole organism level to the company FagoTrace BV.
- **IIBM** has licensed a patent to Tabby Therapeutics for the modification of the B-cell receptor in B-cell cell lines, and primary B-cell cultures.
- **IBGM** has filed a patent on a method to detect coronavirus infection.
- **IBGM** has registered a patent on a method for early prediction of reproductive efficiency in ruminants.
- **IN** has developed a diagnostic method of Alzheimer's disease based on apoliporpotein E detection.
- **IPBLN** has developed a combination of an anti-angiogenic and a dFAK inhibitor to treat uveal melanoma.

ENVIRONMENT

- **IDAEA** has registered the patent 'Separation of arsenic from antimony and bismuth in an eluate'.
- **ICM** has registered the patent 'Compounds useful for the post-sting treatment from a cnidarian organism'.
- **IPNA** has registered the patent 'Procedure for the use of menadione for the control of a new tropical race of Fusarium odoratissimum (TR4) in plants2.



Hydraulic syringe for the extraction of hydrothermal fluids directly from hydrothermal vents.

- **IEO** can list the following outstanding developments in terms of technological innovation in the design and **development of instrumentation for ocean monitoring**:
  - MINION-01: Sensor-bearing hood for monitoring diffuse hydrothermal fluid outflows in the study of submarine volcanology, specifically to study physical-chemical aspects of hydrothermal vents and submarine volcanism on La Palma and El Hierro.

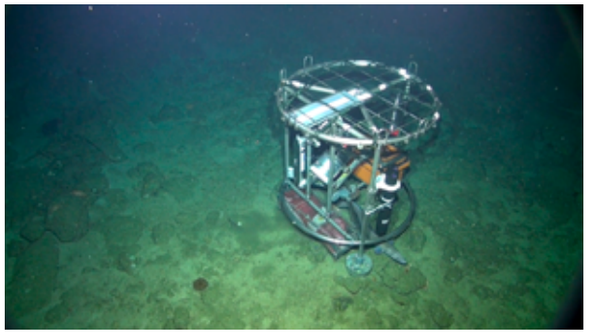
Sensor-bearing hood for monitoring diffuse hydrothermal fluid outflows.

  - Hydraulic syringe-02: Hydraulic syringe for the extraction of hydrothermal fluids directly from the sources through its adaptation to remotely operated vehicles (ROV Liropus).

- C… …o measure the vertical v… …f hydrothermal vents.

Instrument to measure the vertical velocity of the diffuse flow of hydrothermal vents.

- Landerpick: Underwater vehicle consisting of a remote launching and collection system for underwater multi-parametric observatories to monitor environmental conditions in marine protected areas in the deep-sea zones of the Natura 2000 network using flotillas of small landers, also designed at the CN-IEO.



Prototype Landerpick remote launch and collection system for underwater multi-parametric observatories.

AGRICULTURAL SCIENCES

- **MBG** has achieved the highest level of international protection (Community Plant Variety Office decision n° EU 61735 of 20-6-2022) for the rose variety Rosa Narcea, the world's first ancient cultivated rose with application in the perfume industry.

Rosa Narcea specimens.

- **EEZ** has registered a patent for 'Antihypertensive peptides from olive oil' at the European level.
- **IGM** has registered the patent 'Method for Early Prediction of Reproductive Efficiency in Ruminants'.
- **IBVF**:
  - Registration of the patent 'Fertiliser based on sarcosine and free amino acids for different crops' licensed to the company Fitoquivir S.L.
  - Participation in filing a patent for an amino acid biostimulant composition for plants, licensed to the company Qabtur Agroquímicos S.L.
- **IBMCP** has participated in the development of the patent 'Use of a Compound for Plant Protection by means of Stomata Closure and Application Method' which has been licensed to the company Químicas Meristem S.L.
- **CEBAS** has registered the almond varieties Alaska and Florida with the Community Plant Variety Office, licensed to International Plant Selection (IPS).
- **EEAD** has registered the exclusive licence for ADARA (*Prunus cerasifera Ehrh*) fruit tree rootstock in Israel and the areas of Judea, Samaria and Gaza (9572/2002), licensed to Agropro Ltd.
- **EEAD** has registered by Notarial Deed the non-exclusive licence for the Meteorological Drought Monitoring System for Spain, licensed to the State Meteorological Agency (AEMET).
- **INIA**:
  - New DNA SARS-Cov2 vaccine, CISA-INIA (EP22382749).
  - Attenuated African Swine Fever Virus And Use Thereof In Vaccine Compositions licensed by Intervet International B.V.
  - 'Methods and composition to improve plant health and protection' licensed by Plant Response Inc.
  - Device for the emulation of wood moisture and procedure associated with this device licensed by the company Inditecma S.L.
  - DDevice to optimise a plant cultivation system licensed by the company Ibercex.

FOOD S LOGY

- Research staff from **IATA** and **CIAL** have created the spin-off Aerofybers Technologies S.L., dedicated to the commercialisation of cellulose-based biodegradable aerogels in line with the current need for more sustainable materials.

- Research staff from the **IG**, the start-up company Oleica and the Cordoba company La Salmoreteca, have developed a new range of probiotic vegetable drinks with a bacterium from table olives. A patent for the fermenting agent with probiotic potential *Lactiplantibacillus pentosus* LPG1 has been licensed to Culinary Concept Group.

- **IATA** has licensed a process for obtaining hydrophobic aerogels to AEROFYBERS TECHNOLOGIES SL.

NATIONAL CENTRES IEO, IGME AND INIA AS TECHNICAL REFERENCE AND SUPPORT SERVICES FOR CERTAIN GOVERNMENT POLICIES

SPANISH INSTITUTE OF OCEANOGRAPHY (IEO)

The IEO has actively participated in **advising different Ministries in the implementation of sectoral policies related to the marine environment and its resources**, both living and non-living, through scientific-technical advisory reports addressed to the Spanish Administration and international bodies such as the European Commission. In 2022, **over 220 reports** were prepared, the most important of which, given their significance in terms of socio-economic impact and environmental conservation, related to:

- The possible implications of the implementation of the new EU regulation on deep sea fisheries for Spanish national fisheries (affecting 87 fishing grounds, more than half a thousand vessels and 4,000 employees).

- Issues related to the development of the lagoon ecosystem of the Mar Menor within the framework of priority actions for the recovery of the Mar Menor, contributing to the reorganisation of the socio-economic uses of its surroundings and facilitating its compatibility with the preservation of the natural resources of this unique enclave.

- Also noteworthy are the reports on the amendments to the articles of the Law on Sustainable Fisheries and Fisheries Research and to the Royal Decree establishing the approval of the Maritime Management Plans for the five Spanish marine demarcations.

SPANISH GEOLOGICAL SURVEY INSTITUTE (IGME)

- **National Geological Plan of Angola (UTE-PLANAGEO)**. The project, funded by the Angolan government with a total budget of $115 million, was completed at the end of June and has completed one third of Angola's geological mapping, an area of approximately 480,000 km² The objective of the project was to provide a better understanding of Angola's geological and mining potential, with the aim of promoting diversification of the national economy and attracting investment to help in the country's development.

- In terms of scientific-technical consultancy services provided in 2022, **more than 300 reports** were produced on mining, hydrogeology, geological risks, geological heritage, waste disposal facilities, underground storage, wind farms, etc.

- Different **studies** have been done to address **critical and strategic raw materials for the ecological transition** and the supply of the main industrial value chains in Spain, both at national level for MITECO and at a regional level for the Junta de Andalucía.

- The IGME is a member of both EuroGeoSurveys (Geological Surveys of Europe) and ASGMI (Association of Iberoamerican Geological and Mining Surveys), constituting a network whose main objective is knowledge and advice on Geology and Mining, as well as the establishment of common data-repository systems with a view to their use for decision-making on territories.

NATIONAL INSTITUTE FOR AGRICULTURAL AND FOOD RESEARCH AND TECHNOLOGY (INIA)

- INIA has produced **8,323 reports** as a scientific-technical reference service, most of them related to phytosanitary products and seeds.

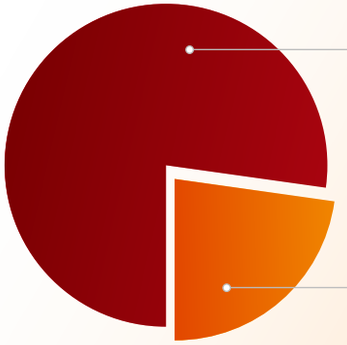
- Advice to the MITERD (Spanish Ministry for Ecological Transition and Demographic Challenge) participation in working groups of the OECD, the EC and the European Chemicals Agency (ECHA) to develop tests to detect the toxicity of chemical products and nanomaterials; in various issues relating to Genetically Modified Organisms (GMOs) and actions relating to restoration of mining areas around the Mar Menor.

- Participation of ICIFOR-INIA experts in the drafting of Royal Decree 159/2022 on the Conservation of Forest Genetic Resources.

CORE AREA MATERIA | DATA 2022

STAFF

RESEARCHER	1,604	W 569 / M 1,035
RESEARCHER IN TRAINING (pre-doctoral)	445	W 153 / M 292
TECHNICIAN/ SUPPORT	1,796	W 802 / M 994
MANAGEMENT / ADMIN / SERVICES	247	W 155 / M 92



NATIONAL PROJECTS AND ACTIONS

	No.	TOTAL FUNDING
IN FORCE*	1,466	251,138,585.30 €
APPROVED	603	92,960,638.72 €
COMPLETED	174	12,509,381.71 €

INTERNATIONAL PROJECTS
(EU PM, EU non-PM and INTERN)

	No.	TOTAL FUNDING
IN FORCE*	295	158,708,281 €
APPROVED	57	25,007,769 €
COMPLETED	48	22,417,833 €

* Data including the number of approved and completed projects.

KNOWLEDGE TRANSFER

3 TRADEMARKS	**10** SOFTWARE	**7** BUSINESS SECRET
88 PATENT APPLICATIONS (PRIORITY)	**64** PCT INTERNATIONAL PATENTS (NON-PRIORITY)	**34** OUT-LICENCING CONTRACTS
37 NUMBER OF LICENSED OBJECTS	**7** TBCs OR SPIN OFFs	**3** MUSICAL OR AUDIOVISUAL WORKS

SCIENTIFIC PRODUCTION

6,494 INDEXED ARTICLES	**179** BOOK CHAPTERS	**290** PhD THESES
241 NON-INDEXED ARTICLES	**39** BOOKS	

AWARDS

SEE ANNEX

Throu[...]en numerous advances and [...]stitutes and research centres belonging to the Core Area Materia at the CSIC. Some of the most important milestones have been achieved in fields as wide-ranging as **cosmology and astrophysics, physics, mathematics, computation, tools, materials and nanotechnology**.

MILESTONES 2022

CSIC LEADS ESA'S GREAT MISSION TO STUDY DARK MATTER IN THE UNIVERSE

A group of scientists from **IFCA**, **IAA**, **ICE** and **CAB** are leading a major European Space Agency (ESA) mission to study dark matter in the Universe. The ARRAKHIS mission has been selected as ESA's next F-class (Fast Missions Opportunities) mission. It involves an international consortium with research centres in Spain and Switzerland, Great Britain, Belgium, Sweden, Austria and the United States. Cosmological observations show that dark matter is five times more abundant than ordinary matter in the universe, but its direct detection is complicated by its properties and, at present, we only know of its existence through its gravitational effects.

Simulation of the halo of one of the galaxies to be observed in the mission. *Credit: Alex Camazón (Arrakhis).*

PARTICLE ACCELERATION MECHANISMS DETERMINED IN A SUPERMASSIVE BLACK HOLE

The **IAA** is participating in research that indicates shock waves are the source of particle acceleration in blazars (a type of active galaxy). Blazars are the most powerful sources of continuous energy in the universe. Like all other active galaxies, they show a structure consisting of a central supermassive black hole surrounded by a disc of matter that feeds it. However, they are among the tenth of active galaxies with a jet of matter emerging from both poles at very high speed, and among the even smaller number of cases where their orientation allows the jet to be observed almost head-on.

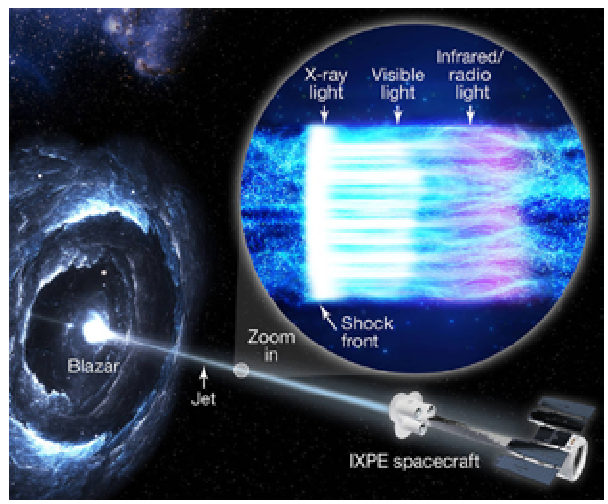
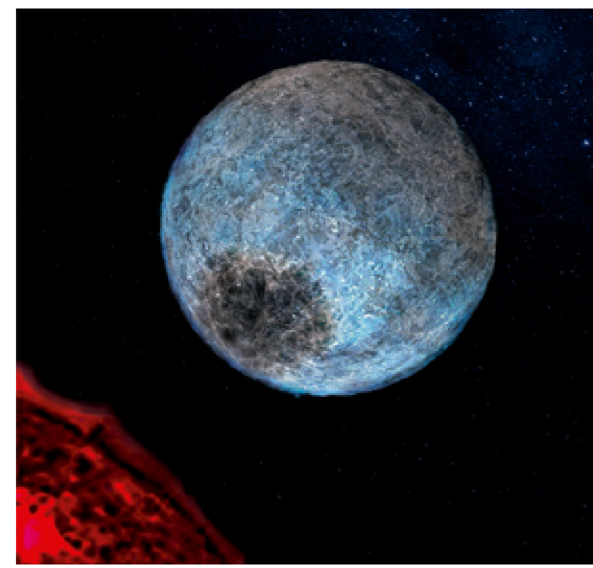


Illustration of IXPE satellite observations of the Markarian 501 blazar. *Credit: Pablo Garcia (NASA).*

A STUDY REVEALS WATER-RICH PLANETS MAY BE MORE COMMON THAN EXPECTED

A novel study, published in Science, suggests that many of the planets known as super-Earths or mini-Neptunes may harbour large amounts of water, with a composition of up to 50% rock and 50% water (by comparison, Earth is composed of only 0.02% water). But that water may be found beneath the crust, rather than flowing across the surface in the form of oceans or rivers. The work, led by the **IAA**, finds evidence for the existence of abundant extrasolar planets composed of ice and rock around dwarf stars (*Science, 377*, 1211 (2022)).



Artist's conception of an aquatic planet. *Credit: Pilar Montañés.*

MERGE ENS UP A NEW S SCENARIO

IAA scientists are involved in the study of a gamma-ray burst (GRB) whose characteristics require a revision of the current theoretical framework explaining GRB. Gamma-ray bursts are flashes associated with extremely high-energy explosions and detectable even in galaxies billions of light years away. Their duration, considered short or long depending on whether they last more than two seconds, is associated with their origin: long bursts are produced by the death of very massive stars and short bursts by the merger of two compact objects. Two studies, published in the journal Nature, report the detection of a GRB of almost one minute in duration produced by the collision of compact objects. This observation requires rethinking the classification of these outbursts and opens up new scenarios in the death of stars. (*Nature 612, 223* (2022); *Nature 612, 228* (2022).

JET OF MATTER DETECTED ERUPTING FROM A SUPERMASSIVE BLACK HOLE AS IT DEVOURS A STAR

In early 2022, the Zwicky Transient Facility (ZFT) telescope at the Palomar Observatory (USA) detected an extraordinary flash, with an intensity equivalent to a thousand trillion suns, where nothing had shone the previous night. Now, two articles published in Nature and Nature Astronomy with the participation of **IAA** and **ICE**, together with the IEEC (Institute of Space Studies of Cataluña), agree on the origin of the flash: it is a jet of relativistic matter produced by a supermassive black hole as it devours a star (*Nature Astronomy, 7, 88-104*, 2023).

Artist's conception of the disruption of a star by a supermassive black hole. Credits: Sophia Dagnello.

CSIC PARTICIPATES IN THE FIRST MISSION DEFLECTING A POTENTIALLY DANGEROUS ASTEROID'S TRAJECTORY

On 24 November 2021, DART, the NASA/Johns Hopkins APL Double Asteroid Redirect Test, was launched into space. On 27 September 2022, at 1:14 am CET, this mission hit its target, the asteroid Dimorphos, slightly changing its orbit. This is the first planetary defence test mission designed to change the course of an asteroid. A scientist at **ICE** belongs to the team undertaking this mission.

MAGNETIC MONOPOLES COULD BE PRODUCED BY A MECHANISM PROPOSED BY JULIAN SCHWINGER, AN AMERICAN PHYSICIST WHO WON THE NOBEL PRIZE IN 1965

Taking advantage of the intense magnetic fields produced in heavy-ion collisions at the world's most powerful particle accelerator, CERN's Large Hadron Collider (LHC), an international team with **IFIC** participation has taken a giant step forward in the long-awaited experimental search for magnetic monopoles. The results of this work, published in Nature, rule out the existence of light magnetic monopoles and lay the foundations for future searches for these new particles (*Nature Astronomy, 7, 88-104*, 2023).

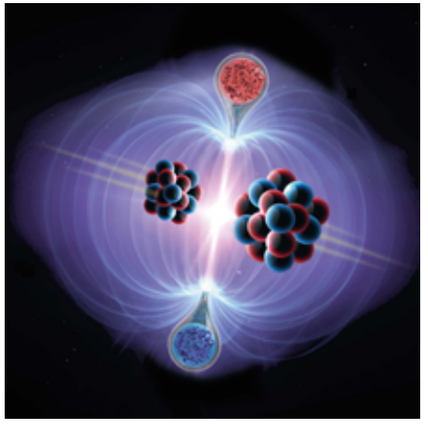
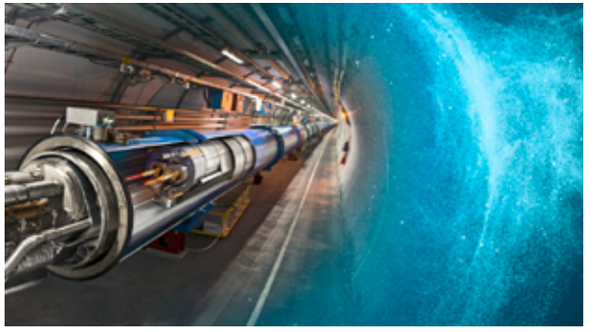


Illustration recreating the production of a pair of magnetic monopoles by the magnetic field created by the collision of two heavy ions. *Credits: James Pinfold.*

FIRST EVER MEASUREMENT OF THE MASS OF ONE OF THE BASIC CONSTITUENTS OF MATTER BY ITS INTERACTION WITH THE HIGGS BOSON

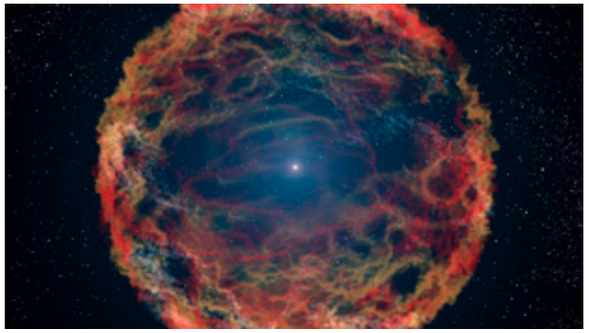
The Standard Model of particle physics, the theory that best describes visible matter in the Universe, predicts that many of the properties of particles have different values depending on the energy at which they are observed. This is also true for the mass of elementary particles and has just been confirmed by a multidisciplinary group of **IFIC** researchers in theoretical and experimental physics. Thanks to the LHC they have observed how a Higgs boson decays into bottom quarks, one of the fundamental constituents of matter; they have measured - for the first time - the mass of the bottom quark from its interactions with the Higgs boson and confirmed, as predicted by theory, that it is not an invariant quantity. (*Phys.Rev.Lett. 128* (2022) 12, 122001).



Recreation of the inside of the LHC tunnel, in which the collisions leading to these results took place. *Credit: CERN.*

CAPTU ENTS AFTER SION

In a single image, the Hubble Space Telescope has photographed the early stages of a stellar explosion, which occurred when the universe was just 2.1 billion years old. This is the first time that a supernova has been observed so accurately in its early stages at this distance, and it also corresponds to a stellar explosion at the beginning of the history of the Universe. Both findings could help scientists learn more about the formation of stars and galaxies in the early Universe. The **IFCA** has participated in this work by interpreting the gravitational lensing effect and the time lapses between the different images of the supernova (*Nature 611*, 256 (2022).



Artist's impression of the supernova 1993J in galaxy M81.
NASA, ESA and G. Bacon.

THE HUBBLE TELESCOPE DETECTS EARENDEL, THE MOST DISTANT STAR EVER OBSERVED

An international team involving **IFCA** research staff has detected Earendel, the most distant star ever observed, located 12.9 billion light years from Earth. Having exploded millions of years ago the star no longer exists, but its light was so powerful that it remains visible. Its discovery opens a window onto the early Universe and the origin of the first star formations (*Nature 603, 815* (2022).

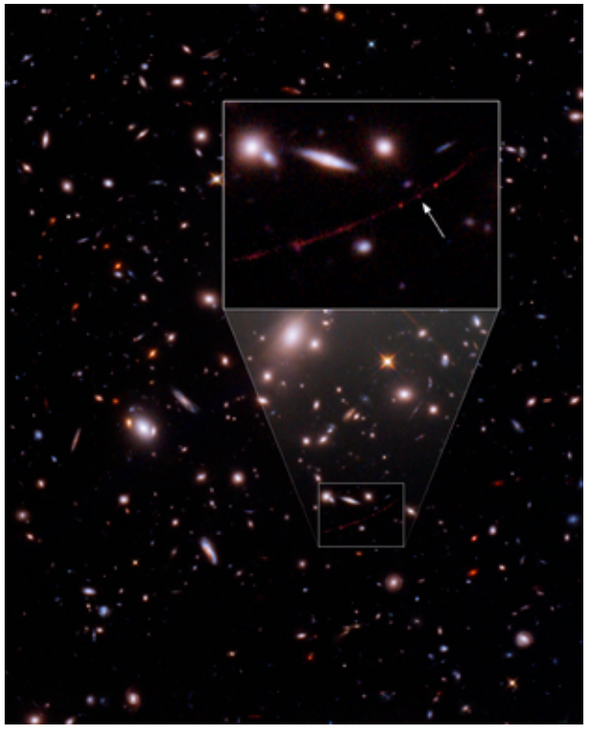


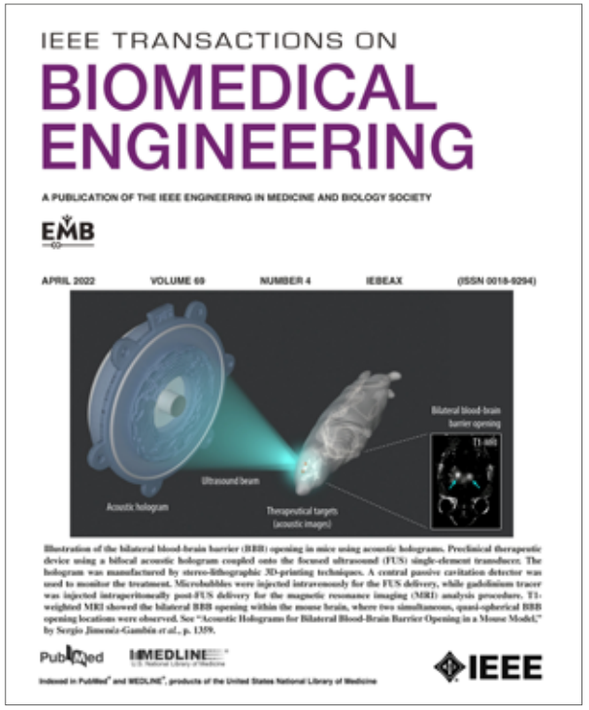
Image of Earendel, pointed out by an arrow.
Hubble.

INDOOR, OUTDOOR AND HOME-BASED PORTABLE MAGNETIC RESONANCE IMAGING OF PATIENTS

Mobile medical imaging devices are invaluable for clinical diagnostic purposes both inside and outside healthcare institutions. However, these scanners' weight and dimensions are incompatible with the most demanding scenarios, such as in remote and developing regions, sports facilities and events, medical and military camps or home healthcare. Researchers at **I3M** have succeeded in taking *in vivo* images with a low-field, lightweight and small extremity magnetic resonance imaging (MRI) scanner, outside the controlled environment of medical facilities. This work opens a path towards highly accessible MRI in circumstances that were previously unrealistic. (*Scientific Reports, 12, 13147* (2022).

3D PRI[illegible]OGRAMS TO TREAT [illegible]SEASES

A team of researchers from **I3M** and Columbia University (USA) has created and tested 3D-printed acoustic holograms in an animal model to improve the treatment of diseases such as Alzheimer's and Parkinson's, among others. The holograms, devised allow the blood-brain barrier to be opened in a selective, efficient and highly focused way, facilitates the administration of therapeutic drugs to treat pathologies affecting the central nervous system. (*IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, 69*, 1359 (2022).



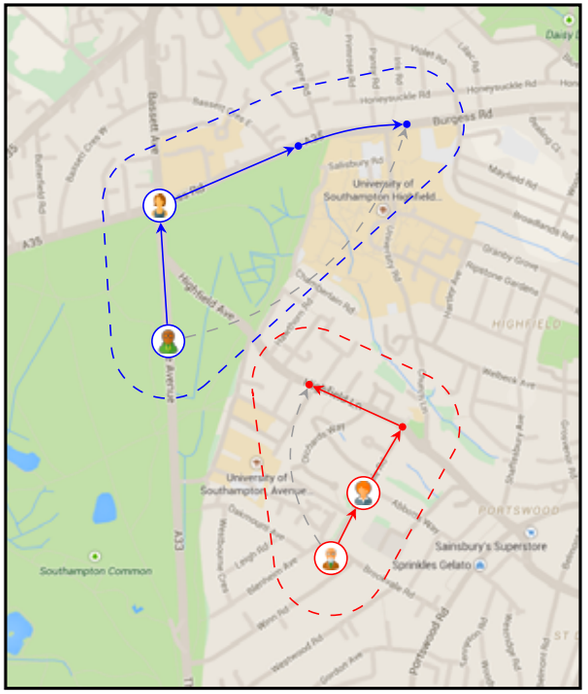
Article selected for the journal cover.

CSIC SETS UP A SCIENTIFIC-COLLABORATION NETWORK PROMOTING RESEARCH IN ARTIFICIAL INTELLIGENCE: AIHUB.CSIC

How can human values be maintained in a life mediated by artificial intelligence (AI), and how can intelligent technologies be developed that respect ethical principles? This is the starting point of most AI projects with a human-in-the-loop approach, a methodology seeking a more humane and effective interaction with the machine, and addressing people's needs to influence and optimise AI developments. HumanE AI Network is a European project in which CSIC researchers and the **AIHUB.CSIC** network seek to develop a system reaching a consensus between different opinions, even when these include self-interested and biased positions that seek to hinder agreement.

NEW ALGORITHM FOR PEOPLE TO COLLABORATE WITHIN A SOCIAL NETWORK

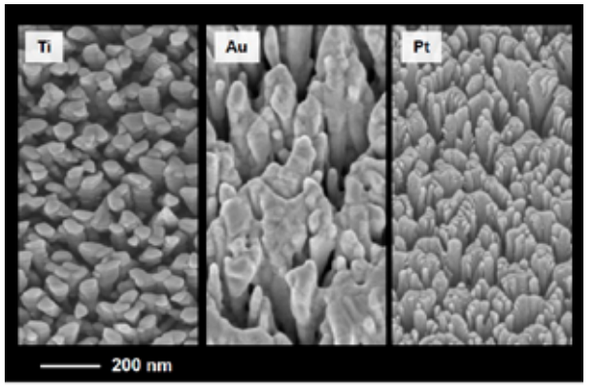
At the **IIIA**, a new algorithm (called AE-ISG) has been developed to form collectives connected by a social network of people wanting to collaborate to achieve a common goal. In general, this problem is computationally very difficult to solve. This general algorithm can be used to facilitate the formation of collectives in real-world scenarios, such as sustainable shared mobility or cooperative learning, thus fulfilling the Sustainable Development Goals. (*IEEE Transactions on Cybernetics 52, 5548* (2022).



In a sustainable mobility scenario, the formation of car sharing between travellers reduces transport costs, pollutant emissions and traffic congestion.

ELECTR[illegible]OF CELLS USING NANOS[illegible]ODES

This work, led by **IMN** researchers, presents a scalable fabrication method for nanostructured bioelectrodes based on magnetron sputtering. The metallic nanocolumnar structures (NCs) and thin films (TFs) from Ti, Au, and Pt, provide a larger effective area, which benefits the performance of the bioelectrodes when compared to flat electrodes of the same metals. Additionally, the electrochemical performance of the nanostructured surfaces was evaluated under physiological and relevant working conditions. For this purpose, potential use in vivo by reactive accelerated ageing test, simulating one-year of in vivo implantation, was evaluated. Researchers observed that nanocolumnar (NC) structures showed more stable performance. (*Nanoscale 14, 3179* (2022).



The bioelectrodes are studied in vitro so that they can be applied in vivo in the future. Electron microscopy images of the surface of the nanostructured bioelectrodes.

NANOMETRE CHIPS ACTING AS "MECHANICAL" DRUGS INSIDE LIVING CELLS

A multidisciplinary team involving scientific staff from the **IMB-CNM** and the **CIB**, with the participation of the UB, has come up with electronic devices that work effectively against diseases such as cancer, preventing the replication of malignant cells. The device is based on silicon 50-nanometre-thick chips, one thousandth of a hairbreadth, which are inserted into living cells. These devices allow cell division processes to be studies and can even be designed to interfere with the cell cycle, preventing division and causing cell death. This research opens up new avenues of exploration in the field of nanomedicine (*Advanced Materials, 34(17)*, 2109581 (2022).

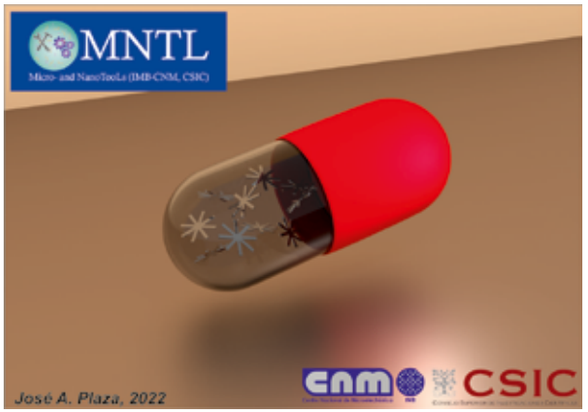
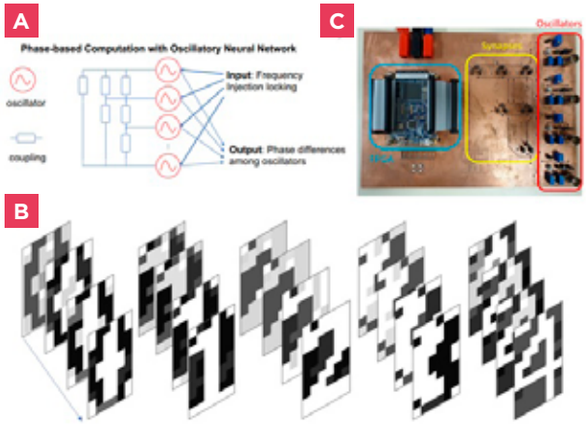


Image recreating mechanical drugs that can alter the cell cycle or even destroy cells.

BRAIN-INSPIRED COMPUTING USES DEVICES AND ARCHITECTURES EMULATING BIOLOGICAL FUNCTIONS TO MAKE SYSTEMS MORE ADAPTIVE AND ENERGY-EFFICIENT

Oscillatory neural networks are an alternative approach to emulate the biological functions of the human brain and are suitable for solving large and complex associative problems. **IMSE** scientists are investigating coupled oscillator dynamics to implement such oscillatory neural networks. By exploiting the complex dynamics of coupled oscillator systems, they have created a novel computational model: information is encoded in the oscillations phase. Interconnected coupled oscillators can exhibit diverse behaviours due to the strength of the coupling. This paper presents a novel method based on subharmonic injection locking (SHIL) to control the states of such coupled oscillators, which allow them to synchronise in frequency with different phase differences. Circuit-level simulation results indicate the effectiveness of SHIL and its applicability to large-scale oscillatory networks for pattern recognition (*IEEE Transactions on Neural Networks and Learning Systems, 33(5)*, pp. 1996-2009, 2022).



(A) Illustration of the proposed phased computation, using coupled oscillators to implement an oscillatory neural network (ONN). **(B)** Example of ONN operation for pattern retrieval of size 10x6 pixels. **(C)** PPCB used to test the proposed subharmonic injection mechanism in a network of four coupled oscillators. The FPGA controls the oscillator initialisation and reads the output phases. The ONN is fully connected with six synapses.

3D VISU[illegible]EMPORAL EVOLU[illegible]URFACE DURING LASER PROCESSING

A team at the **IO** has studied the processes generated in steel under excitation by ultra-short laser pulses. This research has made it possible to see the evolution of the 3D surface in terms of deformation and material removal, an achievement that provides new insights into this metal processing technique used in industry and materials manufacturing. Ultra-short laser processing allows for the extraordinary modification of metals, such as changing their colour, how they reflect light, water repellence and their resistance to wear. It also has medical applications, for instance in the manufacture of devices promoting cell adhesion and preventing bacterial growth (*Laser & Photonics Reviews, 16(12)*, 2200511).

ROBOTIC DOG PROTOTYPE CAPABLE OF GUIDING DEPENDENT OR DISABLED PEOPLE

This four-legged prototype equipped with artificial intelligence is capable of detecting traffic, thanks to its connection to Google, and is able to verbally communicate this to its owner or others. In addition, among its many features, it is able to unequivocally distinguish between an object and a person, thanks to its automatic learning system and the camera incorporated in its head. Although its metallic appearance and jerky, millimetric movements keep it from resembling a real animal, its creators had guide dogs in mind when they began thinking about the possibilities of Tefi, which is how this robot has been named in honour of the acronym of the institute where it was born: **ITEFI**.

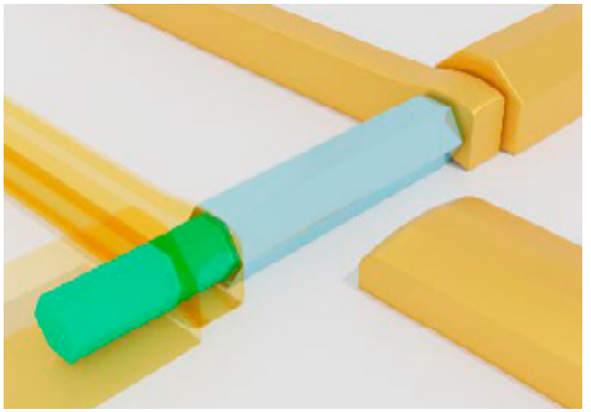
The robotic dog Tefi, created by CSIC researchers, is designed to assist people with disabilities.
Lorenzo Plana / CSIC Communications Department

MANUFACTURING PORTABLE AND INEXPENSIVE STOCHASTIC LASERS FOR MICROSCOPY APPLICATIONS

According to a study published by **ICMM** researchers, this is the **first time** such lasers have been obtained using electrical power. This breakthrough is the first realisation of electrically powered stochastic lasers, which can be carried in a briefcase making their use cheaper and easier. This new technique enables the modification of a conventional laser, which can be operated using any power supply, by treating the conventional laser with an ablation technique, modifying the roughness of one of the laser mirrors by means of a high-energy pulsed laser (*Nature Photonics volume 16, 219-225* (2022).

EXISTENCE OF 'IMPOSTER' PARTICLES, A NEW BREAKTHROUGH TOWARDS ROBUST QUANTUM COMPUTING

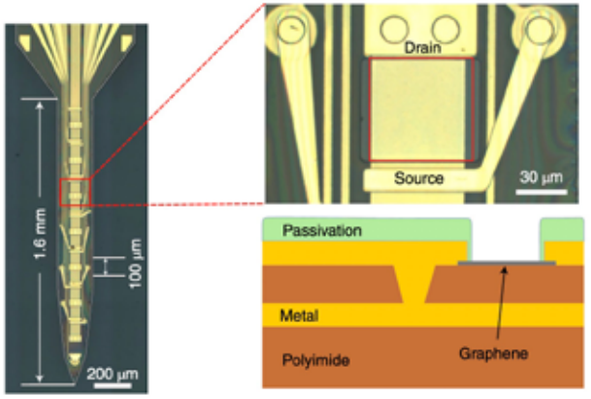
Scientists at **ICMM**, **ICN2** and the ISTA (Institute of Science and Technology Austria) have discovered physical particles that masquerade as Majorana particles. According to the theory, Majorana particles are the key to more robust quantum computation than at present, due to their resilience to external perturbations, known as 'quantum decoherence'. The findings of this joint work, which applies two different measurement techniques combined with a theoretical analysis, help to greatly reduce the interpretation uncertainties in experiments (*Nature 612, 442* (2022).



Schematic representation of the nanowire device that is the basis of the proposed experimental protocol to combine tunnelling and Coulomb spectroscopy in the same device, reducing the ambiguities present in the detection of Majorana particles. In turquoise, the Al-coated InAs core can be seen (blue). In yellow, the Ti/Au connections.

IMPRO[illegible]PPING OF BRA[illegible]

Researchers from **ICN2** and **IMB** use flexible graphene deep neural probes (gDNPs) in a study aiming to record neural activity. These devices can simultaneously record infralow oscillations (<0.1 Hz), typical local field potentials (0.1-80 Hz) and higher frequencies (80-600 Hz), using the same recording site, thus particularly benefitting preclinical epilepsy research and potentially providing clinical biomarkers to improve the delineation of the seizure onset zone (*Nature Nanotechnology; 17, 301*, 2022).



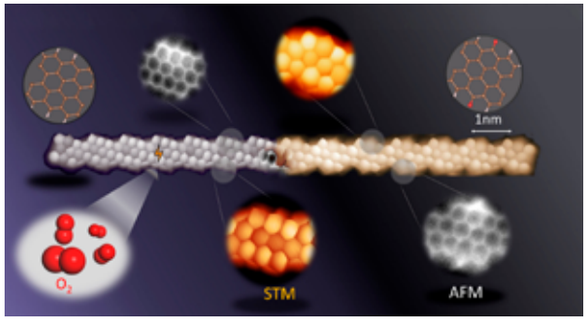
Optical microscope image of a gDNP containing 14 transistors. The area highlighted in red shows the graphene detection area (60 × 60 µm2) of the transistor. The lower right figure shows the schematic cross-section of a transistor.

USE OF TWO-DIMENSIONAL MATERIALS IN MAGNETIC RANDOM-ACCESS MEMORIES (MRAM)

Non-volatile magnetic random-access memories (MRAMs) are becoming essential for developing energy-efficient computing technologies. At the same time, two-dimensional van der Waals materials enable the development of ultra-compact devices by engineering multilayer materials with predefined properties. An **ICN2**-led study provides an overview of current developments and challenges with respect to MRAM by analysing the opportunities that can arise from incorporating two-dimensional materials technologies and the key drivers for possible disruptive improvements in advanced technologies (*Nature 606, 663*, 2022).

STABILISATION OF SURFACE-SYNTHESISED GRAPHENE NANO-RIBBONS WITH ZIGZAG EDGES

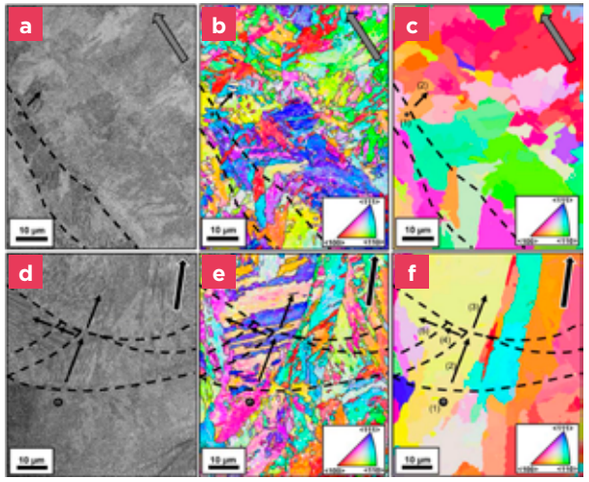
An international team involving the **CFM**, the UPV/EHU and the DIPC has succeeded in implementing chemical stabilisation strategies in the surface synthesis of graphene nano-ribbons with zigzag edges. These nano-ribbons are among the structures that are stirring up greatest interest as they provide materials with exciting electronic and even magnetic properties, having potentially use in a wide variety of applications, including quantum technologies. For their final application in real devices, these structures must be manipulated and transferred outside the vacuum, which would degrade the materials and thus jeopardise their potential use. Consequently, there is a need to devise new device-fabrication processing strategies. This work by CFM researchers is the first to have succeeded in implementing protection/deprotection strategies for the surface synthesis of graphene nanostructures (*Nature Chemistry, Vol. 14, 1451-1458* (2022).



Microscope image of a reactive graphene nano-ribbon (left) and one protected from atmospheric degradation (right).

IMPOR[illegible] G PARAM[illegible] OY TEXTURE

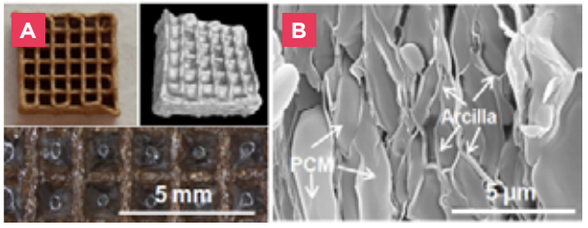
Additive manufacturing (AM) in industry is hampered by the limited availability of materials. In the case of steels for tool manufacture, the choice is reduced to high-cost superalloys or special high-alloy steels, such as maraging steels. To a large extent, these limitations stem from a fundamental lack of understanding of the microstructures obtained by these new technologies as well as a lack of knowledge on how process parameters and the use of integrated heat treatments can control the structure and properties in a wide range of alloys. This work developed at **CENIM** studies the effect of different printing parameters (printer model, laser emission mode and powder layer thickness) on the structure of a maraging steel produced by AM, using laser powder bed fusion (LPBF) technology (*Scientific Reports, 12, 16168*, 2022).



Correlating **(a,d)** scanning electron microscopy (SEM) and **(b,c,e,f)** electron backscattered diffraction (EBSD) results corresponding to the cross-section **(a–c)** and longitudinal **(d-f)** of a Maraging steel processed by additive manufacturing using laser melting technology in powder le-cho.

NOVEL 3D THERMAL ENERGY STORAGE MATERIALS BASED ON HIGHLY POROUS PATTERNED PRINTED CLAY SUPPORTS INFILTRATED WITH MOLTEN NITRATE SALTS

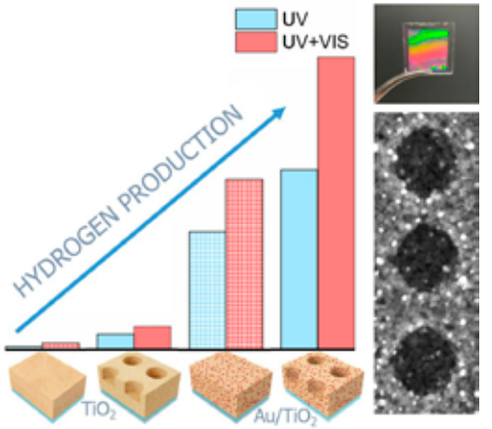
Phase change materials (PCM) for thermal energy storage (TES) systems in concentrated solar power (CSP) applications have the drawback of molten PCM leakage, which considerably reduces storage efficiency. To address this problem, a novel approach is presented based on the development of three-dimensional TES structures (3DTES) consisting of low-cost clay (vermiculite) supports printed with highly porous patterns that are infiltrated with a molten sodium nitrate salt. The obtained 3DTES are lightweight, exhibit high PCM encapsulation capacity (~78%), preventing molten salt leakage, also showing high thermal energy storage efficiency (~80%) and high thermal stability. These results obtained at **ICV** open up new opportunities to fabricate affordable 3D materials that act as promising supports for PCM and with exceptional performance for energy storage applications in CSP (*Additive Manufacturing, 59, 103108*, 2022).



3D thermal energy storage materials: **(A)** 3D porous structures based on clays obtained by direct ink printing and subsequently infiltrated with molten salts as phase change material (PCM) and **(B)** scanning electron microscopy micrograph of the inside of a clay filament composing the 3D structure showing the PCM filling the gaps between the clay layers.

2D PHOTONIC CRYSTALS AS PHOTOCATALYSTS FOR THE PRODUCTION OF H_2

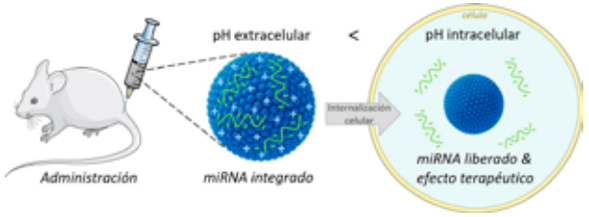
The combination of noble metals with broadband semiconductors allows excitation of surface plasmons in the visible range which, upon relaxation, generate hot electrons that can be used in catalysis. **ICMAB** has developed this strategy, affording an operating range of the semiconductor (typically TiO2) to be extended to the visible spectrum, although the photocatalytic conversion efficiencies are usually low. Their study demonstrates how a 2D photonic crystal of TiO_2 decorated with Au nanoparticles improves the light harvesting efficiency of the oxide beyond the UV region. These nanostructures are easily fabricated by combining two scalable techniques: soft nanoimprint lithography and microwave nanoparticle synthesis. These results may open new avenues in solar harvesting for hydrogen production using photonic crystals as photocatalysts. (*Advanced Energy Materials, 6 2103733* (2022).



The photocatalytic efficiency of titanium dioxide is extended to the visible by combining the plasmonic resonances of gold colloids and the light trapping properties of a 2D photonic crystal. The Au/TiO2 photonic substrates showed a maximum hydrogen yield (H2) of 8.5 mmol-gcat-1-h-1 attributed to photonic-plasmonic effects.

DEVELO[illegible]RUG FOR THE DELIVE[illegible]IERAPIES

An **ICMAB** paper reports the design of novel lipid nanovesicles for the delivery of miRNA and other small RNAs. The nanovesicles are pH-sensitive, and are capable of releasing miRNA into the cytosol of tumour cells, triggering a tumour suppressor response. These nanovesicles have a controlled structure (unilamellar size < 150 nm), are colloidally stable (> 6 months) and are prepared using a green and scalable technology, which are prerequisites for clinical practice. In addition, the vesicles protect miRNAs from RNAases and, when injected intravenously, reach liver, lung and neuroblastoma tumours. These stable nanovesicles with adjustable pH sensitivity constitute an attractive platform for the efficient delivery of small therapeutic RNAs and their exploitation in clinics (*Small, 3, 2101959*, 2022).



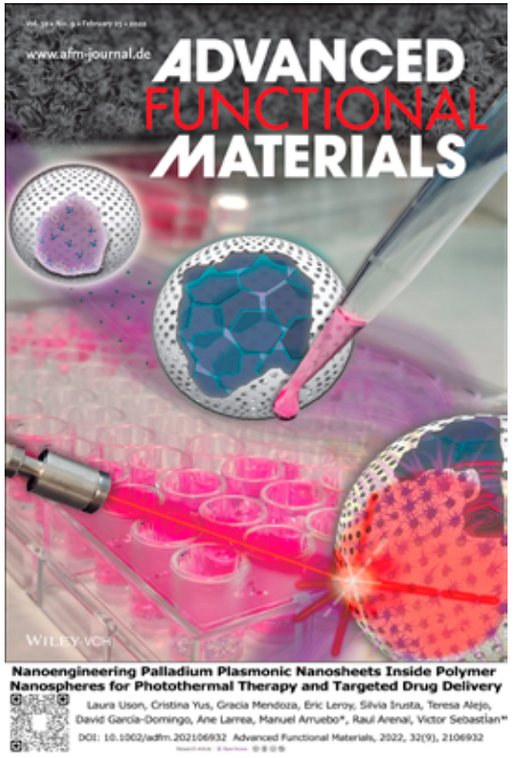
Nanoparticles with high stability at room temperature for the development of a new drug based on therapeutic small RNAs for neuroblastoma treatment.

CAN LIGHT POLARISATION BE CONTROLLED WITH HYBRID PEROVSKITES?

Light polarisers are ubiquitous components in today's optoelectronic devices such as displays or cameras. However, control over light polarisation remains an unresolved challenge as existing display technologies lead to highly significant losses in light intensity. In this context, hybrid metal-organic halide perovskites can play a decisive role because their synthesis allows their optical properties to be tuned while maintaining high photoluminescence and a low non-radiative recombination rate. The **ICMS** paper describes the fabrication of highly aligned and anisotropic lead iodide and methylammonium perovskite nanowalls by flush-angle physical vapour deposition (PVD). The high degree of alignment of these nanowalls provides the samples with anisotropic optical properties for both light absorption and luminescence, so their implementation in optical devices provides them with a polarisation-sensitive response (*Advanced Materials, 34, 18, 2107739*, 2022).

BIODEGRADABLE NANOCAPSULES TO ELIMINATE TUMOUR CELLS OR RELEASE DRUGS

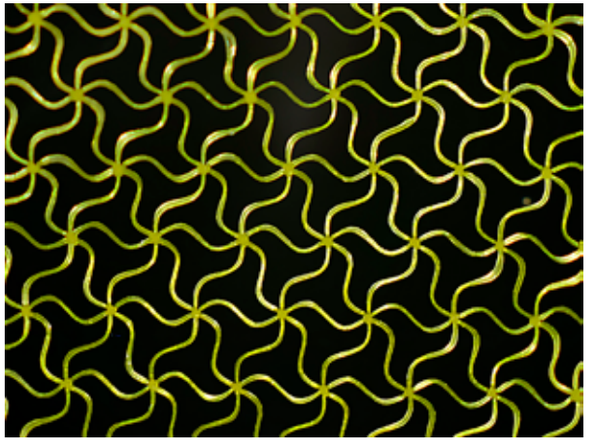
Researchers at **INMA** in collaboration with Ciber-BBN and IIS Aragón are developing biodegradable nanocapsules that simultaneously contain drugs and palladium foils so that, by means of external light stimuli, they can eliminate tumour cells or activate the targeted delivery of these drugs. This could be considered a first step towards the design of hybrid systems at the nanoscale with unprecedented precision and with a functionality applicable to other nanocarriers in which stimulation of their multifunctionality with light is sought (*Advanced Functional Materials, 32, 2106932*, 2022).



Plasmonic palladium nanosheets inside polymer nanospheres for photothermal therapy and targeted drug delivery.

LIQUID [illegible]R OBTAINED BY ELE[illegible]PPLICATIONS IN BIOMEDICINE OR ROBOTICS

In the Advanced Manufacturing laboratory at **INMA**, a new internationally pioneering research line has started on electro-writing by fusion of liquid crystal elastomers. These intelligent materials respond mechanically to an external stimulus, in this case, temperature. The methodology developed has made it possible to digitally deposit ultra-thin liquid crystal elastomer fibres with diameters of just a few microns. As a result, microstructures of these materials have been obtained having tiny dimensions, which were previously inaccessible with other structuring techniques. The proposed new technique outperforms all current methodologies for microfabrication of these materials in terms of size and control of molecular orientation, allowing unprecedented smart microstructures with on-demand mechanical deformation to be obtained with potential applications in biomedicine or soft robotics. (*Advanced Materials, 2209244*, 2022).



Detail of an active microstructure of liquid crystal elastomer obtained by electroscribing.

MATERIALS WITH HIGH ELECTRICAL CONDUCTIVITIES BY EXPLOSIVE PERCOLATION

Scientists at **ICB** have demonstrated a phenomenon never before observed in carbon materials, explosive percolation, a phenomenon that is difficult to observe experimentally. Research shows that a synthesised graphene oxide with a high degree of oxidation forms segregated networks with a polymeric synthetic latex, leading to very low percolation thresholds. This leads to conductivities that exceed densely packed networks of reduced graphene oxide illustrating the great potential of explosive percolation for designing composites with dramatically improved electrical transport properties by means of low loadings of the percolating conductive material (*Nature Communications 2022, 13*, 6872).

NEW ELECTROCATALYSTS FOR GREEN HYDROGEN PRODUCTION

Water electrolysis using proton exchange membranes is a promising technology for producing green hydrogen from renewable energies as it allows very high current densities to be obtained efficiently. For this technology to be truly competitive, it is necessary to significantly reduce the amount of iridium in the electrocatalysts. Researchers at the **ICP** propose the use of catalysts prepared from double iridium perovskites (Sr2CaIrO6) as an alternative to those currently used (*Nature Communications, 13(1), 7935*, 2022).

CATALYTIC PROCESS TO GENERATE DEGRADABLE POLYMERS USING BIOMASS-DERIVED PRODUCTS

A novel catalytic process has been presented by **IIQ** researchers to generate degradable polymers (polysilylethers) from a starting source of biomass-derived products such as 5-hydroxymethylfurfural or vanillin (lignin derivatives) in combination with hydrosilanes. The platinum catalysts developed have revealed excellent activity, using very low catalyst loadings, giving rise to a variety of copolymers with highly diverse architectures (statistical and alternating). These polymers are also recyclable under acidic conditions, making them a sustainable alternative for obtaining polymeric materials (*Angew. Chem. Int. Ed. 61, e202113443*, 2022).

PHOTOPHARMACOLOGY TO SOLVE CARDIAC PROBLEMS FOR DEGRADABLE POLYMER GENERATION USING BIOMASS-DERIVED PRODUCTS

Researchers at the **IQAC** have developed molecules that allow the activity of beta-adrenergic receptors located in cardiomyocytes (cells of the cardiac muscle) to be controlled by light. This research shows the potential of photopharmacology (light-controlled drugs) for the study and control of cardiac physiology and its applicability in living beings. Furthermore, results of this work point to the generation of more precise future therapies that have fewer side effects (*Angew. Chem. Int. Ed., 61, e202203449*, 2022).

IODINE [illegible] PHERIC OZONE [illegible] E ARCTIC

Unlike bromine, the effect of iodine chemistry on the amount of surface ozone in the Arctic is poorly recognised. **IQFR** researchers have made ship-based measurements of halogen oxides in the Arctic boundary layer during the sunlight period from March to October 2020, showing that iodine increases tropospheric ozone destruction in spring. These observations show that reactions between iodine and ozone proved to be the second largest contributor to ozone loss during the study period, after the photolysis-initiated loss of ozone and ahead of that of bromine (*Nature Geoscience, 15, 770-773*, 2022).

BLUE SHARK AS AN INDICATOR OF PERSISTENT ORGANIC POLLUTANTS

An international study with the participation of **IQOG** researchers has made it possible to update the level of contamination by persistent organic pollutants (POPs), highlighting the usefulness of the blue shark as a bioindicator of current POP contamination in the Atlantic Ocean. The study has deepened the toxicokinetic knowledge related to pollutants in this species and has made it possible to establish a risk profile for human health, depending on their consumption (*Environmental Pollution, 309,119750*, 2022).

NEW PROTONATED CERAMIC MEMBRANE-BASED SYSTEM FOR INDUSTRIAL HYDROGEN PRODUCTION

Ceramic proton reactors offer efficient hydrogen extraction from ammonia, methane and biogas by coupling the endothermic reforming reactions with the heat of separation and electrochemical compression of the gas. **ITQ** scientists participate in an international team that has developed a new electrified reactor to obtain hydrogen in a more sustainable and energy-efficient way. The team has successfully combined 36 individual ceramic membranes into a scalable, modular generator, which produces hydrogen and various fuels (biogas, CH4 and NH3) from electricity with almost zero energy loss. This is the first time that this technology has been shown to produce hydrogen industrially (*Science 376, 6591, 390* (2022).

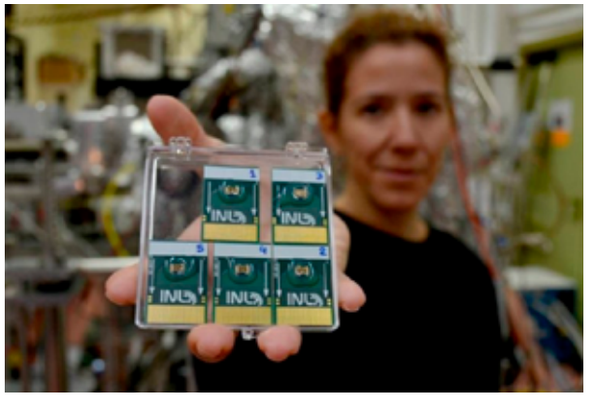
CAM TRANSFER ACTIVITIES

- Researchers from **ICN2** and **IMB-CNM**, among others, have patented a graphene-based device capable of recording electrical signals from the brain, facilitating intelligent neurological therapies able to treat neurological diseases, such as epilepsy and Parkinson's disease. Licensed to Inbrain Neuroelectronics, S.L., it represents a disruptive technology in the field of neuroscience and has enabled the creation of a Knowledge-Based Business.
- **IO** researchers have licensed a new family of pulsed lasers to FYLA Laser, S.L. These devices combine ultrafast lasers (with 200 fs pulses) and ultralong lasers (cavities of tens of km), with native repetition frequencies of the order of kHz and high peak powers of several MW, which extend the versatility of fibre optic sources and have applications in areas ranging from environmental monitoring to materials processing.
- **ICV** researchers have licensed a patent to the Fábrica Nacional de Moneda y Timbre (Spanish Royal Mint) to develop materials and processes that enable the creation of "optical keys" to prevent product counterfeiting.
- **ICTP** researchers have patented an aerodynamic seal that adapts to the geometry of complex aircraft surfaces, reducing both manufacturing and maintenance time and costs. This technology has been licensed to the company Adática Engineering S.L.
- **INCAR** researchers have patented a system based on a counter-current moving bed reactor for CO_2 capture in ships. The patent, licensed to the company SEABOUND, represents a breakthrough to avoid CO_2 emissions in the maritime system.
- **IQAC** researchers have patented a product that attracts flies, whose use as a mass trapping system, can minimise insecticides usage and their harmful effects.

- **IQM** [illegible] patent to the company Alodi[illegible]duce neurological and motor complications characterised by cold and mechanical hypersensitivity, which results in pain and numbness in hands and feet (peripheral neuropathy), in cancer patients.

- **ITQ** researchers have licensed a procedure the company Sener Ingenierías y Sistemas SA for the direct reduction of a material by means of microwave radiation, dispensing with the need to use chemical reducing agents or electrical contacts.

- An international team with CSIC participation has succeeded in building and validating a novel biosensor for the ultra-sensitive detection of the hepatitis C virus (HCV). This graphene transistor-based device can detect key proteins of the virus. Researchers from the **CAB**, the **ICMM**, the International Iberian Nanotechnology Laboratory (INL, Portugal) and the Institute of Physics of the Czech Academy of Sciences have joined forces to create the device, combining three complementary research lines: molecular biology, nanotechnology and microelectronics.



The biosensor, assembled and ready for use.
Image: Ángela R. Bonachera ICMM-CSIC.

- Electrical stimulation devices adapted to different cell-culture platforms have been developed at the **IMN-CNM**. Metallic electrodes have been used for this purpose and, in December 2022, the patent was granted for nanostructured electrodes for electrical stimulation of cells in culture, devices, systems and associated procedures.

- The implementation of the NEOTEC SNEO-20211269 and SNEO-20211099 projects has started for the business development of the CSIC spin-offs g2-Zero and Future Voltaics SL founded on the basis of licensed patents whose inventors belong to the MBE-QNFO group of the **IMN-CNM**.

- Nanostine S.L., the IMN-CNM and ICMM spinoff, has been selected in the ranking of the most innovative start-ups in Spain in 2022 [web link] and has won the Battle Pitch organised by Espacio de Innovación Bulevar Coworking (Comunidad de Madrid) in the Sustainability and Circular Economy field, and the Award for the best pitch in the Aerospace/Aviation theme in Startup OLÉ 2022.

- The TBC **Sensorika Lab Innovation S.L.** has been created, promoted by **IETcc** research staff in collaboration with the industrial partner CHATU TECH S.L. with the aim of developing, industrialising and commercialising the technology and carrying out the service activity of evaluating the durability of reinforced concrete structures.

- **ICMAB** has developed a drug counterfeiting-prevention technology by creating the spin-off **Molecular Gate SL**, which has the licence to implement this patented technology. The nanotechnology-based method makes it possible to improve product labelling in order to prevent counterfeiting. The technology consists of controlling the nanostructure of the printed elements on the surface of the product, taking into account their molecular orientation and the composition of the materials. The concept is that the printed security feature is only revealed when viewed with a simple polarisation system, such as a mobile phone camera, while remaining invisible to the naked eye.

The founders showing their technological development.

SCIENTIFIC PRODUCTION 2022

SCIENTIFIC-TECHNICAL AREAS	INDEXED ARTICLES	NON-INDEXED ARTICLES	BOOKS	BOOK CHAPTERS	THESES
SOCIETY	**531**	**125**	**88**	**322**	**49**
HUMANITIES AND SOCIAL SCIENCES	531	125	88	322	49
LIFE	**8,715**	**321**	**92**	**536**	**441**
BIOLOGY AND BIOMEDICINE	2,570	71	14	51	197
FOOD SCIENCE AND TECHNOLOGY	1,728	56	25	112	57
AGRICULTURAL SCIENCES	1,535	70	15	130	98
NATURAL RESOURCES	2,882	124	38	243	89
MATERIA	**6,494**	**241**	**39**	**179**	**290**
MATERIALS SCIENCE AND TECHNOLOGY	1,942	115	21	101	115
PHYSICAL SCIENCE AND TECHNOLOGIES	3,126	87	15	56	112
CHEMICAL SCIENCE AND TECHNOLOGIES	1,426	39	3	22	63
WITHOUT AFFILIATION	544	22	-	8	-
ADDITION AREAS	**16,284**	**709**	**219**	**1,045**	**780**

Source: ConCIENCIA Data at 05/05/2023.

COLLABORATIVE STRUCTURES: INTERDISCIPLINARY THEMATIC PLATFORMS AND NETWORKS

The CSIC's strategic planning promotes a collaborative culture between institutes and research staff to foster interdisciplinarity, aiming to solve high-impact challenges through quality research.

The Vice-Presidency for Scientific and Technical Research coordinates and promotes the existing collaborative structures: **Interdisciplinary Thematic Platforms** (PTI) and **scientific-technical collaboration networks** (Conexiones. CSIC). Proof of this promotion is the relevant role played in the strategic planning of the CSIC (Strategic Plan 2022-2025) and the MICIN (Transfer and Collaboration Plan to Accelerate Innovation).

The Interdisciplinary Thematic Platforms (Spanish acronym PTI) and Conexiones research hub have been monitored and evaluated during 2022 through regular meetings, with the design of new evaluation indicators and impact analyses in Internationalisation. In the area of outreach and dissemination, a new outreach protocol has been drawn up, in collaboration with the President's Office, and a news blog has been set up.

INTERDISCIPLINARY THEMATIC PLATFORMS (PTI)

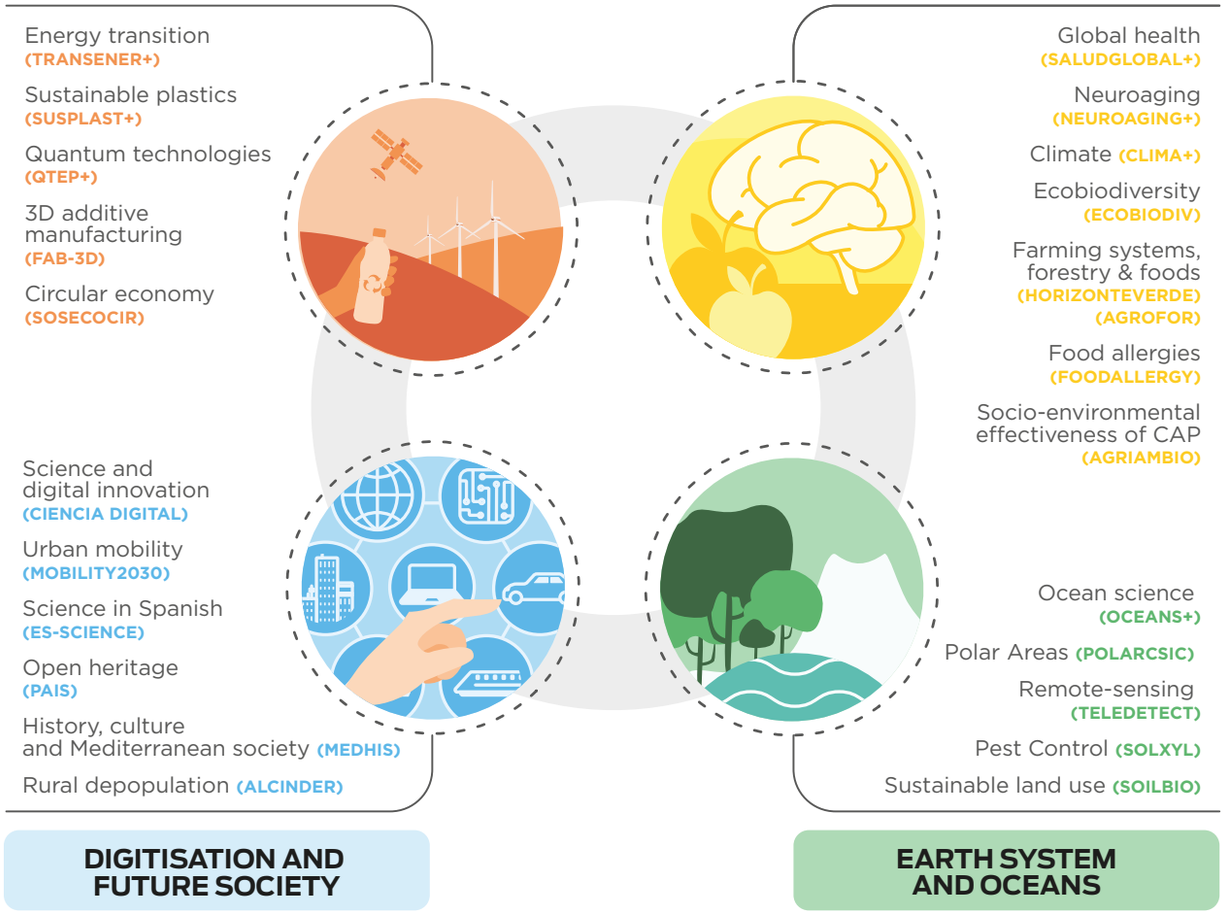
The PTI have continued their consolidation process and their added value for the institution has materialised in manifold research results. Their research and innovation mission and their conception to address multidisciplinary challenges of high scientific, economic and social impact has made it possible to implement the European funds within the Recovery, Transformation and Resilience Mechanism in various knowledge areas (PTI+) since 2021. Public, private and third sector agents have collaborated in this implementation.

In 2022, the nomenclature of the PTI was clarified, adopting the name PTI+ for those financed with European Recovery Funds.

More than 21 proposals have been active during 2022, covering most of the **Sustainable Development Goals (SDGs) and disruptive challenges from different knowledge areas**: Energy and Industry; Health and Environment; Digitalisation and Future Society; Ocean and Earth System.

The **PTI AGRIAMBIO** has officially been inaugurated through the signing of an agreement, fruit of the collaboration between the CSIC and the MAPA (Spanish Ministry for Agriculture, Fisheries and Food).

In addition, the outlines of two other proposals have been drawn up in close collaboration with the Spanish Ministry for Ecological Transition and Demographic Challenge to achieve missions in climate (**PTI CLIMA+**) and marine (**PTI OCEANS+**) strategies.



PTI. MILESTONES 2022

ENERGY AND INDUSTRY

PTI TRANSENER+

- Manufacture of a 10kW vanadium redox flow battery prototype, design and construction of a fuel-cell test bench for power ratings up to 50 kW, as well as several pilots to demonstrate CO_2 capture calcium looping technologies.
- Finalised the designs of various demonstration or pilot plants (hydrogen, biofuels and oxy-fuel technologies).
- Demonstration of a vanadium redox flow battery pilot (50 kW).
- Protection of software for redox flow battery management system.
- Processing of six patents related to CO_2 capture technologies.

PTI-TRANSENER. 10 kW vanadium flow battery - PTI TransEner (CSIC news March 2022).

PTI SU

- 160 high-impact research results published in specialised journals and in applied research and transfer, protected by **12 patents**.
- Creation of **two CSIC spin-offs** specialised in producing bioplastics and the eco-design of sustainable plastics.
- Financing the construction of four pilot plants (TRL up to 6-7), through REC-EU funds, dedicated to bioplastics production and the design of enzymatic biocatalysts for plastics degradation and functionalisation, the generation of eco-design-based prototypes and the certification of biodegradable and compostable plastics.

PTI QTEP+

- New facilities for the fabrication and characterisation of solid-state quantum technologies have been secured: Helium-focused Ion Beam and the extension of an electron microscope within the Alba Synchrotron.
- CSIC Quantum Communications Laboratory was set up and has been awarded a project for the creation and deployment of the national quantum key distribution infrastructure as part of the European Quantum Communications Infrastructure, in collaboration with UPM, ICFO, Telefónica and Cellex.

PTI-QTEP+.
ITEFI-CSIC Quantum Communications Laboratory.
Source: ITEFI Laboratory website.

- The spin-off Inspiration-Q, which commercialises quantum and quantum-inspired algorithms created by PTI groups, has been awarded a Neotec project to further develop these algorithms.

PTI FAB3D

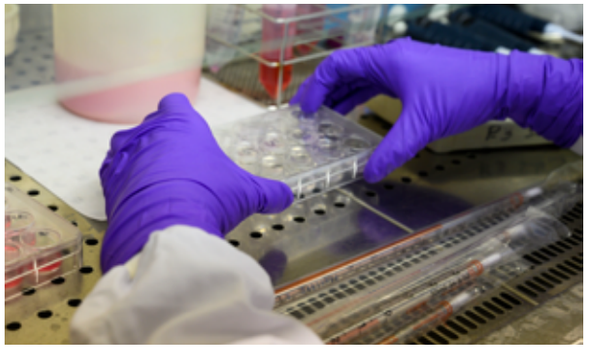
- Creation of a new SCT for Additive Manufacturing of metal parts in the service catalogue.
- Numerous training and dissemination actions, such as the Modular Programme/Master in Additive Manufacturing (UNED) and the #PIA2022 Project (with Fundación COTEC) on *'Additive manufacturing to re-industrialise depopulated rural areas in Spain'*.

PTI-FAB3D. PTI researchers at the Metal Madrid fair (2022).

HEALTH AND ENVIRONMENT

PTI SALUDGLOBAL+

- Clinical trials were completed of two repositioning drugs identified as antivirals against COVID-19, representing the first time CSIC has acted as the sole sponsor of research-initiated clinical trials.



PTI-SALUDGLOBAL. Work in a CNB-CSIC laboratory, presenting a technology against covid-19. CSIC.

- Pre-clinical efficacy and immunogenicity testing of the vaccine candidate MVA-CoV2-S for COVID-19 was completed. The Mpox working group, set up in response to the outbreak declared as a public health emergency by the WHO, demonstrated the Mpox virus was present in the air and saliva of infected patients, pointing to potential airborne transmission.
- Research results patented in the areas of therapeutics, diagnostics, vaccines and containment and protective measures and are in the licensing and commercialisation phase. These include: a nasal spray with antiviral activity and therapeutic antibodies against SARS-CoV-2, and air samplers for the monitoring and identification of viruses and other pathogens in indoor environments.

- The c…egan open access production… id-19 serological tests developed by the PTI.

- Study on real-time monitoring of the presence of West Nile virus in mosquitoes as an early warning system to prevent transmission to humans.

PTI NEUROAGING+

The CINC (Cajal International Neuroscience Centre), as central hub of the PTI, has brought about collaborative projects funded under both national and European calls, as well as publishing scientific articles and protecting research results.

- Study of ellagic acid and its metabolites urolithins A/B in lysosomal storage disorders in cellular and murine models in the context of memory impairment.

- Research on changes in gut microbiota composition and metabolic activity leading to gastrointestinal dysfunction in Parkinson's disease, project *'E2F4DN as a gerotherapeutic agent for brain ageing (GeroE2F4DN)'*.

- Among the potential pharmaceutical applications, mentions should be made of the outstanding work presented by PTI+ groups for the *'Development of the use of the drug ICI-118,551'* (patent PCT/EP2019/084822) by Varsity Pharmaceuticals to treat glioblastomas and Von Hippel-Lindau (VHL) rare disease in humans, or potential probiotic applications developed with isolated strains of *Akkermansia muciniphila* in centenarians and the development of intestinal organoids to explore host-microbiota interactions.

PTI ECOBIODIV

- Forty-one scientific publications in indexed journals and 23 databases published in gbif, github and digital. CSIC.

- Kick off of the 'Bioacustic' project, acoustic monitoring of Climate Change in National Parks.

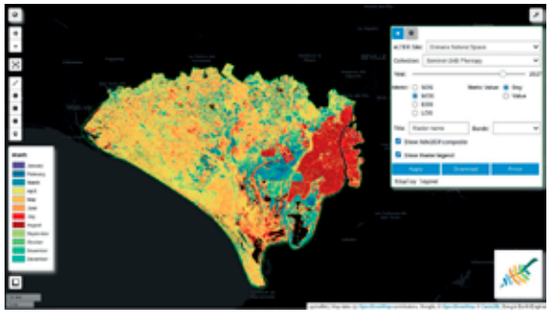
- Project on bats, in which systems were designed and manufactured for capturing, ringing and placing acoustic devices and accelerometers on bats.

- Installation of two cosmic ray sensors (CRNS) in Doñana national park, in order to estimate soil moisture and vegetation cover, with data processing and estimation of energy and CO_2 fluxes.

- GPS placement and tracking to assess the effects of grazing on fire prevention.

- In collaboration with **PTI TELEDETECT**, development of Phenoapp (application for phenology data query and analysis) and PyVPP (Python package for downloading high resolution pan-European vegetation phenology and productivity data).

- In collaboration with **PTI SALUDGLOBAL**, development of the Natural Heritage project with exhibition spaces in various National Parks.



PTI-ECOBIODIV.
Main interface of the PhenoApp application showing the Doñana Natural Area. PhenoApp is based on Google Earth Engine for phenology monitoring.

PTI HORIZONTEVERDE

- The 'green-horizon' platform was officially launched in June, with the participation of 38 groups and 17 centres.

- Liasson with the company CEPSA with a view to signing two collaboration agreements on the use of biomass and oil crops to obtain biofuels. Work is also being done to promote collaboration both internally and with companies, corporations, technology platforms and foundations.

PTI AGROFOR

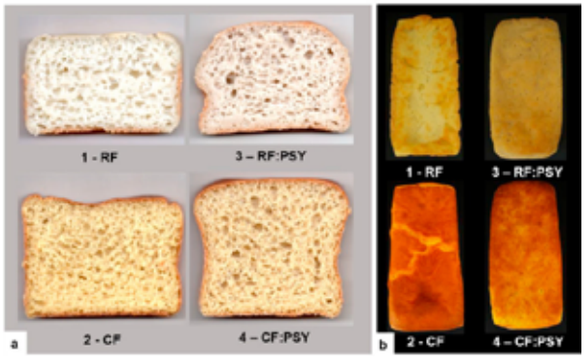
- Researchers formed the organising committee and most of the scientific committee members of the 10th Plant Breeding Congress, participating in the development and editing of the associated book. Aspects of crop biodiversity to face the threats of climate change were discussed with the aim of optimising agricultural and forestry systems.

- This PTI has become part of the FITONET Operational Group promoted and coordinated by the Fundación Cellbitec, in which various companies from the agri-food sector and farmers' groups participate.

PTI FO

- Selection of biomarkers to detect allergens to be used in the new study *'Combination of omics techniques and nanotechnological biosensors for the detection of biological risks in seafood'*, as well as the development of compounds for immunotherapy in food allergy.

- Identification of different alternative matrices to develop hypoallergenic sustainable foods, including chickpea, pea or psyllium flour, to improve the technological, functional, sensory and baking properties of gluten-free products.



PTI-FOODALLERGY.
Effect of replacing rice flour (RF) with chickpea flour (CF) and adding psyllium (PSY) on the appearance of the crumb (a) and crust (b) of gluten-free breads.

DIGITALISATION AND FUTURE SOCIETY

PTI CIENCIA E INNOVACIÓN DIGITAL

The **'digital science and innovation platform'** was launched with an official event held in June 2022 at the CSIC headquarters, its activity is aimed at integrating new research and technical staff from different groups and different knowledge fields. It has participated in transfer conferences presenting, among others, the Ms.W project (Misinformation widget). Also, in collaboration with the FGCSIC, it has been involved in the Spanish GAIA-X Hub.

PTI MOBILITY2030

- This platform has led the project *'Next Generation Tools for advanced Mobility solutions, NEXT4MOB'* whose objective is to create models of urban mobility and provide solutions to possible incidents therein, with the participation of other companies and Public Research Organisations (PROs): AUVASA, TRANSyT, UPM and UNICAN

- Participation in the large electric car project on the recovery and reuse of critical raw materials from electric vehicles, led by the Volkswagen Group and SEAT (Future: Fast Forward) and financed by the Spanish Ministry of Industry, Trade and Tourism in the PERTE VEC call, specifically in the Circular Economy section.

PTI-MOBILITY2030.
Lithium ingots, an element used in electric vehicle components.

PTI ES CIENCIA

- Coordination of the interdisciplinary research project on terminology in Spanish, TeresIA, to be developed in collaboration with other PROs, Public Administrations and Associations (Instituto Cervantes, Asociación Española de Terminología, European Commission Directorate General for Translation, UPM and the Barcelona Supercomputing Centre), and funded within the PERTE framework of "New Language Economy".

- Drafting of a document of conclusions and recommendations on scientific publications for the Ibero-American Ministers of Science and Innovation, which was presented at the 5th Meeting of Ministers and High Authorities of Science, Technology and Innovation of Ibero-America.

PTI PAIS

- Publication of 44 articles involving various groups pertaining to the platform and other publication formats such as books, book chapters, infographics, reports and datasets.

- Organisation and participation in numerous dissemination events (conferences, congresses, competitions, fairs, meetings, videos, radio, interviews...) and training (summer courses, seminars, workshops, specialisation courses, seminars...).

- Partic[illegible]rojects such as E-RIHS IP, AR

- Acquisition of funding to implement the pilot services of the Spanish Node of the European Heritage Science Infrastructure.

PTI-PAIS, Conference: *'Trayectoria con Entidades Asociadas'* (Roadmap with Associated Entities), held in the CSIC Assembly Hall (Madrid). June 2022.

PTI MEDHIS

- Implementation and start-up of *'MEDhis Digital Observatory of Intercultural Contacts in the Mediterranean'* (MEDhis Observer) with a grant from the Ministry.

- Kick off of the project *'Deciphering Qur'anic Dynamics in Spain'*.

- Participation in the multidisciplinary team of the ERC Advanced Grant project *'Medieval Appetites: food plants in multicultural Iberia (500-1100 CE)'* (MEDAPP).

- Publication of the dossier Processions and Royal Entries in the Petrification of *Space during the Medieval and Early Modern Periods. Culture & History Digital Journal, 11 (2)* The MEDhis Connect business transfer concept is being developed through two pilot tests with encouraging results.

PTI ALCINDER

The Community Plant Variety Office granted the highest level of protection at international level to the Narcea Rose, the only rose for use in the perfume industry with recognised breeders and with this level of protection. This was licensed exclusively to Aromas del Narcea S.L., a CSIC Technology-Based Company linked to the PTI. Another PTI group developed the in vitro micropropagation process for Rosa Narcea, protected under Trade Secret and exclusively licensed in 2022 to the Technology-Based Company and sub-licensed to Invisa Biotecnología Vegetal S.L. to reproduce the plant on a large scale.

EARTH SYSTEM AND OCEANS

PTI POLARCSIC

- These new collaborations improve both national and international positioning, including the International Arctic Science Committee (IASC) or the Spanish node of the Scientific Committee on Antarctic Research (SCAR), as well as private companies (Buff and Ternua) with the aim of developing sustainable fabrics for technical clothing manufacture.

- Communication and dissemination actions to increase awareness and social sensitivity towards the changes happening in polar areas. These include the photographic exhibition and digital book *Una Mirada Polar* and the book Observando los Polos, or the second edition of the webinars *'Café con Hielo'*.

PTI TELEDETECT

- Holding of foresight meetings and internal and external collaboration with companies and administrations, including the first conference on *'Innovation in Remote Sensing'* and the second edition of the course *'Remote sensing as a global tool'* (CSIC-UIMP), which placed special emphasis on the use of remote sensing for monitoring the volcanic eruption of La Palma. Also, collaboration with the Asociación Española de Teledetección (Spanish Association of Remote Sensing), the universities of Valencia and León, the MAX PLANCK Institute and ONERA, in a workshop to carry out an intercalibration of spectro-radiometers, drones and cameras, among others, with the aim of developing reproducible protocols for checking instruments calibration.

PTI-TELEDETECT. Participants in the inter-comparison and calibration day of optical and thermal sensors in the framework of WP6 activities organised by PTI TELEDETCT in collaboration with the field and laboratory spectroscopy group of the Asociación Española de Teledetección (AET) in September 2022.

PTI SO

- Important results have been materialised in the publication of several scientific articles and participation in various national and international congresses.

- Funding has been obtained through various projects, notably *'BeXyl (Beyond Xylella)'*, a European project led by the CSIC (HORIZON-CL6-2021-FARM2FORK-01-04) which seeks to develop integrated control strategies to mitigate the economic, social and environmental damage caused by *X. fastidiosa*.

PTI SOILBIO

- Study on the equitable distribution of different plant species and the presence of rare species for improved management of terrestrial ecosystems by limiting plant disease risks (*Proc Natl Acad Sci USA. 2021; 118(7): e2019355118*).

- Study for the identification of critical points for soil nature conservation (Nature, 610 693-698, 2022).

- Collaboration in the development of SHuBest, a multilingual app (Spanish, English, Chinese) for the dissemination of good practices for the sustainable use of soil and water in agricultural systems.

SCIENTIFIC-TECHNICAL COLLABORATION NETWORKS (CONEXIONES CSIC/CSIC HUBS)

In the White Papers, Challenges 2030, the CSIC identified a joint strategy to define its priorities and research needs in the coming decades. They highlighted the promotion of scientific and technical collaboration networks, which was the seed giving rise to the CSIC-HUBs, i.e., networks seeking to establish a sustainable link, in the mid- and long term, between research staff from different institutes around priority topics, so that they can share information and knowledge and carry out joint activities, including staff exchanges.

Five priority thematic areas gave rise to the pilots forming this new scientific structure in 2021 which aims to foster collaboration in Archaeology, Cancer, Artificial Intelligence, Nanomedicine and the Origins of Life.

COLLABORATION NETWORKS. MILESTONES IN 2022

ARCHAEOLOGY

CONEXIÓN ARQUEOLOGÍA

- Four active projects have been obtained in ERC calls and a 100% success rate in the call for Knowledge Generation Projects within the Spanish State Research Plan.

- Three projects led by CSIC researchers were included in the publication co-published by National Geographic and Fundación Palarq.

- Progress, through the holding of three Strategic Reflection Meetings, in the design of a technological infrastructure for access to widespread scientific collections, which will make it possible to implement a National Information System for archaeological lithics-archives.

- Provision of a service portfolio in the field of archaeology and cultural heritage.

CÁNCER

CONEXIÓN CÁNCER

- Publication of nearly 200 papers by research staff belonging to the hub. Publications include: the identification of a biomarker for the early diagnosis of pancreatic cancer (*eBioMedicine 75:103797*), of a new oncogenic driver of the RAS family (*Cell Rep. 38:110522*) and of a new strategy to increase susceptibility to immunotherapy of treatment-resistant breast cancers (*Nat Cancer 3:355-370*).

- Funding of around €4.5 million secured through highly competitive calls for proposals (ERC-Consolidator, AECC-Excellence and EraPerMed).

- Thirty-four new scientific collaborations fostered by the annual Conexión meeting.

- Setting up of a platform, with the aim of encouraging new vocations, so that schools and high-schools can request informative talks to be held at their centres by the members of the Conexión hub.

- Signi agreement with the Asoc gación sobre el Cáncer (Spanish Association for Cancer Research) and contacts with other scientific bodies (ISCIII, CIBERONC), private foundations (AECC, *Cris contra el Cáncer*, Fundación FERO) and companies in the pharmaceutical and biotechnology sector (Gilead, MSD, Roche, Pfizer, Seagen, Fundación Kaertor).

ARTIFICIAL INTELLIGENCE

AIHUB

- This hub unites around 441 researchers from 89 research groups from 43 centres and institutes working in 19 scientific disciplines, including basic research in artificial intelligence, robotics and data science.
- Thirteen collaborative research projects representing some €2.8 million were secured.
- Publications: the detection of electroencephalographic events known as "Sharp-wave ripples" using convolutional networks (*eLife 11: e77772*), neural network-assisted design for finding the right geometry in nanostructures (*Opt. Express 30, 12368-12377*), and the best paper award at the *International Defence and Homeland Security Simulation Workshop* for the work entitled *'Augmented probability simulation for adversarial risk analysis in general security games'*.
- AIHUB General Assembly held to lay the groundwork for collaborative inter-group projects.
- Celebration of the AIHUB summer school, which was attended by 100 participants, including teaching and research staff.

NANOMEDICINE

CONEXIÓN NANOMEDICINA

- Research groups have published more than 60 articles, 89% of them in top-quartile (Q1) journals.
- More than 35 national and European projects have been secured, attracting funding of some €17 million.
- In terms of transfer, work has been carried out on 20 different patents, of which 10 have been applied for, six have been granted and four have been licensed to companies in the sector. Collaborations are underway with numerous TBCs in the sector through contracts and collaboration agreements, which have helped to bring products closer to their final application.

ORIGIN OF LIFE

CONEXIÓN VIDA: ORIGEN, EVOLUCIÓN Y SÍNTESIS

- Promising collaborations include: *'Dark Proteome'*, where approaches are being designed to explore the so-called dark proteome in search of possible new biological functions and their potential applications in technology or health; and *'From Metatranscriptome to Metaviroma'*, which will seek to discover new viruses in the biosphere, in order to describe biological diversity and their origin and to assess the risks of virus "jumping" between species as well as the emergence of new diseases.
- Multiple transversal seminars and participation in the I Edition of the Master's Degree in MISB CSIC-UIMP and in the VIII UIMP Summer School on Integrative Synthetic Biology.
- Promotion of internationalisation through participation in the SynCell EU Initiative consortium. Also, dissemination and outreach initiatives through videos, a photography exhibition and the series of meetings entitled: *'Diálogos improbables sobre la Vida'* (Improbable Dialogues on Life) as a result of collaboration with AEAC.

NATIONALLY FUNDED RESEARCH PROJECTS, ACTIONS AND PROGRAMMES

4,683

PROJECTS AND ACTIONS IN FORCE 2022*

* Including those approved and completed in 2022.

905,081,960.89 €
TOTAL FUNDING

346,941,506.90 €
ANNUITY 2022

1,783
PROJECTS AND ACTIONS APPROVED 2022

250,178,014.61 €
TOTAL FUNDING

100,469,898.63 €
ANNUITY 2022

1,162
COMPLETED PROJECTS AND ACTIONS 2022

163,116,588.78 €
TOTAL FUNDING

14,748,097.91 €
ANNUITY 2022

CURRE ENTIFIC ACTIVITY 2022

Table 3.4.1 Projects and Actions **in force*** in 2022.

CORE AREA	EXTERNAL			INTERNAL		
	No. PROJECTS / ACTIONS	TOTAL FUNDING (€)	ANNUITY 2022 (€)	No. PROJECTS / ACTIONS	TOTAL FUNDING (€)	ANNUITY 2022 (€)
SOCIETY	168	9,871,675.87	3,440,094.62	85	4,609,744.35	1,248,023.81
LIFE	2,161	402,904,561.51	199,390,119.32	551	55,583,714.72	17,180,472.24
MATERIA	1,111	208,299,091.97	82,627,341.75	355	42,839,493.33	10,549,096.13
CENTRAL SERVICES	7	390,000.00	25,000.00	245	180,583,679.14	32,481,359.03
TOTAL	**3,447**	**621,465,329.35**	**285,482,555.69**	**1,236**	**283,616,631.54**	**61,458,951.21**

* Data including the number of projects and actions approved and completed in the year.

Table 3.4.2 Projects and Actions **approved** in 2022.

CORE AREA	EXTERNAL			INTERNAL		
	No. PROJECTS / ACTIONS	TOTAL FUNDING (€)	ANNUITY 2022 (€)	No. PROJECTS / ACTIONS	TOTAL FUNDING (€)	ANNUITY 2022 (€)
SOCIETY	45	3,121,930.67	1,380,050.71	36	880,279.57	480,274.99
LIFE	752	135,452,316.32	52,356,124.38	342	16,852,849.33	7,626,320.76
MATERIA	426	84,122,001.75	34,389,404.20	177	8,838,636.97	3,782,723.59
CENTRAL SERVICES	3	280,000.00	25,000.00	2	630,000.00	430,000.00
TOTAL	**1,226**	**222,976,248.74**	**88,150,579.29**	**557**	**27,201,765.87**	**12,319,319.34**

Table 3.4.3 Projects and Actions **completed** in 2022.

CORE AREA	EXTERNAL			INTERNAL		
	No. PROJECTS / ACTIONS	TOTAL FUNDING (€)	ANNUITY 2022 (€)	No. PROJECTS / ACTIONS	TOTAL FUNDING (€)	ANNUITY 2022 (€)
SOCIETY	241	48,104,876.81	1,919,797.02	25	1,222,011.65	159,800.00
LIFE	6	375,000.00	10,000.00	191	15,719,821.95	5,451,536.54
MATERIA	47	1,867,839.92	140,581.89	127	10,641,541.79	2,772,217.18
CENTRAL SERVICES	524	85,078,158.66	4,294,165.28	1	107,338.00	-
TOTAL	**818**	**135,425,875.39**	**6,364,544.19**	**344**	**27,690,713.39**	**8,383,553.72**

[see Annex]

Table 3.4.4 *PROJECTS in force, by Core Area.*
Table 3.4.5 *PROJECTS in force, by R&D programmes.*
Table 3.4.6 *ACTIONS in force, by Core Area.*

Source: BDC: The area assigned to the project has been used for the distribution by thematic areas.

INTERNATIONALLY FUNDED RESEARCH PROJECTS, ACTIONS AND PROGRAMMES

824

PROJECTS IN FORCE 2022*

* Data including the number of projects started and completed in the year.

382,942,921 €

TOTAL FUNDING

216

PROJECTS STARTED

89,553,650 €

TOTAL FUNDING

207

PROJECTS COMPLETED

66,593,417 €

TOTAL FUNDING

INTER[illegible]FIC ACTIVITY IN FORCE 2022 BY CORE AREA

Table 3.5.1 Projects **in force*** in 2022.

CORE AREA	EU FRAMEWORK PROGRAMME		EU NON FRAMEWORK PROGRAMME		INTERNATIONAL	
	No. OF PROJECTS	TOTAL FUNDING (€)	No. OF PROJECTS	TOTAL FUNDING (€)	No. OF PROJECTS	TOTAL FUNDING (€)
SOCIETY	36	24,445,293.00	5	341,100.00	4	725,989.00
LIFE	298	136,696,959.00	108	40,625,822.00	33	5,029,079.00
MATERIA	245	148,594,179.00	31	5,671,689.00	19	4,442,413.00
CENTRAL SERVICES	2	155,105.00	2	1,053,641.00	-	-
UNSPECIFIED	31	12,884,267.00	-	-	10	2,277,385.00
TOTAL	**612**	**322,775,803.00**	**146**	**47,692,252.00**	**66**	**12,474,866.00**

* Data including the number of projects started and completed in the year.

Table 3.5.2 Projects **started** in 2022.

CORE AREA	EU FRAMEWORK PROGRAMME		EU NON FRAMEWORK PROGRAMME		INTERNATIONAL	
	No. OF PROJECTS	TOTAL FUNDING (€)	No. OF PROJECTS	TOTAL FUNDING (€)	No. OF PROJECTS	TOTAL FUNDING (€)
SOCIETY	9	1,605,802.00	1	36,518.00	5	302,876.00
LIFE	69	32,999,670.00	9	12,309,066.00	17	2,130,529.00
MATERIA	49	23,596,578.00	6	1,184,095.00	2	227,096.00
UNSPECIFIED	29	12,682,759.00	8	861,006.00	12	1,617,655.00
TOTAL	**156**	**70,884,809.00**	**24**	**14,390,685.00**	**36**	**4,278,156.00**

Table 3.5.3 Projects **completed** in 2022.

CORE AREA	EU FRAMEWORK PROGRAMME		EU NON FRAMEWORK PROGRAMME		INTERNATIONAL	
	No. OF PROJECTS	TOTAL FUNDING (€)	No. OF PROJECTS	TOTAL FUNDING (€)	No. OF PROJECTS	TOTAL FUNDING (€)
SOCIETY	10	2,674,632.00	1	154,625.00	7	373,037.00
LIFE	82	30,227,276.00	35	8,514,706.00	15	1,496,276.00
MATERIA	37	20,233,159.00	4	800,311.00	7	1,384,363.00
CENTRAL SERVICES	2	155,104.00	-	-	0	-
UNSPECIFIED	-	-	-	-	7	579,928.00
TOTAL	**131**	**53,290,171.00**	**40**	**9,469,642.00**	**36**	**3,833,604.00**

Source: BDC.

INTER[illegible]FIC ACTIVITY IN FORCE 2022 BY PROGRAMMES

Table 3.5.4 Projects in force* in 2022 by programmes of EU R&I framework programmes, other EU and international programmes.

		EU R&I FRAMEWORK PROGRAMMES			OTHER EU AND INTERNATIONAL PROGRAMMES		
		H2020	HORIZON EUROPE	TOTAL FRAMEWORK PROGRAMMES	EU NON FRAMEWORK PROGRAMME**	INTERNATIONAL	TOTAL OPEI
IN FORCE*	No. OF PROJECTS	465	147	**612**	146	66	**212**
	TOTAL FUNDING (€)	255,313,900	67,461,900	**322,775,800**	47,692,252	12,474,866	**60,167,118**
STARTED	No. OF PROJECTS	-	156	**156**	24	36	**60**
	TOTAL FUNDING (€)	-	70,884,809	**70,884,809**	14,390,685	4,278,156	**18,668,841**
COMPLETED	No. OF PROJECTS	120	11	**131**	40	36	**76**
	TOTAL FUNDING (€)	51,975,639	1,314,532	**53,290,171**	9,469,642	3,833,604	**13,303,246**

* Data including the number of projects signed and completed in the year.

EU NON FRAMEWORK PROGRAMME**

		LIFE	INTERREG	RFCS	ENIC-CBC	PRIMA	OTHERS	TOTAL
IN FORCE*	No. OF PROJECTS	51	39	6	4	8	38	**146**
	TOTAL FUNDING (€)	15,118,227	9,129,453	1,570,645	1,453,707.00	1,482,040	18,938,180	**47,692,252**
STARTED	No. OF PROJECTS	11	-	-	-	1	12	**24**
	TOTAL FUNDING (€)	207,000	-	-	-	207,000	13,976,685	**14,390,685**
COMPLETED	No. OF PROJECTS	5	21	1	-	2	11	**40**
	TOTAL FUNDING (€)	1,228,719	4,461,226	183,260	-	453,812	3,142,625	**9,469,642**

Source: BDC.

EXCELLENCE AT THE CSIC

Two awards within the State Sub-programme for Institutional Strengthening of the State Plan for Technical Scientific Research and Innovation are the **'Severo Ochoa Centre of Excellence' and 'María de Maeztu Unit of Excellence' awards**. These recognitions aim to finance and accredit public research centres and units, in any scientific area, that demonstrate international **scientific impact and leadership** and actively collaborate with their social and business environment.

The accredited centres and units are organisational structures with highly competitive, cutting-edge research programmes, which rank among the best in their respective scientific areas worldwide.

INSTITUTE OF ASTROPHYSICS OF ANDALUSIA (IAA)
START: 07/01/2018 FINISH: 31/12/2022

MATERIALS SCIENCE INSTITUTE OF BARCELONA (ICMAB)
START: 01/01/2020 FINISH: 31/12/2023

INSTITUTE OF NEUROSCIENCES (IN)
START: 01/07/2018 FINISH: 31/12/2022

INSTITUTE OF MATHEMATICAL SCIENCES (ICMAT)
START: 01/01/2020 FINISH: 31/12/2023

CENTRE FOR RESEARCH IN NANOSCIENCE AND NANOTECHNOLOGY (ICN2)
START: 01/07/2018 FINISH: 31/12/2022

INSTITUTE FOR ENVIRONMENTAL DIAGNOSTICS AND WATER STUDIES (IDAEA)
START: 16/12/2019 FINISH: 15/12/2023

INSTITUTE OF INTERDISCIPLINARY PHYSICS AND COMPLEX SYSTEMS (IFISC)
START: 01/07/2018 FINISH: 31/12/2022

EXCELENCIA SEVERO OCHOA
9 CENTRES

INSTITUTE OF MARINE SCIENCES (ICM)
START: 01/01/2020 FINISH: 31/12/2023

INSTITUTE OF SPACE SCIENCES (ICE)
START: 01/01/2021 FINISH: 31/12/2025

AGRIGENOMICS RESEARCH CENTRE CSIC-IRTA-UAB-UB (CRAG)
START: 01/01/2020 FINISH: 31/12/2023

ANDALUSIAN CENTRE FOR DEVELOPMENTAL BIOLOGY (CABD)
START: 01/01/2022 FINISH: 31/12/2025

EXCELENCIA MARÍA DE MAEZTU
3 UNITS

INSTITUTE OF THEORETICAL PHYSICS (IFT)
START: 01/01/2022 FINISH: 31/12/2025

The **European Research Council (ERC) projects** under the European Union's Framework Programmes for Research and Innovation represent one of the EU's major commitments to frontier research.

These projects aim to **fund excellent and creative research staff** to undertake research beyond the state of the art, in any area, **based solely on scientific excellence**, seeking the best ideas and conferring status and visibility, while reinforcing the attraction of international talent.

ERC grants are awarded at all stages of an investigator's research career, both at early and established phases, to carry out research in Europe, irrespective of their origin or nationality.

Ultimately, the ERC aims to make Europe's research base better equipped to respond to the needs of a knowledge-based society and to equip Europe with the necessary frontier research capabilities to meet global challenges.

The relevance of these grants in the European scientific scenario means that **the number of ERC projects** obtained by an institution's research staff is an **indicator of its scientific excellence and international prestige**.

CONSOLIDATOR GRANT (ERC-COG)

PHOTHERM
01/02/2022 - 31/01/2027

KASPER MONTH-POULSEN
MATERIALS SCIENCE INSTITUTE OF BARCELONA
Biology and Biomedicine

ANTICAFING
01/09/2022 - 31/08/2027

FERNANDO CALVO GONZÁLEZ
INST. OF BIOMEDICINE & BIOTECHNOLOGY OF CANTABRIA
Biology and Biomedicine

ADVANCED GRANT (ERC-ADG)

ISLANDLIFE
01/11/2022 - 31/10/2027

ANA MARÍA TRAVESET VILAGINES
MEDITERRANEAN INSTITUTE FOR ADVANCED STUDIES
Natural Resources

POWERBYU
03/10/2022 - 02/10/2027

MARÍA SOLEDAD MARTÍN GONZÁLEZ
INSTITUTE OF MICRO AND NANOTECHNOLOGY
Physical Science and Technologies

STARTING GRANT (ERC-STG)

SEDAHEAD
01/11/2022 - 31/10/2027

CARMELO JUEZ JIMÉNEZ
PYRENEAN INSTITUTE OF ECOLOGY
Natural Resources

BIFOLDOME
01/11/2022 - 31/10/2027

MIGUEL ÁNGEL MOMPEÁN GARCÍA
INSTITUTE OF PHYSICAL CHEMISTRY ROCASOLANO
Materials Science and Technology

Projects started in 2022.

RESEARCH STAFF TRAINING

The organisation's policy on research staff training and teaching by its research and specialised technical staff is designed and implemented by the **Postgraduate and Specialisation Department** through different actions, some of which are included in the CSIC's previous Strategic Plan 2018-2021, and in the current Strategic Plan 2022-2025, in line with national (Spanish Science, Technology and Innovation Strategy 2021-2027) and international (HRS4R Strategy) scientific policy.

In 2022, a greater commitment has been made to the presence on social networks related to the CSIC's training activities in order to attract young people to start or continue their scientific career at the CSIC with the number of followers amounting to: Twitter 11,605, Instagram 1,514 and LinkedIn 1,094, with 3,790 subscribers to YouTube.

CALLS FOR "JAE INTRO" GRANTS

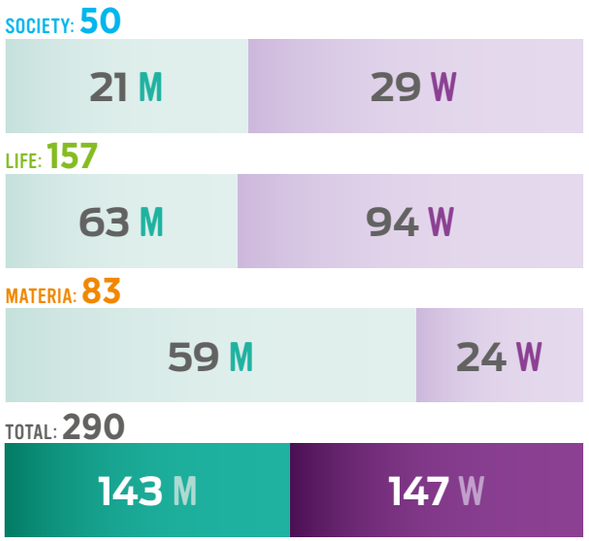
The aim of the "JAE Intro" introductory research grants, part of the Junta de Ampliación de Estudios (JAE) programme, is to integrate university students interested in starting a research career in the different Core Areas of the CSIC institutes.

- In 2022, the publication of three types of calls has been maintained.
- JAE Intro's communication plan included the creation of its own website dedicated to improving communication and increasing the reach of these grants.
- The website jaeintro.csic.es received more than 162,000 hits from more than 75,000 visitors.
- Social networks: Instagram 1,163 followers and Twitter 1,986.

JAE INTRO GRANTS

Call **targeting final-year undergraduate and master's degree students**. In 2022, a total of 300 introductory research grants were announced for seven-month stays in research groups at CSIC institutes, exceeding the number of grants in the previous call by 50, of which 290 (96.7%) were awarded.

Figure 3.7.1 Distribution of the 290 **"JAE Intro"** grants by **Core Area** and **gender**. Year 2022.

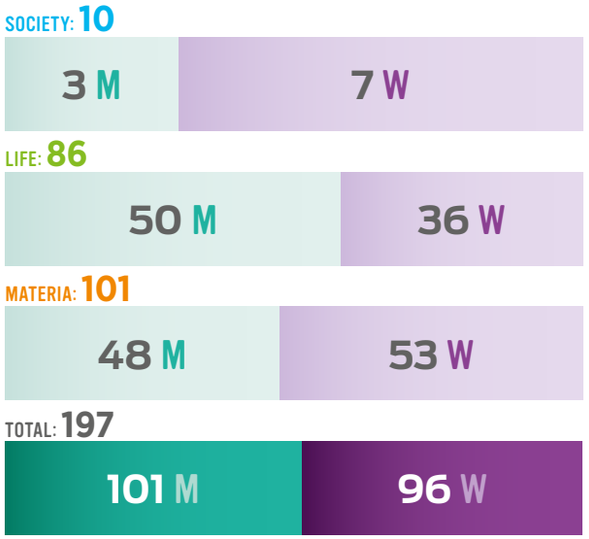


JAE INT

Call for **Bachelor's and Master's degree students** in which CSIC institutes award grants or training scholarships for stays in their research groups during different periods of the academic year.

In 2022 this type of grant was consolidated, during which **60 institutes awarded 197 "JAE Intro ICU" grants** with a total budget of €1,054,100, an average length of stay of 6.4 months and an average amount per grant of €711 per month.

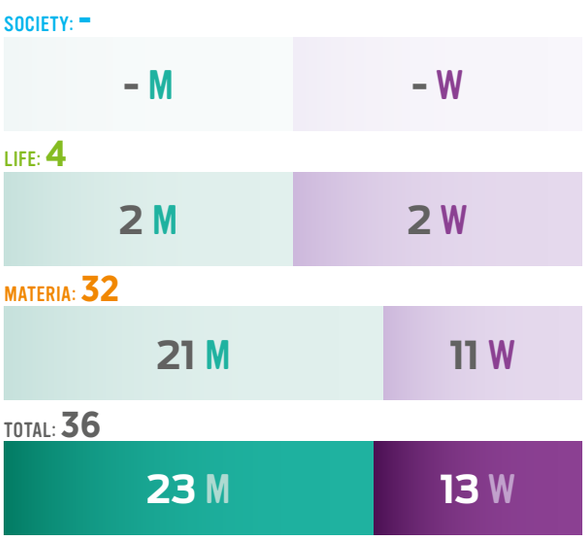
Figure 3.7.2 Breakdown of the 197 **"JAE Intro ICU"** grants by **Core Area** and **gender**. Year 2022.



JAE INTRO SOMdM GRANTS

Aimed at **university students interested in starting a research career** in one of the CSIC's "Severo Ochoa" Centres of Excellence or "María de Maeztu" Units of Excellence (SOMdM). Grants of this type awarded in 2022 totalled **36**, mostly distributed among the research institutes belonging to the Core Area MATERIA (32).

Figure 3.7.3 Distribution of the 36 **"JAE Intro SOMdM"** by **Core Area** and **gender**. Year 2022.



PRE-DOCTORAL RESEARCH TRAINING

Calls for pre-doctoral grants: under the pre-doctoral contract mode, the CSIC recruits pre-doctoral research staff in training, who aim to carry out their doctoral thesis in CSIC research institutes.

In 2022, **394 pre-doctoral researchers** were recruited (*source: GESPER corporate application*).

Number of pre-doctoral contracts formalised at the CSIC classified by year and by funding source.

FPU / AEI	5
PRE-DOC CONTRACT GRANTS FOR PhD CANDIDATE TRAINING	198
LABOUR POOL	96
AUTONOMOUS REGIONS	76
FOUNDATIONS	16
EUROPEAN (DN OR ITN)	3
TOTAL	**394**

TRAIN[illegible]ING/RETAINING RESEA[illegible] TALENT

BACHELOR, MASTER AND DOCTORAL TRAINING

- **Bachelor training: 212 Bachelor's (Bs) theses** were directed by 260 researchers.
- **Master training: 512 Master's (Ms) theses** were directed by **683 researchers**.
- **Doctorate training: 780 Doctoral (PhD) theses** were presented as a result of the research work carried out under the supervision of CSIC research staff. Of the research staff directing doctoral theses, **949** have supervised a PhD thesis defended during 2022.

HIGHER SPECIALISATION COURSES

In 2022, CSIC institutes organised and taught **48** High Specialisation **courses** with 1,682 teaching hours (↑ 31%). Distribution of courses by Core Area:

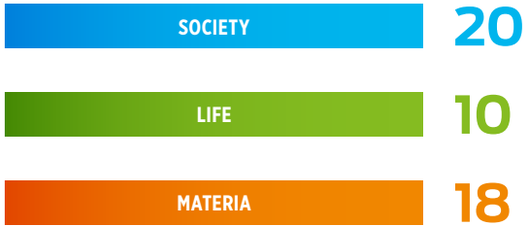


Table 3.7.1 Distribution of Bachelor's (Bs) theses, Master's (Ms) theses and Doctoral (PhD) theses by core area and by gender, both of the candidate and the research supervisor.

	PhDTh*			BsTh*			MsTh*		
	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
PhD CANDIDATES				**CANDIDATES**					
SOCIETY	26	23	**49**	1	4	**5**	28	26	**54**
LIFE	185	256	**441**	51	80	**131**	122	177	**299**
MATERIA	193	97	**290**	31	45	**76**	82	77	**159**
TOTAL	**404**	**376**	**780**	**83**	**129**	**212**	**232**	**280**	**512**
RESEARCH STAFF/DIRECTOR									
SOCIETY	29	17	**46**	4	3	**7**	38	18	**56**
LIFE	330	208	**538**	65	96	**161**	222	185	**407**
MATERIA	260	105	**365**	56	36	**92**	129	91	**220**
TOTAL**	**619**	**330**	**949**	**125**	**135**	**260**	**389**	**294**	**683**

* Data obtained on 05/04/2023 from the ConCIENCIA application.
** There may be research staff/directors who have directed more than one thesis and theses that have been co-directed by more than one researcher.

COLLABORATION CSIC-MENÉNDEZ PELAYO INTERNATIONAL UNIVERSITY (UIMP)

Below are listed the main results of the academic collaboration with the Menéndez Pelayo International University in 2022:

- Approval of the teaching of the Degree in Quantum Technologies (PTI Tecnología Cuánticas), currently undergoing the VERIFICA evaluation process of new degrees by the ANECA (National Agency for Quality Assessment and Accreditation of Spain), which will be taught in collaboration with other universities.
- Number of students in the academic year 2022-23:
  - Doctoral Programme in Science and Technology: 9.
  - CSIC-UIMP Master's Degrees: 39 students, noteworthy was the *Master's Degree in Biodiversity in Tropical Areas and its Conservation* (19), followed by *Integrative Molecular and Cellular Biology* (12) and *High Specialisation in Plastics and Rubber* (8).

FOURTH CONFERENCE FOR CSIC DOCTORAL STUDENTS

In 2022, the **Fourth Conference for CSIC doctoral students** was held, **with 445 PhD candidates** registered, which has so far received more than 757 visitors.

In this edition was held with the invaluable collaboration of the CSIC Doctoral Students Network.

For the 4th Doctoral Students' Conference, the content of **the website**, which serves as a communication platform for the different editions of the CSIC Doctoral Students' Conference, was updated.

FOURTH EDITION OF THE SCIENCE POPULARISATION COMPETITION 'YO INVESTIGO. YO SOY CSIC'

Competition to disseminate the research carried out at the CSIC and promote the participation of doctoral students in scientific dissemination activities. The competition received **79 videos** explaining doctoral theses, recounted in a three-minute time limit [web link] which received 116,623 views.

CAMINO MENTORING PROGRAMME

The second edition of the CAMINO (**CA**reer **M**entoring **I**nitiative for **N**ew **O**pportunities) mentoring programme was launched in 2022 [web link].

Sixty-eight doctoral students registered applications to participate as mentees, with final participation of 57 (38 men/19 women) while 91 registered as mentors with final participation of 56 (27 men/29 women). Finally, 54 pairs were formed.

An "Informative Session" of the programme was organised [web link] and the workshop was held providing the keys to prepare a good CV and face an interview [web link].

ERASMUS+ PROGRAMME PLACEMENTS

Aware of the importance of this type of grant for research stays at the CSIC, support has continued to be given to research staff to publish expressions of interest on the **portal**.

In 2022, **54** Learning Agreements were managed and 31 active placement offers were received.

CSIC PARTICIPATION IN UNIVERSITY EMPLOYMENT FORUMS

With the aim of bringing the CSIC closer to university students with a view to informing them about the training and professional opportunities provided by the organisation, in 2022 it participated in the employment forums *'XVIII Foro de Empleo UAM'*, *'Foro UCMpleo 22'* and in the International Postgraduate and Lifelong Learning Fair at the UIMP.

RESEARCH INTEGRITY AND ETHICS

ETHICAL ASSESSMENT OF RESEARCH. RESEARCH INTEGRITY CONFLICTS

397 TOTAL APPLICATIONS RECEIVED – INCLUDING – **569** ASSESSMENTS

174 ANIMAL TESTING PROJECTS

223 PROJECTS WITH BIOETHICAL AND/OR BIOSAFETY IMPLICATIONS, INVOLVING:

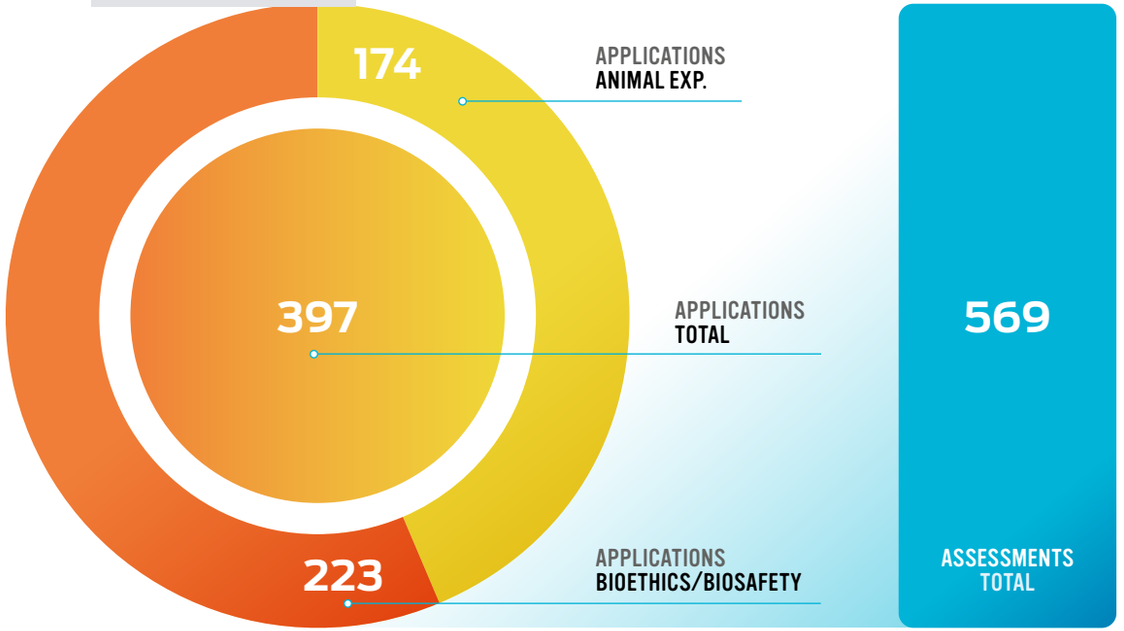
- **30** EVALUATIONS OF METHODS AND STATISTICAL CALCULATIONS
- **365** EVALUATIONS OF RESEARCH ACTIVITIES
  - **91** WITH THE PARTICIPATION OF HUMAN BEINGS, THEIR SAMPLES AND DATA
  - **150** WITH GMO
  - **124** WITH BIOLOGICAL RISK AGENTS

8 RESEARCH INTEGRITY CONFLICTS ADDRESSED

DOCUMENTS PRODUCED

- 2021 Activity Report of the CSIC Ethics Committee and of the Committee's evaluation actions in its capacity as an authority for the evaluation of animal experimentation projects.
- Review and participation in the drafting of different versions of the Regulations for the constitution and operation of the Spanish Research Ethics Committee, at the request of the MICIN (Spanish Ministry for Science and Innovation).
- Revision of the *Procedure for handling conflicts by the CSIC Ethics Committee*.
- Drafting of recommendations for the ethical evaluation of research in the social sciences and humanities. Definition of criteria.
- Response to various parliamentary enquiries concerning animal experimentation.

Figure 3. plications received for and assessments performed.



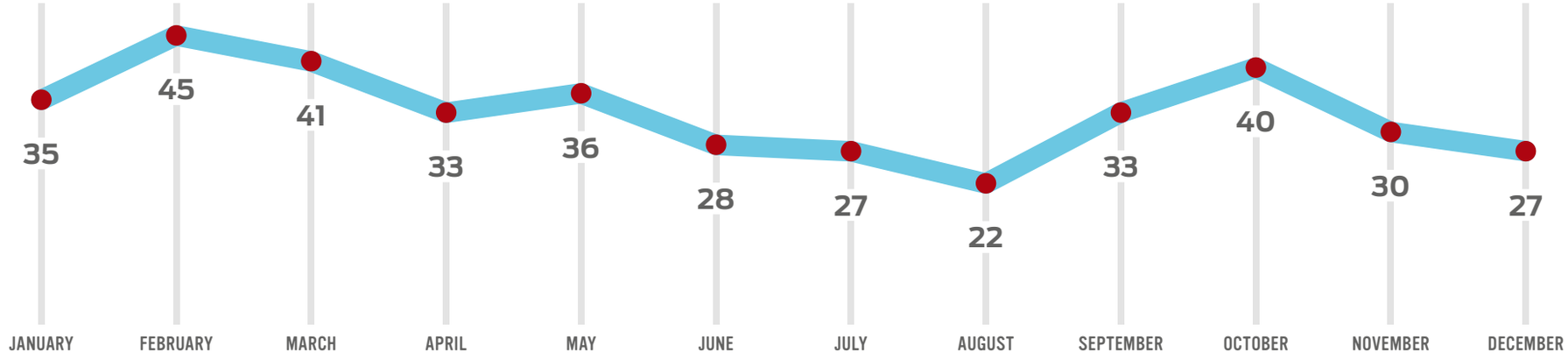
PARTNERSHIPS

- Advice to the FGCSIC (CSIC General Foundation) on ethics for obtaining co-funding (MSCA-COFUND H2020) for the COMFUTURO programme.
- Collaboration with ABBOT LABORATORIES, S.A. within the framework of the contract signed with the CSIC-EEZ (Zaidín Experimental Station).
- Issuance of opinions in relation to the draft bill to amend Law 14/2011, of 1 June, on Science, Technology and Innovation and to draft a new revised edition of the *European Code of Conduct for Research Integrity* (at the request of ENRIO-ALLEA).

TRAINING

Numerous training activities were in run, in which Committee members and the Committee's secretary have participated. These included courses on: good scientific practice (FGCSIC); the ethical and legal aspects of biomedical research, addressing the standards of good clinical practice; the ethics of health-related research on human beings; quality in research laboratories, and a course on research integrity and ethics, among others.

Figure 3.8.2 Monthly trends of the number of assessment applications received in 2022.



SCIENTIFIC AND TECHNICAL SERVICES

The CSIC institutes and centres have a wide range of scientific equipment and instrumentation for general use. Interest in the use of such equipment is not restricted to the research groups that operate them, but extends beyond the organisation itself to other actors in the State Science, Technology and Innovation System, as well as the private sector.

The range of scientific services offered is set out in the **CSIC's Catalogue of scientific and technical services**. This catalogue provides access to the contact points of the services offered in order to provide detailed information on the technical characteristics of the services and the economic conditions. follows a methodology that makes it possible to establish unit costs, and to promote and encourage the shared use of the scientific-technical equipment available at the CSIC.

DATA 2022

1,192
SERVICES AVAILABLE

6,919
SERVICES PROVIDED

(EACH TYPE OF SERVICE HAS ONE OR MORE ASSOCIATED SERVICES)

Scientific-technical services provided listed by type.

BIOLOGICAL ANALYSIS AND METHODS	1,410
PHYSICAL ANALYSIS AND METHODS	866
CHEMICAL ANALYSIS AND METHODS	1,258
TECHNICAL ASSISTANCE AND LOGISTICAL SUPPORT AND OTHER SERVICES	784
CONSULTING AND QUALITY AND SAFETY AND DISSEMINATION	69
DOCUMENTATION, LIBRARIES AND COLLECTIONS	320
PRINT AND DIGITAL PUBLISHING, DESIGN AND IMAGE PROCESSING	40
MANUFACTURING AND TREATMENT	108
ICTS AND SPECIFIC UNIQUE LABS AND LARGE PROJECTS	317
MICROSCOPY, MICROANALYSIS AND IMAGING	578
SAMPLING, SAMPLE PREPARATION, TREATMENT AND PRESERVATION	176
PILOT PLANTS AND EXPERIMENTAL FARMS	225
PROTEOMICS, GENOMICS AND METABOLOMICS	489
ICT, COMPUTATIONAL AND MATHEMATICAL AND CARTOGRAPHIC ANALYSES	279
TOTAL	**6,919**

Scientific-technical services available by scientific-technical areas.

	No.
HUMANITIES AND SOCIAL SCIENCES	45
BIOLOGY AND BIOMEDICINE	238
NATURAL RESOURCES	237
AGRICULTURAL SCIENCES	155
FOOD SCIENCE AND TECHNOLOGY	53
PHYSICAL SCIENCE AND TECHNOLOGIES	108
MATERIALS SCIENCE AND TECHNOLOGY	140
CHEMICAL SCIENCE AND TECHNOLOGIES	128
NO AREA	88
TOTAL	**1,192**

4

INSTITUTIONAL RELATIONS AND SCIENTIFIC COLLABORATION

04 INSTITUTIONAL RELATIONS AND SCIENTIFIC COLLABORATION

The CSIC State Agency is a Public Research Organisation, and is the **central hub** of the **SECTI** (Spanish Science, Technology and Innovation System). It is the top institution undertaking scientific and technical activities in Spain, and is present in all the autonomous regions through its web of research institutes. Besides this strategic position the CSIC has a **multidisciplinary and interdisciplinary nature**, enabling it to establish agreements and alliances with multiple and varied research organisations, both public and private. The Vice-Presidency for Institutional Affairs and Organisation is responsible for the CSIC's institutional relations at national level.

4.1 JOINT AND ASSOCIATED INSTITUTES

The CSIC's closest institutional relations take the form of **joint research institutes** and joint service centres with shared ownership with one or several other institutions by means of an agreement between them. Similar to the former category are the **associated institutes**, with a separate legal status, established /participated by the CSIC and one or more other institutions.

Table 4.1 Number of joint research institutes, joint service-provision centres, associated institutes listed by co-owners for 2022.

		UNIVERSITIES	
UNIVERSIDAD DE SEVILLA	7	CABIMER	ANDALUSIAN MOLECULAR BIOLOGY AND REGENERATIVE MEDICINE CENTRE
		IBIS	INSTITUTE OF BIOMEDICINE OF SEVILLE
		IBVF	INSTITUTE OF PLANT BIOCHEMISTRY AND PHOTOSYNTHESIS
		IMSE,CNM	SEVILLE INSTITUTE OF MICROELECTRONICS
		ICMS	INSTITUTE OF MATERIALS SCIENCE OF SEVILLE
		IIQ	INSTITUTE FOR CHEMICAL RESEARCH
		CICCARTUJA	SCIENTIFIC RESEARCH CENTRE ISLA DE LA CARTUJA
UNIVERSIDAD AUTONÓMA DE MADRID	6	CBM	CENTRE FOR MOLECULAR BIOLOGY SEVERO OCHOA
		IIBM	ALBERTO SOLS BIOMEDICAL RESEARCH INSTITUTE
		ICMAT	INSTITUTE OF MATHEMATICAL SCIENCES
		IFT	INSTITUTE FOR THEORETICAL PHYSICS
		CIAL	RESEARCH INSTITUTE OF FOOD SCIENCE
		CFTMAT	CENTRE FOR THEORETICAL PHYSICS AND MATHEMATICS
UNIVERSIDAD POLITÉCNICA DE VALENCIA	4	INGENIO	INSTITUTE OF INNOVATION AND KNOWLEDGE MANAGEMENT
		IBMCP	INSTITUTE FOR PLANT MOLECULAR & CELLULAR BIOLOGY PRIMO YUFERA
		I3M	INSTITUTE FOR MOLECULAR IMAGING INSTRUMENTATION
		ITQ	INSTITUTE OF CHEMICAL TECHNOLOGY
UNIVERSIDAD AUTÓNOMA DE BARCELONA	3	CREAF	CENTRE FOR RESEARCH ON ECOLOGY AND FORESTRY APPLICATIONS
		CRAG	CENTRE FOR RESEARCH IN AGRICULTURAL GENOMICS
		ICN2	CATALAN INSTITUTE OF NANOSCIENCE NANOTECHNOLOGY
UNIVERSIDAD DE VALENCIA	3	I2SYSBIO	INSTITUTE FOR INTEGRATIVE SYSTEMS BIOLOGY
		CIDE	DESERTIFICATION RESEARCH CENTRE
		IFIC	INSTITUTE FOR CORPUSCULAR PHYSICS

		UNIVERSITIES	
UNIVERSIDAD COMPLUTENSE DE MADRID	3	IGEO	GEOSCIENCES INSTITUTE
		ICMAT	INSTITUTE OF MATHEMATICAL SCIENCES
		CFTMAT	CENTRE FOR THEORETICAL PHYSICS AND MATHEMATICS
UNIVERSIDAD DE ZARAGOZA	3	INMA	ARAGON MATERIALS AND NANOSCIENCE INSTITUTE
		ISQCH	INSTITUTE OF CHEMICAL SYNTHESIS AND HOMOGENEOUS CATALYSIS
		CEQMA	ARAGON CHEMISTRY AND MATERIALS CENTRE
UNIVERSIDAD CARLOS III DE MADRID	2	ICMAT	INSTITUTE OF MATHEMATICAL SCIENCES
		CFTMAT	CENTRE FOR THEORETICAL PHYSICS AND MATHEMATICS
UNIVERSIDAD DE BARCELONA	2	CREAF	CENTRE FOR RESEARCH ON ECOLOGY AND FORESTRY APPLICATIONS
		CRAG	CENTRE FOR RESEARCH IN AGRICULTURAL GENOMICS
UNIVERSIDAD DE CANTABRIA	2	IBBTEC	INSTITUTE OF BIOMEDICINE AND BIOTECHNOLOGY OF CANTABRIA
		IFCA	INSTITUTE OF PHYSICS OF CANTABRIA
UNIVERSIDAD DE LAS ISLAS BALEARES	2	IMEDEA	MEDITERRANEAN INSTITUTE FOR ADVANCED STUDIES
		IFISC	INSTITUTE FOR CROSS-DISCIPLINARY PHYSICS AND COMPLEX SYSTEMS
UNIVERSIDAD DE SALAMANCA	2	IBFG	INSTITUTE FOR FUNCTIONAL BIOLOGY AND GENOMICS
		IBMCC	INSTITUTE OF CANCER MOLECULAR AND CELLULAR BIOLOGY
UNIVERSIDAD DE OVIEDO	2	IMIB	JOINT BIODIVERSITY RESEARCH INSTITUTE
		CINN	CENTRE FOR RESEARCH IN NANOMATERIALS AND NANOTECHNOLOGY
UNIVERSIDAD DEL PAÍS VASCO	2	IBF	BIOPHYSICS UNIT
		CFM	MATERIAL PHYSICS CENTRE
UNIVERSIDAD PABLO DE OLAVIDE	2	CABD	ANDALUSIAN CENTRE FOR DEVELOPMENTAL BIOLOGY
		CABIMER	ANDALUSIAN MOLECULAR BIOLOGY AND REGENERATIVE MEDICINE CENTRE
UNIVERSIDAD POLITÉCNICA DE MADRID	2	CBGP	CENTRE FOR PLANT BIOTECHNOLOGY AND GENOMICS
		CAR	CENTRE FOR AUTOMATION AND ROBOTICS
UNIVERSIDAD DE CASTILLA-LA MANCHA	1	IREC	RESEARCH INSTITUTE OF HUNTING RESOURCES
UNIVERSIDAD DE GRANADA	1	IACT	ANDALUSIAN EARTH SCIENCES INSTITUTE
UNIVERSIDAD DE LA RIOJA	1	ICVV	INSTITUTE OF GRAPEVINE AND WINE SCIENCES
UNIVERSIDAD DE LEÓN	1	IGM	MOUNTAIN LIVESTOCK INSTITUTE
UNIVERSIDAD DE MÁLAGA	1	IHSM	INSTITUTE FOR SUBTROPICAL AND MEDITERRANEAN HORTICULTURE
UNIVERSIDAD DE VALLADOLID	1	IBGM	INSTITUTE OF MOLECULAR BIOLOGY AND GENETICS
UNIVERSIDAD MIGUEL HERNÁNDEZ DE ELCHE	1	IN	INSTITUTE OF NEUROSCIENCES
UNIVERSIDAD POLITÉCNICA DE CATALUÑA	1	IRII	INSTITUTE OF ROBOTICS AND INDUSTRIAL INFORMATICS
UNIVERSIDAD POMPEU I FABRA	1	IBE	INSTITUTE OF EVOLUTIONARY BIOLOGY

Continued on next page.

25

PUBLIC UNIVERSITIES COLLABORATE WITH CSIC THROUGH JOINT INSTITUTES

10

REGIONAL GOVERNMENTS PARTICIPATE IN THE FUNDING OF JOINT INSTITUTES

Continuat

AUTONOMOUS GOVERNMENTS AND RELATED ENTITIES			
JUNTA DE ANDALUCÍA	4	CABD	ANDALUSIAN CENTRE FOR DEVELOPMENTAL BIOLOGY
		CABIMER	ANDALUSIAN MOLECULAR BIOLOGY AND REGENERATIVE MEDICINE CENTRE
		IBIS	INSTITUTE OF BIOMEDICINE OF SEVILLE
		CICCARTUJA	SCIENTIFIC RESEARCH CENTRE ISLA DE LA CARTUJA
FUNDACIÓN PROGRESO Y SALUD	1	CABIMER	ANDALUSIAN MOLECULAR BIOLOGY AND REGENERATIVE MEDICINE CENTRE
SERVICIO ANDALUZ DE SALUD	1	IBIS	INSTITUTE OF BIOMEDICINE OF SEVILLA
GENERALITAT DE CATALUNYA	2	CREAF	CENTRE FOR RESEARCH ON ECOLOGY AND FORESTRY APPLICATIONS
		ICN2	CATALAN INSTITUTE OF NANOSCIENCE NANOTECHNOLOGY
INST. RECERCA I TECNOLOGIA AGROALIMENTÀRIES-IRTA	2	CREAF	CENTRE FOR RESEARCH ON ECOLOGY AND FORESTRY APPLICATIONS
		CRAG	CENTRE FOR RESEARCH IN AGRICULTURAL GENOMICS
INSTITUTO DE ESTUDIOS CATALANES	1	CREAF	CENTRE FOR RESEARCH ON ECOLOGY AND FORESTRY APPLICATIONS
PRINCIPADO DE ASTURIAS	2	IMIB	JOINT BIODIVERSITY RESEARCH INSTITUTE
		CINN	CENTRE FOR RESEARCH IN NANOMATERIALS AND NANOTECHNOLOGY
GENERALITAT VALENCIANA	1	CIDE	DESERTIFICATION RESEARCH CENTRE
GOBIERNO DE LA RIOJA	1	ICVV	INSTITUTE OF GRAPEVINE AND WINE SCIENCES
GOBIERNO DE NAVARRA	1	IDAB	AGROBIOTECHNOLOGY INSTITUTE
JUNTA DE COMUNIDADES DE CASTILLA-LA MANCHA	1	IREC	RESEARCH INSTITUTE OF HUNTING RESOURCES
JUNTA DE EXTREMADURA	1	IAM	ARCHAEOLOGY INSTITUTE OF MERIDA
GOBIERNO DE CANTABRIA - SODERCAN, S.A.	1	IBBTEC	INSTITUTE OF BIOMEDICINE AND BIOTECHNOLOGY OF CANTABRIA
XUNTA DE GALICIA	1	IEGPS	PADRE SARMIENTO INSTITUTE OF GALICIAN STUDIES

OTHERS			
AYUNTAMIENTO DE BARCELONA	1	IBB	BOTANICAL INSTITUTE OF BARCELONA
FUNDACIÓN OBSERVATORIO DEL EBRO	1	OE	EBRO OBSERVATORY
INSTITUTO ESTEBAN TERRADAS (INTA) - Mº DEFENSA	1	CAB	ASTROBIOLOGY CENTRE

4.2

CSIC ASSOCIATED UNITS

A successful formula for collaboration with external entities are the **CSIC Associated R&D+i Units**, a CSIC-specific entity whereby research groups from outside the CSIC can obtain recognition of this status from the CSIC Presidency upon request, for a period of three years.

In 2022, **10 new associated units have been formalised and 25 units have renewed for a new period**. Thus, 83 currently remain in force.

The total number of associated units in force at the end of 2022 totalled **118**:

- Regarding the **type of entities** that are **associated**, the universities stand out in terms of number: 41 different universities have formalised 92 associated units, representing 77.9% of the total number of associated units.

[see Annex]

Table 4.2 Associated units 2022. Institutions associated with the CSIC in 2022.

- The **CSIC institutes with the largest number of Associated Units** (AU) include the ICMM (7 AU), ICVV and IH (5 AU), EEAD, IDAEA, IEM and MGB (4 AU).

[see Annex]

Table 4.3 Associated units 2022. CSIC institutes.

4.3

CSIC PARTICIPATION IN ENTITIES AND AGENCIES

The CSIC creates or participates in a wide variety of public or private entities, with their own legal status and is also a member of collegiate bodies, specialised committees and governing or advisory bodies of other organisations.

- There are **328 independent entities and collegiate bodies** subject to different forms of participation (member, trustee, advisor, etc.), including foundations (56), consortia (15) and public limited companies and economic interest groupings (8).

Table 4.4
Entities with CSIC participation in 2022.

FOUNDATIONS	56
CONSORTIUMS	15
COMPANIES + ECONOMIC INTEREST GROUPINGS	8
ASSOCIATIONS	38
PUBLIC BODIES	17
TOTAL ENTITIES WITH OWN LEGAL STATUS	**134**
TOTAL ENTITIES WITHOUT OWN LEGAL STATUS	**194**
TOTAL ENTITIES	**328**

*Data recorded on 31/12/2022.

- **Incorporation in entities and collegiate bodies in 2022.**
  - Fundación Biodiversidad (Biodiversity Foundation).
  - Consejo Ciencia, Tecnología e Innovación de Aragón (Science, Technology and Innovation Council of Aragon).
  - Agencia de Investigación e Innovación de Castilla-La Mancha (Research and Innovation Agency of Castilla-La Mancha).
  - Plan Territorial Insular de Emergencias de Protección Civil de la Isla de La Palma (Territorial Insular Civil Protection Emergency Plan for the Island of La Palma).
  - Consejo Nacional del Agua (National Water Council).
  - Mesa Nacional del Regadío (National Irrigation Board).
  - Mesa de la Ciencia Pesquera (Fisheries Science Board).
  - Oficina y Ciencia Tecnológica del Congreso de los Diputados (Office and Technological Science of the Congress of Deputies).
  - Renovation of CSIC participation in entities and bodies such as public bodies and collegiate bodies of the Public Administrations: Agencia Valenciana de Innovación (Valencian Agency for Innovation) and Comité de Asesoramiento Científico del Mar Menor (Mar Menor Scientific Advisory Committee); foundations like the VET+i Plataforma Tecnológica Española de Sanidad Animal (VET+i Spanish Animal Health Technology Platform), and associations such as Museos y Centros de Ciencia y Técnica de España (Museums and Science and Technology Centres in Spain); Consejo para la Edificación Sostenible España ACESE (Sustainable Building Council Spain).
  - Incorporation in the entities in which National Centres participated (among others, associations such as the Entidad Nacional de Acreditación (National Accreditation Entity), Sociedad Española de Paleontología, (Spanish Society of Palaeontology), organisations managing river-basins such as the Júcar and Guadalquivir hydrographic confederations).
- **Departures from entities and collegiate bodies in 2022.**
  - CIBERNED, SINCROTRÓN ALBA, VLC CAMPUS Consortia.
  - AIE Índice Iberoamericano de Investigación y Conocimiento (I3C Ibero-American Research and Knowledge Index).
  - Fundación Parque Científico Tecnológico Aula Dei. (Science and Technology Park Foundation).
  - CEIs Carlos III, Barcelona Knowledge Campus.
- **CSIC promotes or collaborates in scientific initiatives** such as International Excellence Campuses, technology platforms, Health Research Institutes and other institutional collaborations.
- **In 2022**, CSIC research staff **participated in 245 expert advisory tasks in commissions, committees and councils** created to study and make decisions in relation to a specific subject area, including their participation in Parks and Nature Reserves and National Parks, and their presence in more than 125 national and 40 European or international technical bodies of the Asociación Española de Normalización (Spanish Association for Standardisation). The institutes and centres that contributed the greatest number of research personnel were the IGME, IETCC, IPE and RJB.

4.4

SCIENTIFIC AND INSTITUTIONAL COLLABORATIONS

The CSIC is **associated, advises and collaborates** with a wide range of initiatives from all sectors of Spanish society, which are implemented through general action protocols, agreements, management committees and other forms of collaboration.

MILESTONES 2022

Agreements and other legal instruments.

SIGNED	234
PROCESSED	248
COMPLETED	198
IN FORCE	1,187

Addenda, extensions and continuity agreements.

PROCESSED	25
SIGNED	25

Table 4.5
Object of agreements/instruments signed in 2022.

R&D	**55**
SCIENTIFIC COLLABORATION	**50**
EDUCATIONAL COOPERATION	**41**
TRAINING	40
JOINT INSTITUTES	10
SCIENTIFIC CULTURE	9
USE OF FACILITIES AND EQUIPMENT	8
EXPERT ADVICE	7
STAFF	5
OTHER R&D STRUCTURES	4
LARGE INFRASTRUCTURES	1
SCIENTIFIC INFORMATION	1
OTHER	1

- **55 agreements for the funding/subsidising various activities**, as well as the implementation of **specific R&D projects**, including: 5 agreements within the Health Research 2022 call of the Fundación La Caixa, the THINKINZUL projects with the Generalitat Valenciana and universities in the Comunitat Valenciana (Valencia, Castellon and Alicante), those of the SINÉRGICOS 2020 programme of the Comunidad de Madrid, the collaboration with the FECYT and the one with the Diputación de Pontevedra on the ICA. Donations have been implemented from the Fundación Tatiana Pérez de Guzmán el Bueno, as well as the foundations: Palarq, Científica AECC, BBVA and La Caixa.

- Articulation of **general frameworks and protocols for general scientific collaboration or in technical projects and activities with various entities**, including: creation of the "CSIC-María la Brava" science museum in Salamanca, Cazorla Natural Park with the Junta de Andalucía; Mar Menor with MITECO; with CRUE, REPSOL, and other private companies, associations, universities, foundations, societies and hospitals. Likewise, for collaborations, the Interdisciplinary Thematic Platforms (PTIs for additive manufacturing and open heritage) and the protocols signed within the framework of the CSIC's Living Lab for "public procurement of innovation" with Aqualia, with the Sociedad de Salvamento y Seguridad Marítima, with the Sociedad de Electrónica Submarina, with the General Directorate of the Civil Guard and with the Omnium group.

- **41 educational cooperation agreements for students** from 23 public and private universities to carry out undergraduate, master's and doctoral internships and postgraduate programmes at CSIC institutes.

- **40 agreements for the training of experts and/or teachers** with companies, banking foundations, the Spanish Ministry of Universities, regional governments, provincial councils, etc.

- Agreements to **update joint institutes**: CICICARTUJA, CABIMER, CABD, IBIS, IAM, IBGM, IFISC, IHSM, IMEDEA, CNA, and others related to **R&D structures**: the Digital Innovation Hub in Artificial Intelligence (AIR4S), the Alliance for Translational Research in Rare Diseases of the Comunitat Valenciana and the CIBER (Consortium for Biomedical Research Network Centre).

- **Scien** for the exhibition *'Los mapa ndo. La expedición de Magallanes y Elcano'* (Maps and the first voyage around the world. Magellan and Elcano's expedition) held at the Instituto Geográfico Nacional, agreements with RENFE and ADIF, with Seville's City Council (prize competition) and Madrid City Council (visits to schools) and protocols with the AEPECT (Spanish Association for the Teaching of Earth Sciences), the company Marco Lógico Consultores S.L. and the Fundación Parques Reunidos.

- **Institutional agreements for the regulation of the use of facilities** in various buildings with different national, regional and local public administrations:

  - Agreement for the regulation of shared facilities in Valladolid, Valencia and Palma de Mallorca.

  - Protocols with the MPT (Ministry for Territorial Policy) within the *'Citadel of Knowledge'* initiative in Barcelona and with Barcelona City Council to expand the city's scientific ecosystem.

- Formalisation of **expert advice and support and assistance from the CSIC** to various entities in different aspects: Vall d'Uixó town council (study of les Coves de Sant Josep), MAPA (Ministry for Agriculture, Fisheries and Food) committees to INIA (innovation and agricultural sustainability AEI-AGRI) and CEBAS (plan for irrigation) as well as agreement for the monitoring of the Strategic Plan for the Common Agricultural Policy 2023-2027, AECID (Spanish Agency for International Development Cooperation), Provincial Councils of Pontevedra (archaeological sites) and Salamanca (soil analysis).

- **Agreements co-funded by ERDF funds** with LIFEWATCH ERIC in the Comunidad Autónoma de Andalucía; with the Universidad Complutense and the Universidad Politécnica de Madrid for COVID-19 projects.

- **Agreements with funds from the Recovery, Transformation and Resilience Plan:** with the MINECO (Ministry for Economic Affairs and Digitalisation) in the framework of the Public Administrations Digitalisation Plan, in the area of astrophysics with Catalan institutions and universities, with the CELLS consortium in the area of advanced materials and two on marine science programmes with Galician institutions and universities.

- Agreements for the implementation of **various scientific collaboration projects and actions**: *'Dobla de Oro'* project (EEA-Patronato Alhambra Generalife-Agencia Albaicín Alhambra), updating of the ISOC Thesaurus of psychology (CCHS-Univ.Complutense-Colegio de Psicólogos), management of the Urban River Lab platform (CEAB-Consorci Besòs Tordera-Fundació Rivus-Naturalea Conservació, S.L. - Ayto.Montornès del Vallès), for the development of volunteer programmes of the *Sociedad de Amigos del Real Jardín Botánico* (Botanical Garden friends' society), LIFE Nature and Biodiversity project (IESA-WWF Spain), ungulate conservation programme (EEZA-SELWO S.L.) and scientific communication programme with the Fundación BBVA.

4.5 RESEARCH STAFF MOBILITY

An important means of fostering and intensifying collaboration between scientific institutions is the research staff mobility in different modalities, within CSIC itself, from CSIC to the outside world, and vice versa.

In 2022, a variety of mobility requests, totalling **121** applications, were processed and accepted.

Table 4.6 Mobility applications processed in 2022.

CSIC → CSIC	**17**
ICU TRANSFERS	15
TEMPORARY ASSIGNMENT OF TASKS	2
CSIC → EXTERNAL CSIC	**67**
TRAINING STAYS IN FOREIGN CENTRES	5
TRAINING STAYS IN NATIONAL CENTRES	2
TEMPORARY LEAVE FOR FOREIGN STAFF	7
TEMPORARY LEAVE OF ABSENCE FOR SECTI STAFF	4
ATTACHMENTS TO OTHER SECTI NATIONAL AGENTS	9
SCIENTIFIC, TECHNOLOGICAL AND INNOVATION COLLABORATIONS	40
EXTERNAL CSIC → CSIC	**34**
TEMPORARY SECONDMENTS TO THE CSIC	2
ASSOCIATED PhDs	30
TRANSFERS FROM AGENCIES OR MINISTRIES	2
OTHER	**3**
PARENTAL LEAVE	2
SCIENTIFIC-TECHNICAL COLLABORATION OF NON-RESEARCH PERSONNEL BELONGING TO OTHER BODIES AND CATEGORIES	1
TOTAL	**121**

5

INTERNATIONALISATION

05 INTERNATIONALISATION

International scientific collaboration is essential to tackle society's global challenges, as well as to place the CSIC as one of the most attractive organisations for performing science in Europe, according to the CSIC's Multiannual Action Plan 2022-2025.

With this objective in mind, the Vice-Presidency for International Affairs is working to strengthen the CSIC's competitiveness in both the European and intercontinental spheres, The aim is to increase the institution's competitiveness in the European and international spheres, promoting a vast network of relations with foreign and international institutions. This endeavour is supported through specific actions favouring international mobility, participation in European and international calls for proposals, as well as strengthening institutional representation and improving the instruments that enable scientific cooperation with countries receiving Official Development Assistance (ODA).

In order to **analyse internationalisation of the institution**, the following **indicators** have been taken into account:

- International collaboration initiatives, through agreements with foreign entities, participation in European or international associations, in joint calls for proposals with other entities or through our own or co-managed programmes.
- International mobility of CSIC staff through its own calls for proposals or those of the EU and other European and international programmes.
- Accounting for funds received from participation in European and international programmes and investment in own programmes.

Table 5.1 International indicators.

STRATEGIC OBJECTIVE OF THE MULTIANNUAL ACTION PLAN 2022-2025	INTERNATIONAL LEVEL INDICATOR	VALUE 2022
A3 Consolidate/extend alliances with national and international universities and research centres	No. of partnerships (Agreements, Protocols and other pacts) established and/or renewed with foreign universities and research centres	54
B4 Increase internal/external mobility in knowledge exchange programmes	No. of stays abroad by research or management personnel	363
D2 Improve CSIC leadership in programmes funded by EU and international agencies	No. of competitive projects led by CSIC funded by the EU and/or other international agencies	12
D4 Positioning in large consortiums and infrastructures (ESFRI, EIROS...)	No. of initiatives funded to promote and strengthen the participation of CSIC research groups in ESFRI	4

MILESTONES 2022

- Public position of the CSIC, through the G6, in solidarity with the sovereignty of **Ukraine** and condemnation of its invasion. Launch of a call for applications to receive Ukrainian personnel in CSIC institutes.

- CSIC joined CoARA (Coalition for the Advancement of Research Assessment), being one of the 44 Spanish entities that joined in the constituent period.

- **Third European institution in number of projects obtained from the European Horizon 2020 R&D+i programme**. Publication of a special edition of CSIC INVESTIGA journal, **[web link]**.

Special CSIC Research Edition
HORIZON 2020
July 2022.

- Four CSIC researchers were successful in obtaining **Advanced Grants** from the ERC (European Research Council); Seven CSIC technologies received EU grants to explore their commercial potential (**Proof of Concept**); One CSIC researcher obtained an **ERC Synergy Grant**.

- Strengthening of the CSIC's **institutional presence** by participating in 50 European and international legal entities and networks. Institutional relations with Africa and Latin America were channelled through participation in strategic forums such as the 'AU-EU Innovation Agenda Stakeholder Event' held in Nairobi (Kenya).

Cristina Russo (Director for Global Approach and International Cooperation in R&I/European Commission), Lucía Benito (VP International Affairs /CSIC), José Manuel Durán (Centre for Techno-Industrial Development - CDTI), Mónica Martín Lanuza (DVP Internationalisation & Cooperation CSIC), Vincenzo Lorusso (European Commission) and Armela Dino (MICINN).

Baccalaureate students at the European Researchers' Night, September 2022.

- Promotion of a network to share advances in biomedicine with Latin America, together with the AECID (Spanish Agency for International Development Cooperation).

- Reinforcement, through the i-COOP cooperation programme, of institutional relations with Equatorial Guinea, and training of the first doctors in Chemistry to graduate from the University of Haramaya, Ethiopia.

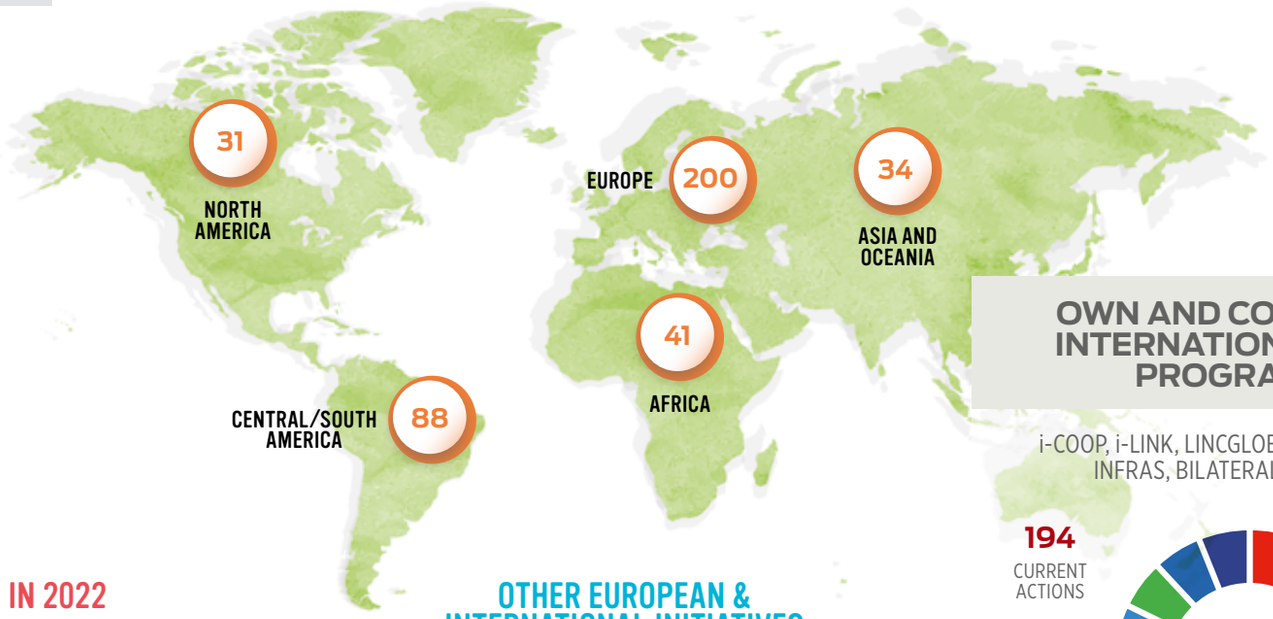
- Coordination of the Spanish participation in **EOSC AISBL**, the largest research infrastructure for the development of Open Science, and launch of the European Solar Telescope (EST) project to build the next generation 4m solar telescope located in the Canary Islands.

- Growth in the number of CSIC publications, by 0.4%, in international collaboration with respect to the previous year. Of particular note is the close collaboration in scientific productions with research staff and entities based in the United States, United Kingdom, Germany and France, in that order.

- Organisation of the seventh *'Reunión de Técnicos de Internacionalización'* a meeting of CSIC internationalisation technicians, attended by more than 90 participants.

- Active participation in international outreach activities, such as the European Researchers' Night and Europe Day.

Figure 5.1 CSIC INTERNATIONAL PROJECTION IN 2022



4th
EUROPEAN PUBLIC RESEARCH INSTITUTION
SCIMAGO INSTITUTIONS RANKINGS

7th
GLOBAL PUBLIC RESEARCH INSTITUTION
SCIMAGO INSTITUTIONS RANKINGS

394
CURRENT INTERNATIONAL AGREEMENTS

OWN AND CO-MANAGED INTERNATIONALISATION PROGRAMMES

i-COOP, i-LINK, LINCGLOBAL, INTERCOONECTA, INFRAS, BILATERALS, Drs UKRAINE

194 CURRENT ACTIONS

69% FUNDS FOR SCIENTIFIC DEVELOPMENT COOPERATION

63.4% CSIC PUBLICATIONS RESULTING FROM INTERNATIONAL COLLABORATION

FOREIGN SCIENTIFIC STAFF: **4.43%** PUBLIC EMPLOYEES

H2020/HE IN 2022

156
PROJECTS STARTED IN 2022
€70.9M

924 PROPOSALS SUBMITTED
612 CURRENT COLABORATIVE PROJECTS
85 CURRENT MSCA IF
70 CURRENT INDIVIDUAL ERC

OTHER EUROPEAN & INTERNATIONAL INITIATIVES

60
PROJECTS STARTED IN 2022
€18.6M

NIH · interreg · EUMETSAT

CSIC MOBILITY CALLS

(SCIENTIFIC STAFF PLACEMENTS)

5.2

EUROPEAN RESEARCH AREA

The year 2022 witnessed the start of the European Research Area (ERA) policy agenda for the 2022-2024 period, with the signing of several actions by all 27 Member States. The five most subscribed actions are: Research Careers (action 4), Open Science (action 1), Research Infrastructures (action 8), Missions and Partnerships (action 10) and Research Assessment Reform (action 3). The launch of the ERA Forum facilitates coordinated workflow and provides a tool to support Member States in planning and prioritising the necessary reforms and investments. During 2022, a total of 12 meetings of the ERA Forum were held with the participation of all 27, as well as seven representatives of the interest groups established.

A turning point in 2022 was the publication by the Council of the European Union of the Conclusions on Open Science including specific reference to research evaluation and the European Framework for Research Careers, as well as the European Charter and Code of Conduct for Researchers.

EUROPEAN PROJECTS PROGRESS AND SUMMARY OF RESULTS

The total number of project proposals submitted in 2022 was **924** according to the Funding and Tenders portal. It should be noted that this website includes all individual and collaborative project proposals from Horizon Europe, as well as proposals from other European Programmes such as LIFE, ERASMUS+ or RFCS.

The number of proposals submitted reflects the efforts of CSIC research staff to prepare collaborative proposals for Horizon Europe, and shows an increase compared to the average of the last four years.

DDuring 2022, the CSIC participated in a total of **612 projects in two European Framework Programmes**, with H2020 accounting for 76% of the current projects and the current Framework Programme (Horizon Europe, 2021-2027) for the remaining projects. (*see table 3.5.4*).

Trends show that regarding the number of projects initiated per year, in 2022 the CSIC has increased project numbers considerably compared to 2021, with a total of 156 projects. This rise is due, in addition to the success of the proposals submitted, to the kick-off of most of the projects awarded in the first HE 2021 calls.

In relation to the pillars of the Framework Programme and their economic contribution to the CSIC, it is noteworthy that 52% of the funds come from the Global Challenges Pillar, compared to the pillars of Excellent Science and Innovative Europe, with 31% and 12%, respectively. This is a change from the H2020 Framework Programme, where around 60% of funding corresponded to the Excellent Science pillar. This change is due, in addition to the CSIC's success in the Global Challenge calls for Food, Bioeconomy, Natural Resources, Agriculture and Environment, to the withdrawal of the Excellent Science pillar from the Future and Emerging Technologies (FET) sub-programme, currently included in the European Innovation Council (EIC) under the Innovative Europe pillar.

CSIC ranks third in the number of projects obtained from the European R&D+i programme Horizon 2020

CNRS (FRANCE)	1,929	THE UNIVERSITY OF CAMBRIDGE (UK)	766
FRAUNHOFER (GERMANY)	1,186	THE UNIVERSITY OF OXFORD (UK)	734
CSIC (SPAIN)	917	KOBENHAVNS UNIVERSITET (DENMARK)	709
CEA (FRANCE)	820	UNIVERSITY COLLEGE LONDON (UK)	687
CNR (ITALY)	803	KATHOLIEKE UNIVERSITEIT LEUVEN (BELGIUM)	680

Figure 5.2 CSIC RESULTS UNDER THE 2022 FRAMEWORK PROGRAMME

MILESTONES FOR PROJECTS STARTED IN 2022

924
PROPOSALS SUBMITTED[1]

156
TOTAL PROJECTS[2]

13
PROJECTS COORDINATED BY CSIC[2]

14
ERC PROJECTS[2]

14 PIs
ICM
CSIC TOP CENTRE (NUMBER OF PARTICIPATIONS)[3]

M5.5 €
IDAEA
CSIC TOP CENTRE (ECONOMIC RETURN)[3]

M16.2 €
LIFE/ NATURAL RESOURCES
CSIC AREA/SUB-AREA WITH HIGHEST ECONOMIC RETURN[3]

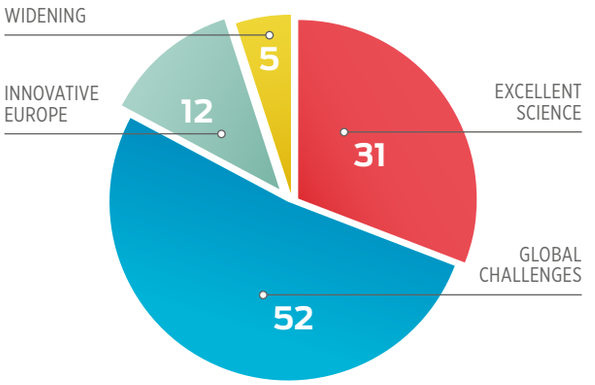
HORIZON EUROPE RANKING DATA (HE)

3rd
RANK IN THE DASHBOARD EU (TOTAL NUMBER OF PARTICIPATIONS IN HE)

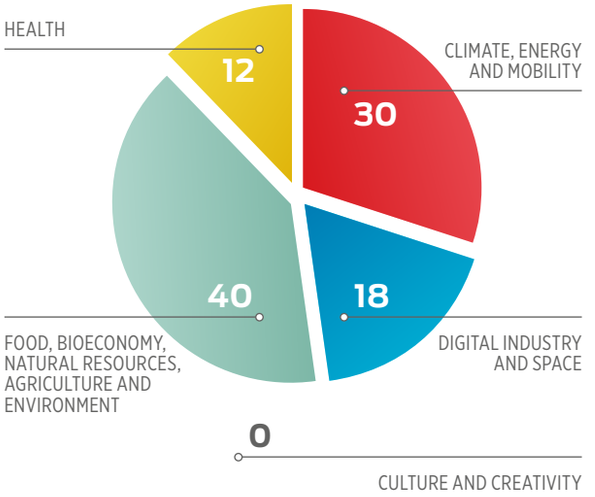
6th
RANK IN THE DASHBOARD EU (TOTAL ECONOMIC RETURN IN HE)

FUNDING DISTRIBUTION

% OF FUNDING BY HORIZON EUROPE PILLARS[2]



% FUNDING GLOBAL CHALLENGES HORIZON EUROPE[2]



Source:

[1] Funding and tenders Portal

[2] Corporate database: DG projects

[3] Corporate database: centres and people

The high[illegible] number of principal investiga[illegible]itiated in 2022 correspond to IDAEA (Institute for Environmental Diagnosis and Water Studies) and ICM (Institute of Marine Sciences).

The Life area, Natural Resources sub-area, had the highest economic return in relation to projects initiated in 2022.

CSIC-coordinated projects started in 2022 *(table 5.2)*: with a total of 12 coordinated projects, the trend in the percentage of coordinated projects remains at 10.8%, the average for the previous four years was 11%. The projects in the Climate, Energy and Mobility cluster are outstanding compared to the total amount of grants awarded.

Increasing the leadership of collaborative projects is a strategic objective of the CSIC, and is aligned with the Spanish Strategy for Science, Technology and Innovation 2021-2027, which prioritises the promotion of Spanish participation and leadership in European R&D+I programmes (Horizon Europe).

Table 5.2 Projects coordinated by CSIC started in 2022.

TIT.ACC.KEY	TITLE	AREA	NAME OF THE PI CENTER	PRINCIPAL INVESTIGATOR'S NAME
European Innovation Council	Photosynthetic electron focusing technology for direct efficient biohydrogen production from solar energy	Biology and Biomedicine	Institute of Integrative Systems Biology	Jaramillo Rosales, Alfonso
Marie Sklodowska Curie	Long-TREC: The Long-Reads Transcriptomics European Consortium. The next generation transcriptome biology revealed by single molecule sequencing technologies	Biology and Biomedicine	Institute of Integrative Systems Biology	Conesa Cegarra, Ana Victoria
Food, Bioeconomy, Natural Resources, Agriculture and Enviroment	Facilitating Innovations for Resilient Livestock Farming Systems	Agricultural Sciences	Zaidín Experimental Station	Yañez Ruiz, David Rafael
Food, Bioeconomy, Natural Resources, Agriculture and Enviroment	Beyond Xylella, Integrated Management Strategies for Mitigating Xylella fastidiosa impact in Europe (BeXyl)	Agricultural Sciences	Institute of Sustainable Agriculture	Landa Del Castillo, Blanca Beatriz
Marie Sklodowska Curie	From seed to seedling: Epigenetic mechanisms of priming to design strategies for crop improvement	Agricultural Sciences	National Biotechnology Centre	Rubio Muñoz, Vicente
Climate, Energy, and Mobility	Understanding groundwater Pollution to protect and enhance WATER quality	Natural Resources	Institute for Environmental Diagnostics and Water Studies	Vazquez Suñe, Enrique
Research Infraestructures	A Digital Twin for GEOphysical extremes	Natural Resources	Geosciences Barcelona	Carbonell Bertran, Ramon
European Innovation Council	Value-Aware Artificial Intelligence	Physical Science and Technologies	Artificial Intelligence Research Institute	Sierra Garcia, Carlos Alberto
Research Infraestructures	Artificial Intelligence for the European Open Science Cloud	Physical Science and Technologies	Physics Institute of Cantabria	Lopez Garcia, Alvaro
Climate, Energy, and Mobility	Calcium looping to capture CO^2 from industrial processes by 2030	Chemical Science and Technologies	Institute for Carbon Science and Technology	Abanades Garcia, Juan Carlos
Climate, Energy, and Mobility	Hybrid tandem catalytic conversion process towards higher oxygenate e-fuels	Chemical Science and Technologies	Institute of Chemical Technology	Prieto Gonzalez, Gonzalo
Marie Sklodowska Curie	DNA replication at the heart of cell fate decisions and cancer development	Biology and Biomedicine	Severo Ochoa Molecular Biology Centre	Lecona Sagrado, Emilio

ERC proj *e 5.3)*: **12 ERC projects** were initi **an economic return of €12.8 million**. The breakdown by sub-programme is two grants awarded for each type of call: Starting, Consolidator and Advanced Grant, and six for the Proof of Concept (PoC) sub-programme. The objective of the PoC is to support projects already funded by the ERC in a previous call by seeking to add value to the project in order to establish proof of concept, identify development pathways and design an appropriate intellectual property protection strategy.

The Core Areas Life and Materia are even in the total number of projects started in 2022.

Marie Skłodowska-Curie individuals

During 2022 the CSIC has remained the national leader in attracting resources through individual projects in the Science Excellence calls for proposals. In the case of individual MSCA actions, it is the first Spanish institution and Spain is the first country in the European Union to obtain this type of action.

MSCA Individual Fellowship (IF) projects contribute significantly to the internationalisation of the CSIC. Forty-five percent of the research staff under contract are foreigners, with predominance of non-national Europeans, accounting for 77%.

Table 5.3 ERC projects started in 2022.

PROJECT ACRONYM	TYPE	TITLE	AREA	PRINCIPAL INVESTIGATOR'S NAME	NAME OF THE PI CENTER
ISLANDLIFE	ADVANCE GRANT	Determinants of island ecological complexity in the context of global change	Natural Resources	Traveset Vilagines, Ana María	Mediterranean Institute for Advanced Studies
POWERBYU	ADVANCE GRANT	Powering wearable devices by human heat with highly efficient, flexible, bio-inspired generators	Physical Science and Technologies	Martín Gonzalez, María Soledad	Institute of Micro and Nanotechnology
SEDAHEAD	STARTING GRANT	Dynamic river catchments in a Global Change context: assessing the present, preparing for the future	UNSPECIFIED	Juez Jimenez, Carmelo	Pyrenean Institute of Ecology
BIFOLDOME	STARTING GRANT	BiFoldome: Homo- and Hetero-typic Interactions in Assembled Foldomes	Materials Science and Technology	Mompean García, Miguel Angel	Institute of Physical Chemistry Rocasolano
ANTICAFING	CONSOLIDATOR GRANT	Harnessing Stromal Fibroblasts to Reduce Resistance and Improve Colon Cancer Therapeutics	Biology and Biomedicine	Calvo Gonzalez, Fernando	Institute of Biomedicine and Biotechnology of Cantabria
PHOTHERM	CONSOLIDATOR GRANT	Photo Thermal Management Material	Biology and Biomedicine	Month-Poulsen, Kasper	Materials Science Institute of Barcelona
PKDCONTROL	PROOF OF CONCEPT	Blocking BAFF signaling to treat Proliferative Kidney Disease (PKD) in trout	Natural Resources	Tafalla Piñeiro, Carolina	National Institute of Agricultural and Food Research and Technology
INPATT	PROOF OF CONCEPT	INorganic Photochemical PATTerning	Natural Resources	García Ruiz, Juan Manuel	Andalusian Institute of Earth Sciences
CELLO	PROOF OF CONCEPT	Cellulose base photonic materials	Materials Science and Technology	Mihi Cervello, Antonio Agustín	Materials Science Institute of Barcelona
SMS-INKS	PROOF OF CONCEPT	Scalable Method for Synthesis of multifunctional colloidal INKs for Superconductors	Materials Science and Technology	Puig Molina, M. Teresa	Materials Science Institute of Barcelona
OPEN-IMAGING	PROOF OF CONCEPT	Open Geometry PET, with 150ps TOF Resolution, for Real Time Molecular Imaging	Physical Science and Technologies	Benlloch Baviera, José María	Institute of Instrumentation for Molecular Imaging
FAIRGLUCOSE	PROOF OF CONCEPT	Affordable and sustainable self-powered GLUCOSE sensing system for a global FAIR diabetes management	Physical Science and Technologies	Sabate Vizcarra, María Neus	Barcelona Institute of Microelectronics

Europea

The Starting Grant call stands out, both in terms of the number of projects signed and underway in 2022. The second in terms of number are the Consolidator Grants while the Advanced Grants take third place *(tables 5.4 and 5.5)*.

Table 5.4 Individual Framework Programme Projects in force in 2022 .

	SUBPROGRAMME	NUMBER	FUNDING
ERC	STG	24	33,006,687 €
	COG	22	41,402,348 €
	ADG	16	28,431,920 €
	POC	8	1,055,000 €
MSCA	EUROPEAN FELLOWSHIP/ POSTDOCTORAL FELLOWSHIP	85	15,625,302 €
TOTAL		**155**	**119,521,257 €**

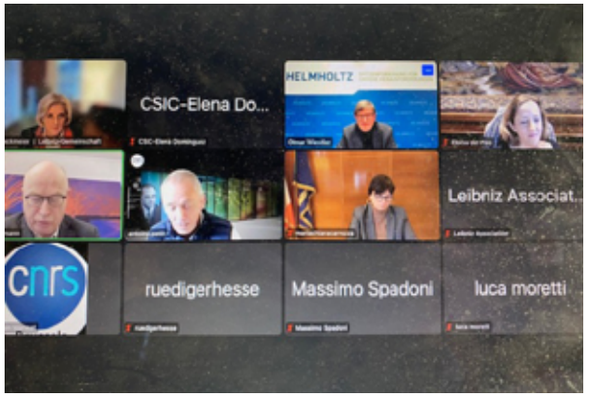
Table 5.5 Individual Framework Programme Projects starting in 2022.

	SUBPROGRAMME	NUMBER	FUNDING
ERC	STG	2	2,995,669 €
	COG	2	3,999,827 €
	ADG	2	4,982,989 €
	POC	6	885,000 €
MSCA	EUROPEAN FELLOWSHIP/ POSTDOCTORAL FELLOWSHIP	29	5,095,641 €
TOTAL		**41**	**17,959,126 €**

IDENTITY OF THE CSIC IN THE EUROPEAN RESEARCH AREA

The CSIC is positioned in the ERA through scientific collaborations in Horizon Europe, with an outstanding third place in terms of the project achievement of (2021-2022), through bi- and multilateral scientific agreements and through participation in scientific associations, with a diversity of **implemented actions**. The following achievements stand out:

- Attendance of the CSIC 2022 presidents, Rosa Menéndez (outgoing) and Eloísa del Pino (incoming) to two G6 meetings, highlighting the role of the non-formal partnership in various ERA actions, as well as the corresponding CSIC priorities.
- CSIC participation in the Core Group for the discussion of the document leading to the **Agreement on Research Assessment**.
- CSIC membership of the CoARA Coalition in its set-up period.
- Participation of research and technical staff (10) in six working groups and five task forces of Science Europe resulting in the following documents: i) ***A Values Framework for the Organisation of Research***, ii) ***Towards Strengthened Research and Innovation Systems Across Europe***, iii) ***Interdisciplinary research for the Green and Digital Transition (survey report)***, iv) ***Open Science as Part of a Well-Functioning Research System***, v) ***A Digital Legislation that Works for Science?***, vi) ***Science Communication for Greater Research Impact***.



Participation of CSIC president, Eloísa del Pino, in the G6 meeting held by videoconference.

- Participation of two CSIC researchers in the Science Business sessions: i) The road to resilience: Which future role for the EU in health and life sciences? and ii) Expert round table on Research Assessment.
- CSIC participation in the ERA Forum on behalf of the G6.
- Organisation or co-organisation of events and meetings in collaboration with entities such as the Spanish Embassy in Belgium; the Instituto Cervantes; the European Parliament and Spanish R&I entities in Brussels with which the Delegation has a collaboration agreement: CDTI, ISCIII, universities.

5.3

COOPERATION AND INTERNATIONALISATION RESOURCES

Collaboration between research staff and public and private institutions in different countries is one way of internationalising knowledge. The CSIC collaborates very actively and in different ways with international organisations carrying out scientific research through different instruments or programmes of its own. In addition to its participation in the European Research Area (ERA), the following **collaboration initiatives** are also noteworthy:

- Participation in associations at European or international level.
- Participation in calls for proposals from foreign entities and international organisations.
- Signing of bilateral and multilateral international agreements.
- Funding of own or co-managed calls for proposals.

INTERNATIONAL AGREEMENTS

In 2022, the number of agreements and general action protocols in force was **394**, with entities from 54 countries *(figure 5.1)* Close collaboration is held with France, Italy and Germany inside Europe while, outside Europe, there is a close relationship with Brazil, Colombia and Mexico. Likewise, meetings have been intensified with different Spanish and foreign agents in order to analyse synergies and strengthen strategies for the future.

[see Annex]

Table 5.6 International Agreements in force 2022.

OWN OR CO-MANAGED PROGRAMMES

In 2022, the CSIC committed resources to establish or strengthen international networks through the i-COOP, LINCGLOBAL, INTERCOONECTA and UCRANIA DOCTORES programmes for development cooperation, and through its own funds for internationalisation through the i-LINK, BIL. MOST (bilateral with Taiwan), IRP2021FR (bilateral with France) and INFRAS (supporting CSIC networks in the process of joining ESFRI).

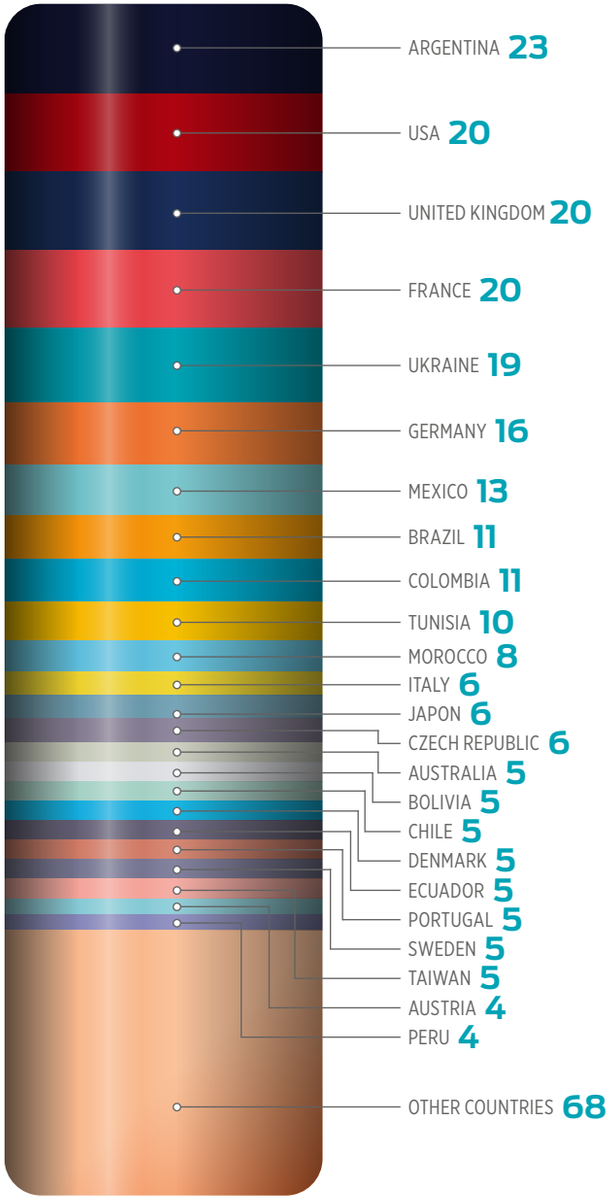
In line with the 2030 Agenda, the CSIC has incorporated the 17 Sustainable Development Goals (SDGs) in its development cooperation and internationalisation programmes, as well as the gender perspective, including it as a tie-breaking issue.

Figure 5.3 shows the data corresponding to the total number of current collaborations funded by the CSIC with cooperation budget and own resources for internationalisation in 2022. Those countries in which there are fewer than three projects are not shown individually, with all of them being included in a single block.

In internationalisation programmes, France and the USA stand out, with 20 collaborations each. Along the same lines, the Centre National de la Recherche Scientifique (CNRS) stands out among the institutions with which there has been greatest collaboration.

In development cooperation programmes, Argentina should be highlighted, numbering 23 collaborations, with the National Council for Scientific and Technical Research of Argentina (CONICET) being the CSIC's main partner, followed by the University of Buenos Aires.

Figure 5.3 Current collaborations financed with CSIC's own funds and cooperation budget for internationalisation in 2022.



INTERN

The mobility of scientific staff between different countries is a way of bringing together and facilitating international knowledge flows, which can also provide a direct curricular return. The programmes aimed at facilitating this include actions of the centres and institutes themselves, external mobility calls and their own internationalisation instruments. The latter include the i-LINK (general international exchange), i-COOP (international cooperation with countries receiving development aid), LINCGLOBAL (international cooperation on climate change), INTERCONECTA (international cooperation in Latin America in collaboration with AECID) and, exceptionally, *UCRANIA DOCTORES*, the aim of which has been to facilitate the work of Ukrainian research staff at the CSIC in times of war.

In 2022, other bilateral internationalisation initiatives have been launched with Taiwan and France, which promote and enhance the circulation of scientific staff through two-way stays.

i-LINK PROGRAMME

In 2022, the outflow of CSIC research staff abroad was, all together, higher than the inflow of foreign research staff, taking into account aspects such as the number of stays and countries visited, the average length of stays and the number of researchers posted.

A total of **102 stays** were undertaken, mainly in institutions in Germany, followed by the USA, France, the UK and the Czech Republic. The average length of stay was approximately 15 days.

i-COOP PROGRAMME

During 2022, research staff from foreign institutions carried out **84 stays** in 77 i-COOP current actions with 25 countries. The number of stays by scientific staff from Tunisia and Argentina was outstanding in terms of number. The average length of stay in the actions under implementation was approximately 73 days.

The flow of CSIC research staff to other foreign countries in the field of development cooperation amounted to **26 stays** in institutions in 12 different countries, mainly Argentina, with an average length of stay of 12 days.

LINCGLOBAL PROGRAMME

In 2022, funding was awarded to **18 LINCGLOBAL actions with 10 Latin American countries**, half of them in collaboration with Argentina. The outflow of CSIC research staff abroad is, on the whole, lower than the inflow of foreign research staff, taking into account aspects such as the number of stays and countries visited, the average length of stays and the number of researchers posted.

A total of **30 stays** were carried out by research staff from foreign institutions and 19 by CSIC staff in the Latin American partner country.

OTHER OWN INTERNATIONALISATION PROGRAMMES

In 2022, in the framework of the bilateral actions with the Taiwanese NSTC, four stays were carried out, one of them of CSIC staff with an average duration of one month, three of them of NSTC staff at CSIC, with an average duration of one week.

Likewise, in collaboration with the CNRS, a 56-day stay of CSIC staff at the CNRS was carried out in the framework of an IRP grant, while five stays were carried out in the framework of a LIA grant, two of them from France, the rest from other European countries.

On the other hand, it is important to highlight the recruitment of 19 Ukrainian PhDs by the CSIC during 2022, which means that there have been 19 movements to the organisation.

5.4 ECONOMICS OF INTERNATIONALISATION

This section analyses the economic return of different sources of international funding compared to other CSIC funding sources, as well as the impact of different types of CSIC activities and programmes, their investments and relative economic returns.

EUROPEAN AND INTERNATIONAL COMPETITIVE CALLS FOR PROPOSALS

The total of international competitive funds raised during 2022 amounts to €70.9 million, with the EU Framework Programme for Research and Innovation representing the largest contribution, accounting for 86% of the total funds awarded to CSIC during 2022 *((see sub-chapter 3.5)*.

HORIZON EUROPE

In 2022, a total of 156 European Framework Programme projects were initiated at the CSIC with a total of €70.9 million in funding awarded *(Figure 5.1)*.

Regardin illar of the projects initiated in 7 es" pillar is the one that offers the greatest economic return to the CSIC with €34.9 million. Within this pillar, the Food, bioeconomy, natural resources, agriculture and environment sub-programme is the one with the highest economic return, with €14 million *(Figure 5.2)*.

OTHER EU PROGRAMMES

The economic return of projects funded by the EU, but not belonging to the Framework Programme, reveals that the LIFE Programme has achieved the greatest economic return for the CSIC, with a total of €2.7 million, which represents 18% of the funds from non-FP European projects.

INTERNATIONAL PROGRAMMES

The financial data for these actions would indicate that funding per collaborative project is around 3.5 times lower, with a total of €4.2 million awarded in projects initiated in 2022.

INVESTMENT IN INTERNATIONALISATION AND COOPERATION CALLS

In 2022, **the CSIC invested €1,128,658.17 in the field of scientific cooperation for development** to carry out I-COOP, INTERCOONECTA, LINCGLOBAL and UCRANIA DOCTORES projects.

In relation to the internationalisation funds in 2022, actions were financed for an amount of €782,725.29 through I-LINK, INFRAS, LINCGLOBAL, BILATERAL with Taiwan, LIA and IRP with France.

Figura 5.4 shows the distribution of funds through the cooperation and internationalisation programmes, with funds dedicated to scientific cooperation accounting for 59% of the total budget.

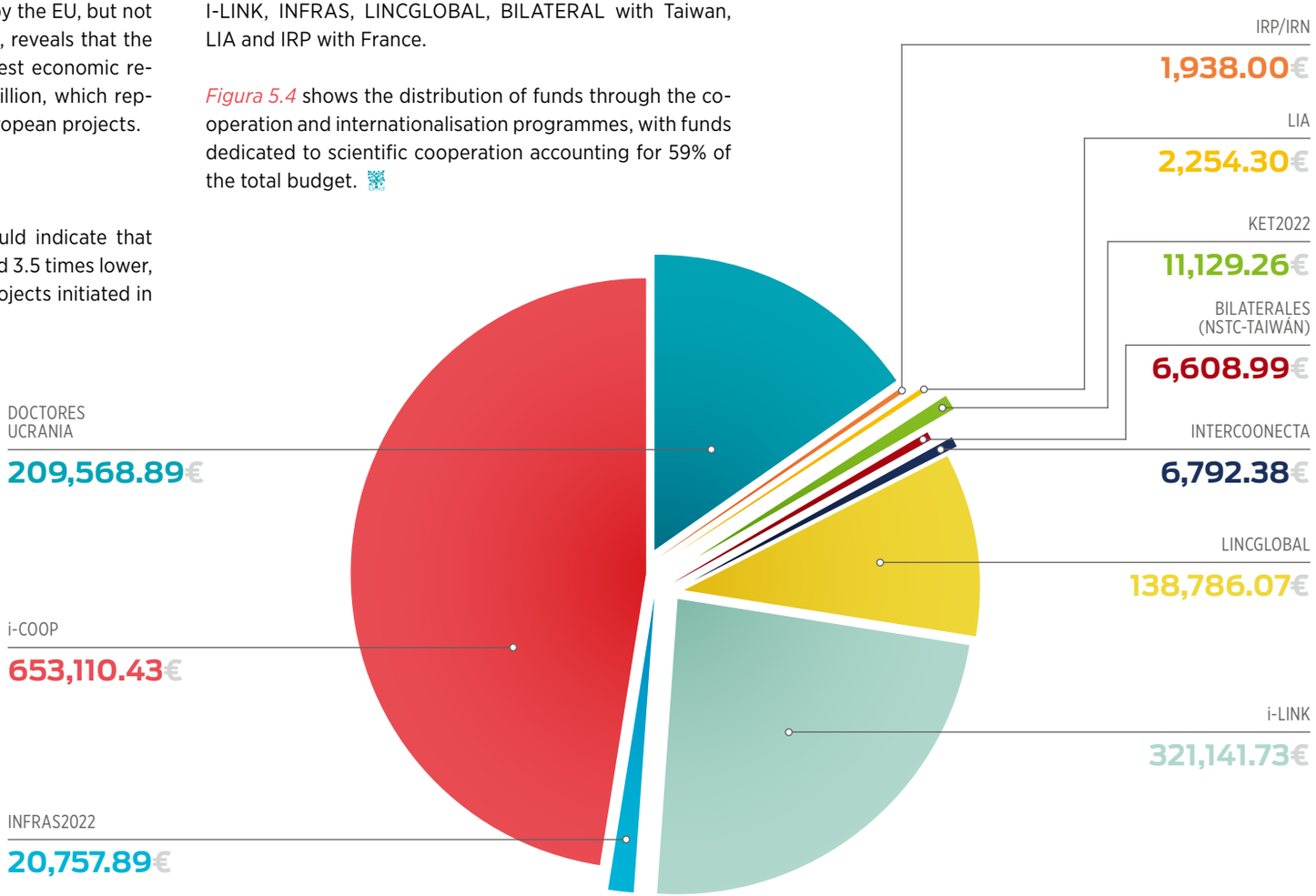


Figure 5.4 Funds invested and grouped by cooperation and internationalisation programmes in 2022.

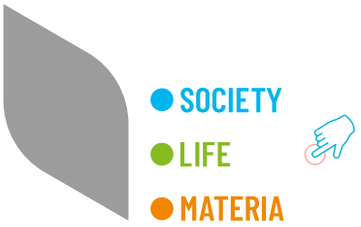
6

INNOVATION AND KNOWLEDGE TRANSFER

06 INNOVATION AND KNOWLEDGE TRANSFER

The CSIC's transfer and entrepreneurship activity is carried out through the Deputy Vice-Presidency for Knowledge Transfer, part of whose mission is to contribute to transforming science into real advances that improve people's quality of life.

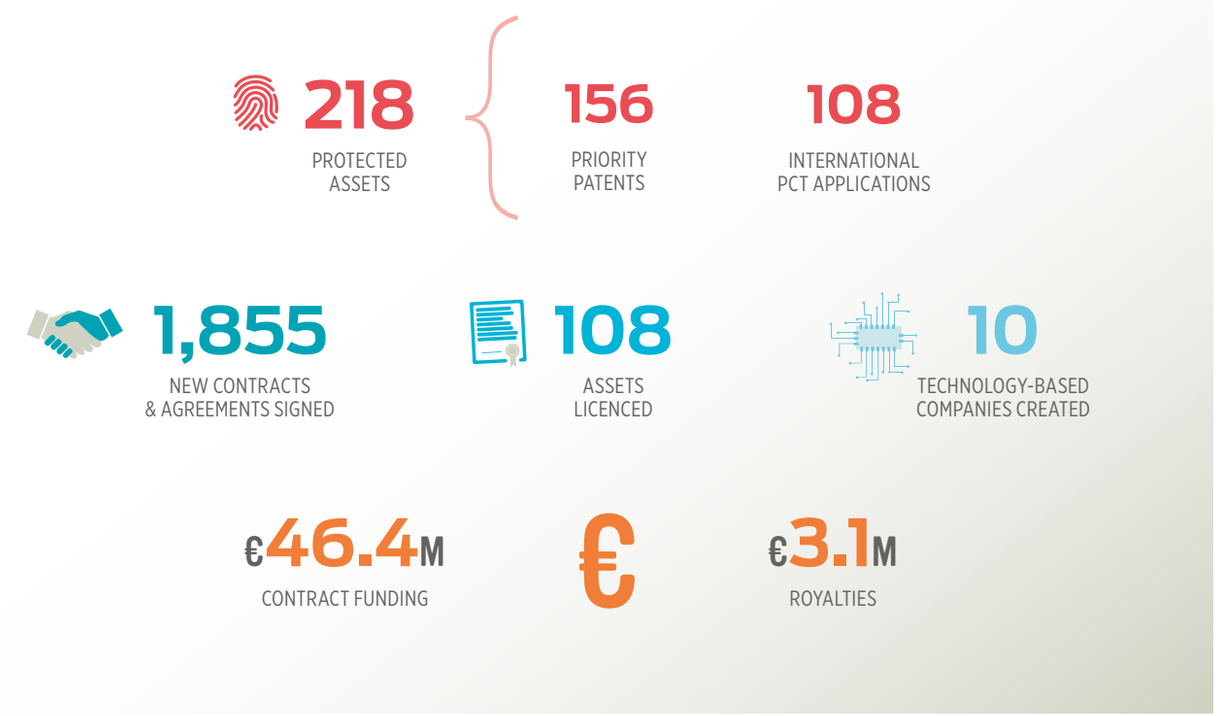
To carry out this mission, activity is organised into five areas and units: Industrial Property and Entrepreneurship Support; Commercial Strategy and Internationalisation; COVID-19 Therapies and Vaccines Support Office; Legal Support Unit, and Economic Management Unit.



6.1 MILESTONES 2022

- Institutional commitment to boost the value of CSIC technologies by filing patent applications with wider international scope. Consequently, the CSIC once again ranks as the leading Spanish entity among both public and private sectors, applying for European patents and preserving patents in the Patent Cooperation Treaty (PCT), and providing opportunities to fully realise technologies at the CSIC.
- Active participation in the Strategic Project for Economic Recovery and Transformation in the comprehensive line of action promoting the development and manufacture of the electric and connected vehicle ("PERTE VEC").
- Contribution to business innovation by promoting and supporting entrepreneurship through the DINAMIZA and EBTon programmes.
- Promotion of "Living Labs" as new innovation ecosystems for the development of Public Procurement of Innovation models, conceived as open and dynamic platforms bringing together public procurement and business.
- Acting as an engine of economic development, generating just over €3 million in royalties.

Figure 6.1 Summary of transfer indicators 2022.



6.2 PATENTING AND VALORISATION OF RESEARCH RESULTS

The CSIC is the **leading Spanish applicant for European patents** at the European Patent Office (EPO) and international PCT patents.

In 2022, a total of **218 assets** (patents, plant varieties, software, utility models, trademarks, biological materials and trade secrets) **were protected**, of which **156 correspond to priority patents**. A total of **108 international PCT patents** have been applied for, again reflecting the effort to internationalise and maintain patents beyond the priority year.

The **international dimension of transfer** shows that the scope has been extended through phasing of the PCT applications in different countries around the world, in addition to European applications, in 2022. Specifically, protection has been extended to national or regional phases of 58 patents in 35 different countries, 75% more different countries than in 2021, including the USA, China, Japan, the Philippines, Ukraine, Qatar, Singapore and Vietnam, among others.

Table 6.1 Priority applications, PCT applications, European and International Priority applications.

	2018	2019	2020	2021	2022
PRIORITY PATENT APPLICATION	126	96	147	137	156
PCT APPLICATION	71	83	69	115	108
EUROPEAN AND INTERNATIONAL PRIORITIES	43	35	73	81	100

Source: BDC, own databases VATC, ORION.

Table 6.2 Trends in Priority patent applications.

BREAKDOWN	2018	2019	2020	2021	2022
SPANISH PRIORITY	83	61	74	56	54
INTERNATIONAL PRIORITY*	43	35	73	81	102
EUROPEAN PRIORITY	34	29	65	76	87
% SPANISH PRIORITY	65.9	63.5	50.34	40.87	35.06
% INTERNATIONAL PRIORITY	34.1	36.4	49.65	59.12	65.38
% EUROPEAN PRIORITY	27	30.2	44.21	55.47	55.76
TOTAL	**126**	**96**	**147**	**137**	**156**

* All International priority patents (foreign national, PCT and European priority patents) are included.

With reg ationalisation of patent applicati with international priority has increased over the last five years, with the number doubling in 2021 and 2022 compared to previous years.

Table 6.3
Asset protection applications in 2022 by Core Area.

ASSET APPLICATIONS	
SOCIETY	3
LIFE	105
MATERIA	110
TOTAL	**218**

Table 6.4 PCT applications by Core Area in 2022.

PCT APPLICATIONS	
SOCIETY	-
LIFE	44
MATERIA	64
TOTAL	**108**

Table 6.5 Licenced assets.

	2021	2022
PATENTS (AND UTILITY MODELS)	46	54
BUSINESS SECRETS	8	6
BIOLOGICAL MATERIALS	8	2
PLANT VARIETIES	18	33
SOFTWARE PACKAGES	-	3
OTHER	1	10
TOTAL	**81**	**108**

6.3 STRATEGIC AGREEMENTS

The CSIC closed 2022 with a balance of **108 licensed assets** *(Table 6.5)*, the signing of **1,828 new contracts and agreements** for an approximate amount of **€46.4 million** *(Table 6.7)* and the signing of **86 licensing contracts**, including those of the **10 new TBCs (Technology-Based Companies)** set up during the year *(Table 6.6)*.

In **2022, the number of contracts and agreements in force was 7,181** for an amount of approximately **€60.4 million** *(Table 6.7)*.

Table 6.6 Number of licence agreements signed.

No. OF LICENCE AGREEMENTS SIGNED	
NON-TBC COMPANIES	61
CSIC TBCs CREATED BEFORE 2022	13
CSIC TBCs CREATED IN 2022	10
TBCs FROM ANOTHER INSTITUTION	2
Nº TOTAL	**86**

Most outstanding agreements, include:

- **Development of a new vaccine against canine leishmaniasis, together with the Zendal Group**, being the first DNA vaccine in the world authorised by the EMA in mammalian animals. The vaccine, developed by the Molecular Parasitology group led by Vicente Larraga, from the Margarita Salas Biological Research Centre (CIB-CSIC), is based on fragments of genetic information that encode immunogens.

- **Participation in the PERTE**, providing support for two of the ten projects that have been chosen for funding in the Strategic Project for Economic Recovery and Transformation for the *'Integral line of action for the development and manufacture of the electric and connected vehicle'* (the "**PERTE VEC**"), promoted by the National Metallurgical Research Centre (CENIM), for the ***'Future: Fast Forward (F3)'*** project, and by the ICV (Institute of Ceramics and Glass), for the ***'INVECPRO'*** project. Furthermore, in the case of the *'Future: Fast Forward (F3)'* project, led by the company SEAT and together with 75 other institutions, the CSIC participates actively in its governing bodies, forming part as a full member of its Executive Committee.

Table 6.7 Number of contracts/agreements signed with entities and institutions in force in 2022 and funding committed. Breakdown by Core Area.

CORE AREA	No. IN FORCE	CURRENT FUND. (€ thousand)	No. SIGNED	FUNDING SIGNED (€ thousand)
SOCIETY	109	500.37	48	678.85
LIFE	3,090	17,849.28	624	19,700.80
MATERIA	1,742	9,789.45	349	7,995.43
UNSPECIFIED	1,862	20,276.69	738	17,756.20
CSIC CENTRAL SERVICES	378	11,974.53	69	310.01
TOTAL	**7,181**	**60,390.32**	**1,828**	**46,441.29**

Table 6.8 Number of contracts/agreements signed with entities and institutions in force in 2022 and funding committed. Breakdown by type of contracting entity.
Table 6.9 Number of contracts/agreements signed with entities and institutions in force in 2022 and funding committed. Breakdown by autonomous region.

6.4 COVID-19 VACCINE AND THERAPEUTICS SUPPORT OFFICE

This office has become a key player in promoting the valorisation and transfer of research results in the ambit of COVID-19 therapies and vaccines, generated mainly by the Interdisciplinary Thematic Platform (PTI+) SALUDGLOBAL, with the aim of ensuring that the solutions reach society as soon as possible, globally and at an affordable price.

- **Preclinical** studies, effective **strategic collaborations** for the **valorisation** of therapies and vaccines have been managed and coordinated, continuing **toxicology and efficacy studies *in vivo*** in animal models of compounds with antiviral or prophylactic potential against SARS-CoV-2 infection.

- During 2022, applications to protect 34 assets were filed, including priority patents (30), software (1), business secrets (1) and utility models (2), directly related to COVID. With respect to patents from previous years, 14 patent families have been continued via PCT, and five of them have been extended to national phase applications (Europe and the USA). In addition, 20 contracts related to the development of different solutions were signed.

- Support has continued to develop a **COVID-19 vaccine based on the highly attenuated MVA poxvirus**, expressing the S-protein of the virus spicule stabilised in its prefusion form, resulting in safety, efficacy and immunogenicity studies in hamsters.

- Completion of **two** Phase-3 **clinical trials** to evaluate the safety and efficacy of two **repositioning drugs** for COVID-19 in outpatients.

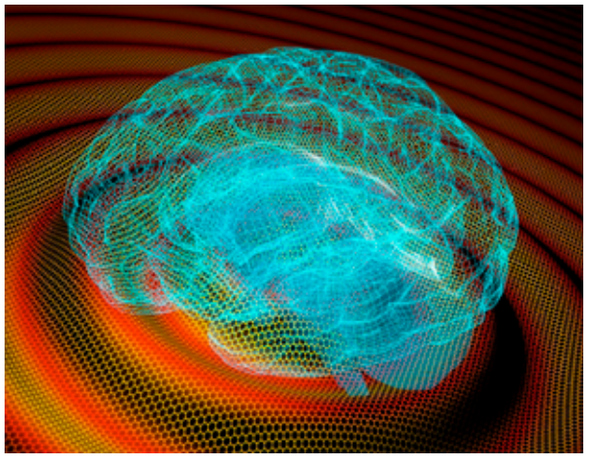
6.5 BUSINESS INNOVATION

CSIC contributions of high industrial market value.

- **New fluorescence assay kits developed by CSIC's TBC A4Cell have reached the market**. These kits, combining the fields of nanotechnology and cell biology, are composed of fluorescent silicon microparticles that can be internalised in the cytosol of cultured cells and allow changes to be monitored over long time periods.

CytoCHECK SPAchip® assay kits are a new family of fluorescence assays developed by A4Cell. Courtesy of A4Cells.

- **Graphene transistors to treat neurological diseases by CSIC's TBC INBRAIN Neuroelectronics**. The devices improve the decoding of brain signals, enabling the development of smart neurological therapies to treat neurological diseases such as epilepsy and Parkinson's disease. The TBC, founded by researchers from ICN2, IMB-CNM-CSIC and ICREA, has signed a licence agreement to develop and exploit three patents and a trade secret, co-owned by ICN2, IMB-CNM-CSIC, ICREA, CIBER, UAB and IDIBAPS. In addition, INBRAIN Neuroelectronics has obtained a historical funding in Medtech in Spain of €15.5 million to date, from recognised local and European investors. Both facts will allow INBRAIN to transfer the technology, based on graphene transistors with unique capabilities in recording ultra-slow brain signals, to the clinical setting.



The company Inbrain develops graphene-based brain implants. Courtesy of ICN2/IMB-CNM/INBRAIN.

- **Valorisation of CSIC technologies through Public Procurement of Innovation**. In 2022, the CSIC promoted the first three **sessions of the Living Lab** to present its own technological proposals of interest to public administrations. The platform **presented over thirty technological proposals generated at the CSIC** and framed within seven key themes to an audience of more than 100 participants, including companies and public administrations. As a result of these sessions, 23 technical meetings were held, in which teams of interested companies and public administrations had the opportunity to get to know the technological proposals in depth and assess potential technological integration or collaboration for development.

- **Prom**. Within the framework of the *'BTon'*, **programmes to support entrepreneurship** have continued, with the aim of **promoting the creation of Knowledge-Based Businesses** at the CSIC. Dinamiza is a project co-financed by the CSIC, the Comunidad de Madrid and European Regional Development Funds (ERDF), also having the collaboration of Madrid's science park: Parque Cientifico de Madrid. EBTon is a project funded by the Madrid city council.

6.6 SOCIAL AND ECONOMIC IMPACT

The **economic returns** obtained in 2022 from the exploitation of CSIC research results amounted to **€2,942,372.71**. This amount represents an increase of up to 18% compared to the previous year. This confirms an upward trend, interrupted in 2019 and 2020 (pandemic), making it possible to recover the €2 million threshold achieved for the first time in 2018.

Overall (downpayment, milestones, sales statements, etc.) **royalties** remain at **€3.1** million, minimally lower than in 2021 (-Δ2%) but with a greater diversity in licensees. Technology portfolio investment remains constant with a small variation (Δ1%), **€1.4** million.

Key research findings underpinning the soaring royalties received by licensees:

- The exploitation of plant varieties generated at CEBAS (Segura Centre for Soil Science and Applied Biology): protected varieties of almond and apricot trees, marketed for reproduction and sale through nurseries and farmers.
- The increase in the number of licensees reporting sales, especially in 2022. The Deputy Vice-Presidency for Knowledge Transfer has made a concerted effort to contact and request information from licensees, achieving an increase of almost 60% in the number of declarations compared to 2021.
- The positive trend, in some cases almost exponential, in licensee sales linked to different research results, among which the following stand out:
  - In the area of Trade Secrets, the licensing of new plant varieties of Tritordeum (low-gluten cereal hybrid).
  - In the field of Biological Material, buffers for gluten extraction and testing with the R5 antibody.
  - In Patents, licences associated with processes related to preserving the greenness of processed fruits and vegetables; the sale of helium recycling equipment in large scientific facilities or hospitals; multifocal refractive intraocular lenses with optimised optical quality in a range of focus and the application of biodegradable polymeric materials as filters in protective masks.

Figure 6.2 Trends in royalties (2017-2022).

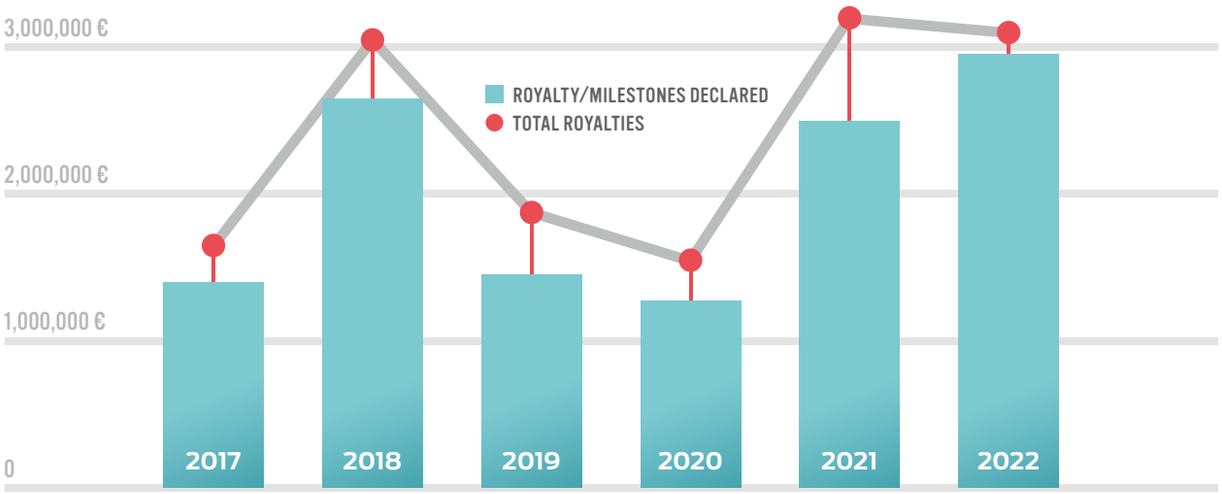


Figure 6. type of licensed asset.

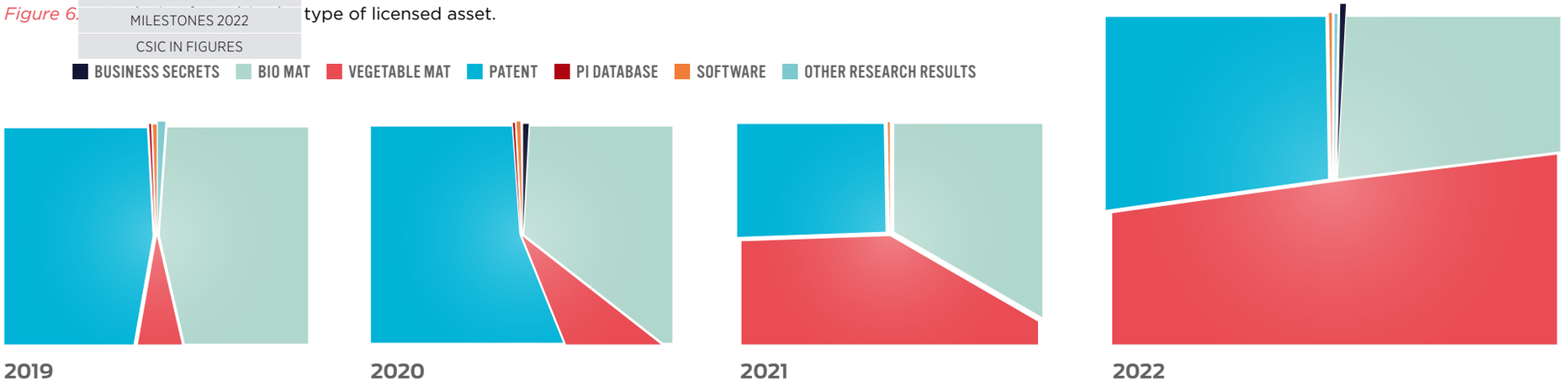
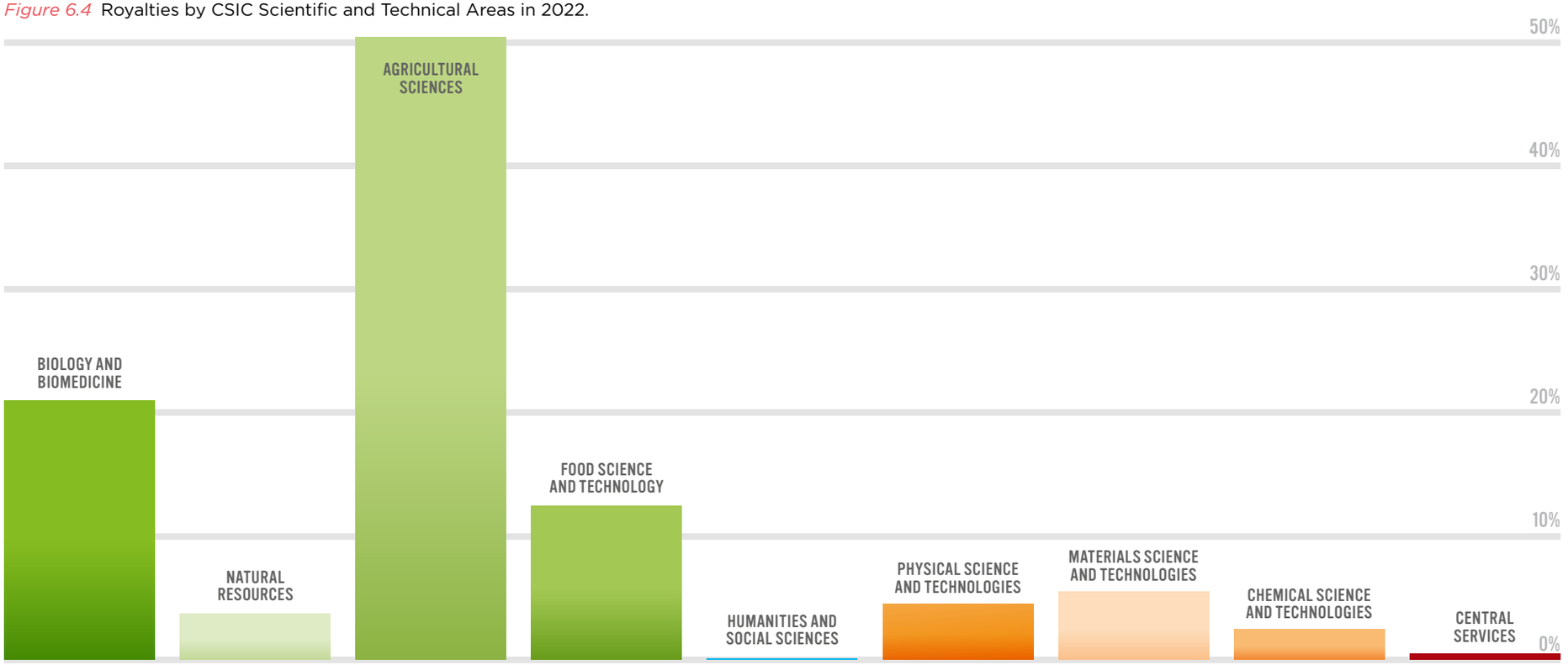
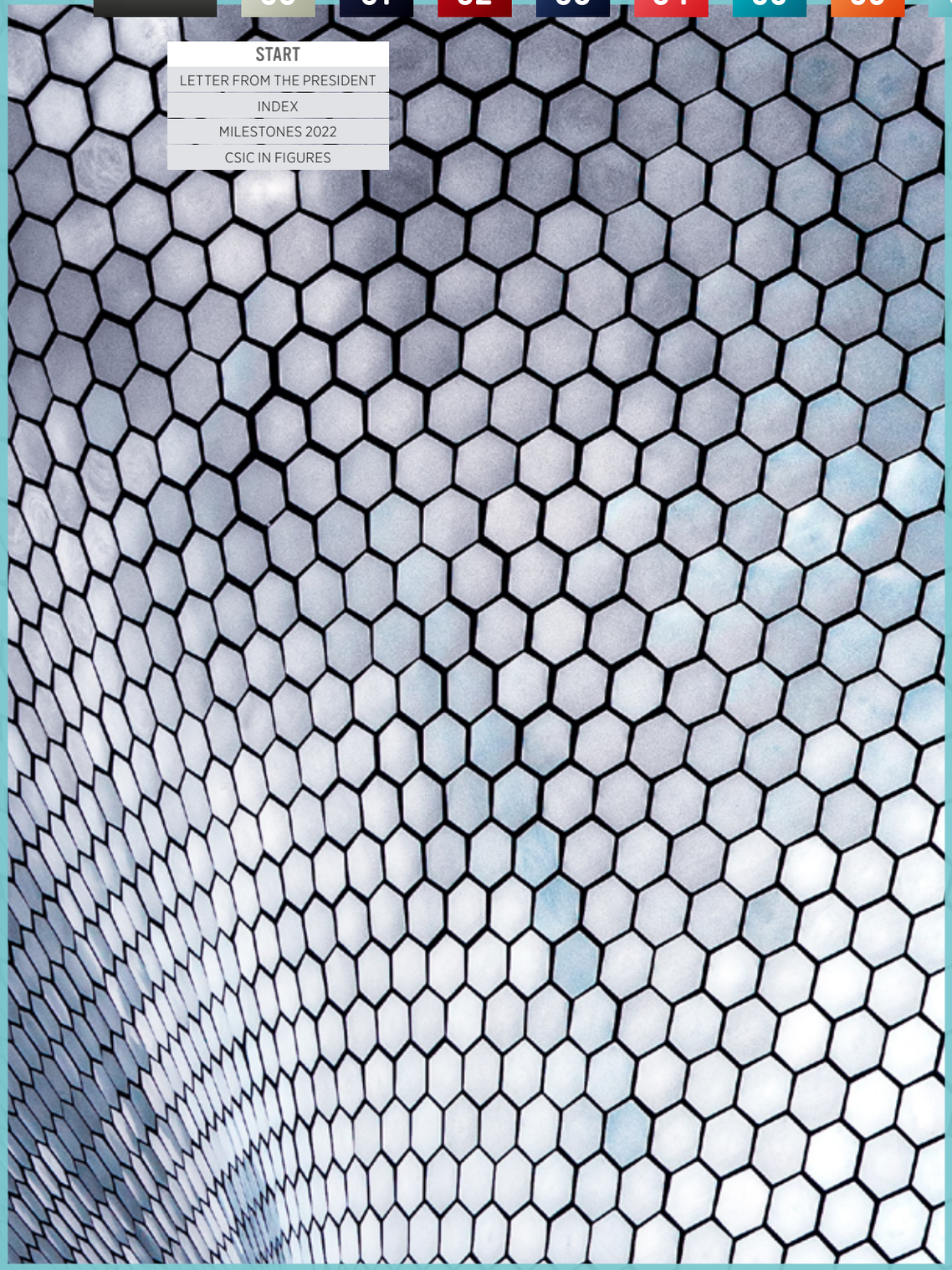


Figure 6.4 Royalties by CSIC Scientific and Technical Areas in 2022.





7

LARGE RESEARCH INFRASTRUCTURES

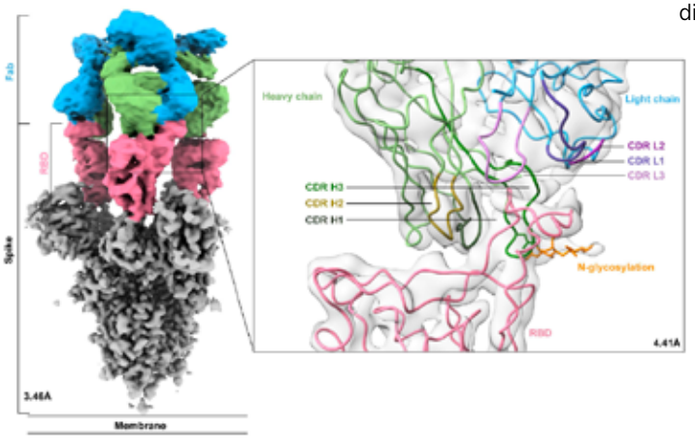
07 LARGE RESEARCH INFRASTRUCTURES

7.1 UNIQUE SCIENTIFIC AND TECHNICAL INFRASTRUCTURES (ICTS)

CNB-CSIC ELECTRON CRYOMICROSCOPY SERVICE (CRIOMECORR)

This service is housed at the CNB facilities and is, together with I2PC (Instruct Image Processing Centre), one of the two Spanish centres that form part of the European Instruct-ERIC network for research in structural biology. Milestones 2022:

- A total of **776 works** have been performed, 749 for national groups and 27 for international groups.
- The service has helped determine the structure of more than 15 complexes, including coronavirus spicules and various antibodies, some of which are about to be published in high-impact journals.
- The correlative cryomicroscopy infrastructure is fully operational and has been used by over 15 research groups to perform 50 studies.
- The service has been a pioneer in electronic cryodiffraction techniques in Spain, currently being implemented by 12 Spanish and Portuguese groups in 50 different research works.



Left: high-resolution structure obtained by cryo-electron microscopy of a complex between the SARS-CoV2 spicule and an antibody fragment (Fab). **Right:** detail of the interaction between spicule and Fab.

MICRONANOFABS - INTEGRATED MICRO AND NANO FABRICATION CLEANROOM AT SBCNM

The SBCNM (National Microelectronics Centre) of the CSIC, based at the IMB (Institute of Microelectronics of Barcelona), is one of the three nodes of the Spanish Network of Micro and Nanofabrication Cleanrooms (ICTS MICRONANOFABS) and is a node of the ICTS NANBIOSIS. Milestones 2022:

- Recognition of MICRONANOFABS as a strategic asset for the deployment of the PERTE Chip Microelectronics and Semiconductors, both in its research and technological enabling aspects.
- Performance of 731 manufacturing runs for a total of 10,431 stages completed and 3,042 wafers processed. 1,263 self-service admissions were hosted for a total of 3,008 hours.
- Continuation of the upgrade of the cleanroom equipment and its adaptation to 150 mm diameter wafers with the installation of three thermal process batteries for oxidation, annealing and dielectric layer deposition.

- Posti… of a virtual tour of the clean… …ling the public to visit the facility and learn about the utility of the different equipment [web link].

One of the new thermal process coils.

R-LRB MANUEL RICO NUCLEAR MAGNETIC RESONANCE LABORATORY (LMR)

The laboratory, located on the Serrano campus of the CSIC in Madrid, is a node of the Biomolecule Nuclear Magnetic Resonance laboratories network (R-LRB) working in the research area of health sciences and biotechnology. Milestones 2022:

- Outstanding scientific results obtained within the international Covid19-NM consortium aiming to search for antiviral drugs with SARS-CoV-2, specifically, publication of the identification of a binder directed against a fragment of the RNA of this virus.
- Results on proteins playing a key role in memory consolidation in humans: Characterisation of the dynamic regions of the amyloid formed by the CPEB3 protein.

POLAR BASES AND OCEANOGRAPHIC VESSELS

The management, maintenance and improvement of facilities and equipment related to research activity at polar bases and on oceanographic vessels is carried out by the **Marine Technology Unit**, which also supports research campaigns at polar bases.

JUAN CARLOS I ANTARCTIC STATION

- In the current campaign, the Byers International Camp has been open for six weeks with an average occupancy of 6-7 people. It has hosted two main projects: *'Micropolar 2'* and *'Parantar'*.
- The 2022-23 campaign at Juan Carlos I Antarctic Station, with an average occupancy of 35-40 people, has hosted 10 projects.
- Back in operation after COVID-19, successful support has been given to recover the timelines of the various projects run at the station within the National Plan. The main focus of the station is to consolidate the operation of renewable energies, in order to provide energy to different facilities and equipment, which can remain connected 12 months of the year.

Juan Carlos I Antarctic Station.

OCEANOGRAPHIC VESSELS (UTM)

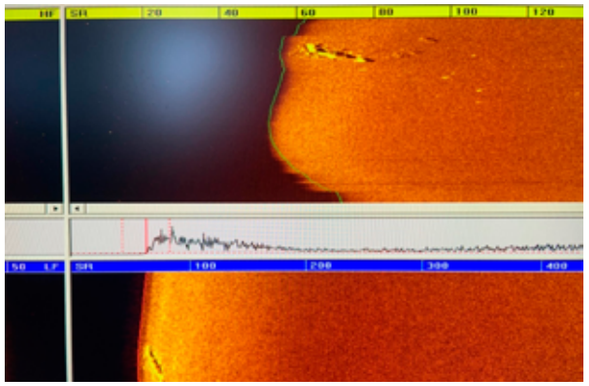
BIO HESPÉRIDES

Three oceanographic campaigns and participation in the opening and logistics of Antarctic stations. The campaigns were carried out in Antarctic waters, in the Atlantic and in Spanish waters, with the participation of Marine Technology Unit's technical personnel (10) and research personnel (63).

Automatic titrator in the BIO Hespérides laboratory during the ANTOM campaign.

SARMII

One oceanographic campaign in the Antarctic and seven in the Mediterranean and the Atlantic, with the participation of scientific personnel from the CSIC, Spanish and European universities and research centres (118), as well as CSIC technical personnel (59).



Identification of targets with Side Scan Sonar from the DT-1 vehicle aboard the Sarmiento de Gamboa oceanic vessel.

GARCÍA DEL CID

Six research campaigns involving research staff (91) and trainees, as well as technical staff from the CSIC (8).

Collection of anchorages on board the García del Cid oceanic vessel.

OCEANOGRAPHIC VESSELS – INSTITUTE OF OCEANOGRAPHY (IEO)

Five oceanographic vessels are managed by the IEO. In addition to campaigns included in the programmes for monitoring the state of marine ecosystems, most of them financed through MITERD and FEMPA commissions, competitive project campaigns are also carried out.

REGIONAL VESSELS

The **Ramón Margalef** accomplished 245 effective campaign days, which required several changes of equipment to meet the specific needs of each campaign (hydrography, acoustic-fishing survey, geology, ichthyoplankton, cetacean observation, geology, study of ecosystems in rocky and muddy bed-based habitats). The **Ángeles Alvariño** continued to monitor volcanoes in the Canary Islands area, as well as carrying out coastal monitoring, acoustic-fishing, ichthyoplankton and rock habitat surveys.

COASTAL AND LITTORAL VESSELS

After a long period of inactivity due to propulsion problems, vessel **Francisco de Paula Navarro** has recovered its regular activity, clocking up 266 days of campaign. The **Mytilus** carried out dry-docking, starting its activity. The **Lura** performed all the scheduled daily trips with a total of 75 campaigns.

ODÓN DE BUEN

At the end of 2021, the contract for the construction of the new global oceanographic vessel, Odón de Buen, was signed. During six months, the ship was redefined and scale tests were carried out at INTA's CEHIPAR experimental channel. The keel was put into place in October.

DOÑANA BIOLOGICAL RESERVE (RBD)

During 2022 the ICTS-RBD has recovered the regular pace of activity prior to the pandemic with some 80 active research projects at the Doñana Nature Laboratory. Recovery, Transformation and Resilience Plan funding was received from the Ministry of Science and Innovation to implement the 2021-2025 Strategic Plan. The funding corresponds to the approval of the PENELOPE project: *'Valorising the Doñana E-infrastructure for the long-term monitoring of natural processes'*, based on two actions: *'Network of monitoring stations for water quality and quantity, and CO_2 flow and fixation'* and *'Valorisation of ICTS-RBD data'*.

The first [redacted]eration and continuous data coll[redacted]eteorological monitoring stations located in the Doñana marshes and the four 'Eddy Covariance' CO_2 flow stations, for monitoring the exchange of carbon and water between ecosystems and the atmosphere.

The second action makes data available on biodiversity, scientific collections and data generated through the programme for monitoring natural processes in the Doñana Nature Reserve.

CENTRE FOR ANIMAL HEALTH RESEARCH (CISA)

CISA is a **high biosafety facility** and a **node of the distributed ICTS RLASB**, which maintains intense collaboration with a multitude of institutes nationally, and on the European and continental level. At a national level, it maintains relations with the MAPA (Ministry for Agriculture, Fisheries and Food), providing scientific and technical support to the National Reference Laboratories. Also noteworthy are the relations through RELAB with the Spanish Ministry of the Interior, Ministry of Health as well as regional, provincial and local authorities.

During 2022, SCI articles published numbered 70, excluding those derived from the facility's open-access work. Moreover, 100 *in vivo* experiments have been performed in the animal facility, of which 40 experiments were performed on SARS Cov2 in the NCB4 Animal Facility (OIE).

SARS-Cov2 research in the CISA animal facility.

UNIQUE SCIENTIFIC-TECHNICAL INFRASTRUCTURE FOR BLUEFIN TUNA FARMING (ICAR)

The ICAR, encompassing the Marine Culture Plant in Mazarrón (Murcia) and the ICRA (Atlantic Bluefin Tuna Reproduction monitoring facility) in Cartagena (Murcia), has been **accessed six times** in 2022, in which the following actions (among others) have been carried out on individuals of bluefin tuna reared in its facilities:

Test of an infertility protocol in bluefin tuna clutches; Production of juveniles from fertilised eggs; Analysis of swimming activity and the onset of endothermy in juveniles from the implantation of sensors by surgery; Analysis of fatty acids and study of the structure of the retina of wild and captive juveniles, to establish their relationship with mortality due to collisions; Effect of selenium-enriched diets on the growth and survival of juveniles; Preliminary study on the possible influence of noise on the behaviour of breeders; Study of the growth and feeding, over five years, of specimens kept in captivity at the ICTS-ICAR facilities.

Bluefin tuna farming facilities at the ICTS-ICAR.

BALEARIC ISLANDS COASTAL OBSERVING AND FORECASTING SYSTEM (SOCIB)

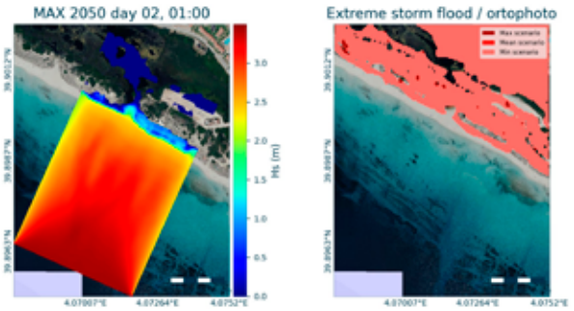
- The ICTS SOCIB detected five **unprecedented marine heat waves in 2022 in terms of intensity, frequency and duration**, with surface temperature anomalies of up to 3.3ºC on average in the Balearic Sea. These results were obtained using tools such as the **Sub-regional Mediterranean marine heat waves**.

Sub-regionally integrated time series of daily (black line) SST (sea surface temperatures) and daily mean (red line) and 90th percentile (dashed red line) climatologies, for the period 1982-2015, highlighting marine heatwave events in 2022 in the Balearic Sea.

- Instrumental contribution has been made to the **multi-platform experiment of the international CALYPSO Project**. The experiment involved two oceanographic vessels, eight gliders, 11 vertical profiling drones and more than 200 drifters. Operational predictive modelling and data assimilation were also carried out in situ, in near real time. This work allowed the identification of key areas and eddies in the Mediterranean, helping to understand, characterise and predict the three-dimensional transport and exchanges between the shallow and deep layers.

- In lin…es, the CoreTrustSeal certi… …varded recognising the quality of the Metocean Data Repository.

- Tools have been developed to assess the effects of climate change in the coastal zone of the Balearic Islands, at a local scale, such as the ONA Toolbox, to locally assess the impact associated with sea-level rise and extreme marine events, in accordance with the IPCC scenarios for 2050 and 2100.



Results of storm surge and inundation propagation simulations, considering the 2100 regional sea level projection for the IPCC scenario RCP 8.5: on the right, surge propagation at the peak of the extreme 100-year return period storm; on the left, maximum inundation zone at the peak of the storm.

NATIONAL ACCELERATOR CENTRE (CNA)

The mission of the CNA is to carry out research into particle accelerators and their applications, to promote collaboration with the scientific community and companies and to facilitate access to its facilities and equipment by research and technology personnel. Highlights from 2022:

- Total number of admissions was 113.

- Constructing and equipping a radiopharmacy laboratory associated with the centre's cyclotron accelerator.

- Installation of a calibration bench in the photonic irradiation laboratory (RadLab) for precise dosimetric determinations.

- The number of long half-life radionuclides measurable in trace amounts in environmental samples was increased with the centre's accelerator mass spectrometry (AMS) system. This ranks the CNA among the top five European laboratories with the broadest portfolio of long-lived radionuclides that can be determined by AMS.

- In collaboration with IFIC and CABIMER, an experimental campaign was carried out with protons and photons, with the aim of demonstrating the radiosensitising potential of gold nanoparticles in hadrontherapy.

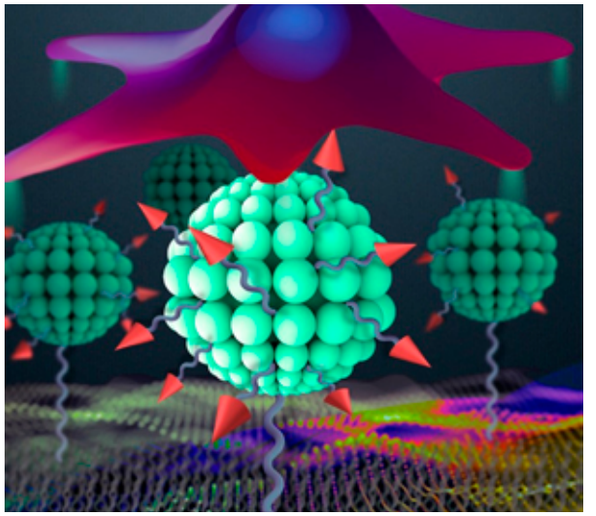
- At the proposal of the CNA, researchers from the centre and from the USE, USC, CLPU, IFIC, UPC, UAB, I3M and CIEMAT carried out the experiment "Laser-driven neutrons for nuclear physics experiments and applications at CLPU" at the ICTS-VEGA at CLPU. Pulsed neutron beams were produced and characterised using particle and neutron detectors (scintillators, bubble gas and Bonner spheres).

New radiopharmacy laboratory at the CNA (National Accelerator Centre).

NANBIOSIS DISTRIBUTED ICTS

This ICTS offers a comprehensive service ranging from the design, production and characterisation of biomaterials, nanomaterials, tissues, devices and medical systems to their pre-clinical validation. Highlights from 2022:

- New innovative method for detecting RNA viruses based on the use of triplex structure-forming probes, which opens up new options for detecting viruses such as SARS-CoV-2, influenza A virus (H1N1) or respiratory syncytial virus (RSV), a pathogen that affects newborn babies and requires careful differential diagnosis. These results have been obtained within the framework of the *'POC4CoV'* projects, in which the U2, U3, U29 and U1 units collaborate, and a project funded by La Marató de TV3 to fight against COVID-19. In parallel, the work of the different groups involved has also been the basis of a technology presented and licensed in July 2022 by the UB, CSIC and CIBER-BBN to the Spanish company Nanoimmunotech.



Hierarchical immobilisation of biomolecules on surfaces using nanovesicles as a robust and novel tissue engineering strategy.

- Than… NANBIOSIS units U2 and … LISA has been developed. This development shows great potential for high-throughput sample analysis, e.g., for diagnosing and stratifying *Staphylococcus aureus* infections. In the framework of the cooperation between U6 and U3, a versatile platform based on hierarchically nanostructured RGD peptides using quatsomes has been created and shown to improve cell adhesion, opening avenues for understanding cell behaviour and improving the performance of clinical applications such as implants and tissue engineering.

CALAR ALTO ASTRONOMICAL OBSERVATORY (CAHA)

Observatory located in the Sierra de los Filabres (Almería) at an altitude of 2,168 metres, dedicated to obtaining quality scientific data, through access to the 3.5 m and 2.2 m telescopes by means of biannual open calls. Highlights from 2022:

- Observations with the telescopes have led to over 120 publications, including:
    - Study of a kilonova produced by the merger of two neutron stars. Rastinejad et al., 2022, *Nature, 612, 223*.
    - First time estimate of the internal structure of a super-Earth exoplanet around the star Gliese 486 b. Caballero et al. 2022, *A&A, 665, 120*.
    - Discovery of two telluric planets around the nearby star HD 260655. Luque et al. 2022, *A&A, 664, 199*.
    - Detection of variability in the planetary nebula IC 4997. Miranda et al., 2002, *A&A, 657, L9*.
- New technological developments:
    - Selection of TARSIS as the future two-dimensional spectrograph instrument for the Calar Alto 3.5m telescope. This project is co-led by IAA-CSIC and UCM.
    - MARCOT Project kick-off (see figure), to develop a modular infrastructure prototype whose design is based on the construction of a large aperture telescope from several identical small, low-cost telescopes. Led by CAHA and IAA-CSIC.

MARCOT prototype at Calar Alto.

SPANISH BM25-SPLINE SYNCHROTRON BEAMLINE AT THE ESRF

Multidisciplinary line dedicated to structural research using synchrotron radiation in the X-ray region, located at the European Synchrotron Radiation Laboratory ESRF - the European Synchrotron, in Grenoble, France. Highlights from 2022:

- Phase II of SpLine upgrades have continued, aimed at increasing the technical capabilities of the experimental equipment. Three state-of-the-art X-ray detectors have been acquired, which will reduce acquisition time and allow chemical, structural or electronic transitions to be studied in real time. Moreover, completely new equipment has been installed for single-crystal characterisation by X-ray diffraction.
- A total of 4,984 hours have been dedicated to experiments with external users, in-house experiments and fine-tuning of experimental equipment. A total of 30 experiments have been carried out, with the participation of a total of 90 researchers.

Installation at SpLine of equipment for single-crystal characterisation by X-ray diffraction.

- Disco… electron system by intersh… pitaxial growth of Van der Waals compounds (*Nat. Comm. 2022, 13, 2472*).

- Development of novel materials as high capacitance cathodes in lithium-ion batteries (*Chem. Mater. 2022, 34, 694-705*).

- Homogeneous deposition of magnetic molecules on functionalised substrates with application in molecular spintronics (*Inorg. Chem. Front., 2022, 9, 4160*).

SPANISH CRG AT THE LAUE LANGEVIN INSTITUTE (ILL)

The Spanish CRG (Collaborating Research Group) staff at ILL have been leading the XtremeD project at ILL for several years. The project involves the construction of a new diffractometer to operate under extreme conditions of very high pressure and very high magnetic fields, which will be operated by the CSIC as a new Spanish CRG. During 2022, the assembly of the individual XtremeD components began for assembly in the experimental area (final phase) from mid-2022.

View of XtremeD in December 2022, with all components installed and in the process of wiring and alignment (without neutrons).

The final phase of assembly of the instrument in the experimental area has achieved different milestones: conditioning of the experimental area, alignment of the new neutron guide, assembly of the monochromator bunker and the primary and secondary slits, assembly of the primary and secondary shutters, assembly of the experimental area security systems, assembly of the optical transport to the sample, transfer of the detector and the ROC to the area, assembly of the sample table, wiring, alignments, installation and testing of the control and data acquisition software, etc. These tasks have been coordinated by the staff of the Spanish CRG group at ILL.

7.2 EUROPEAN STRATEGY FORUM ON RESEARCH INFRAESTRUCTURES (ESFRI)

Large Research Infrastructures (LRIs) are one of the main drivers of science policy on a global scale. Because of their scientific and technological complexity and the very high level of investment they require, these infrastructures are addressed within a framework of international collaboration, whose strategy and development are defined by the European ESFRI forum.

PHYSICAL SCIENCES & ENGINEERING

CHERENKOV TELESCOPE ARRAY OBSERVATORY (CTAO)

MILESTONES 2022:

- The foundation stone for CTAO's Scientific Data Management Centre (SDMC) was laid at the Deutsches Elektronen-Synchrotron (DESY) campus in Zeuthen, Brandenburg (Germany).

- The CTAO Board of Government Representatives (BGR) submitted the formal application to the European Commission to establish the CTAO ERIC.

- The first telescope, LST1, of the CTA on the island of La Palma, continues to operate normally and is preparing its first scientific publications. The LST2-4 telescopes are under construction.

- The Gammapy open-source software package, in whose development the IAA plays an important role, and on which the official CTAO scientific analysis tools are based, was awarded the Jury's Prize during the Open Science Awards for Open-Source Research Software, by the French Ministry of Higher Education, Research and Innovation.

EXTREMELY LARGE TELESCOPE (ELT)

MILESTONES 2022:

- Participation in the second-generation instruments MOSAIC and ANDES for which the ESO Council approved the start of phase B for construction in December 2021.

- Participation of the IAA-CSIC in the technological development of MOSAIC includes the control system of the cryogenic mechanisms associated with the infrared spectrograph (NIR-SPEC), including both the control electronics and the high- and low-level software. To this end, during 2022 work was carried out on the design of a prototype, with the aim of implementing the first ideas of the conceptual design of the control system of the cryogenic devices in real models.

- With 2022 the CSIC signed the A nt on behalf of the two centres participating in the consortium, the IAA and CAB.

EUROPEAN SOLAR TELESCOPE (EST)

MILESTONES 2022:

- The preliminary design of the European Solar Telescope (EST), including the basic construction project at the Roque de Los Muchachos Observatory, was completed during 2022. This preliminary design will be reviewed by an international committee of experts in 2023. In parallel, the instrument design has been progressing well. The IAA-CSIC, which is responsible for the three Tunable Imaging Spectropolarimeters of EST, presented a conceptual design that is currently being worked on.

- The IAA-CSIC also maintaining the EST Communication Office in Granada beyond the preparatory phase. Finally, steps have been taken to set up the Fundación Canaria EST. This legal instrument was approved by the EST Board of Directors at the end of 2022 and will materialise in 2023, with the main objective of initiating the formation of the ERIC EST.

SQUARE KILOMETRE ARRAY OBSERVATORY (SKA)

MILESTONES 2022:

- Event to mark the start of construction in South Africa and Australia.

- Negotiation (finalised) for Spain to join the SKAO.

- Spanish Ministry of Finance's approval of the financial contribution to the SKAO until 2030.

- The Spanish IAA-CSIC SKA Regional Centre (SRC) prototype contributed to defining the SRC network requirements. The IAA also led one of the seven international prototyping teams, being the only team to achieve the gold credential for reproducibility in the second SKA challenge.

KM3 NEUTRINO TELESCOPE 2.0 (KM3NeT 2.0)

MILESTONES 2022:

- During 2022, KM3NeT made significant progress in constructing its detectors, reaching 35 detection data-collection lines. The IFIC group's participation in the construction was outstanding with remarkable visibility of the first scientific results.

- The IFIC is currently co-leading the EU-funded *'KM3NeT-INFRADEV2'* project (€1.5 million, €225 thousand CSIC), whose objectives include the formation of a legal entity for KM3NeT and open access to the experimental data.

- Internationally, new projects have been approved in France and Italy, namely 'NEUMED' (€8 million) and *'KM3NeT4RR'* (€67 million), which ensure the construction of 50% of the infrastructure. In Spain, the IFIC, UPV, UGR, and CSIC-IEO groups have obtained funding from the National Plan and the RTResilience Plan (€2 million), increasing the level of funding in recent years. CSIC-ICM has completed the Spanish participation in *'KM3NeT'*.

FAIR (FACILITY FOR ANTIPROTON AND ION RESEARCH)

MILESTONES 2022:

- IEM: Olof Tengblad, Technical Director of the experimental set-up of R3B, Deputy Spokesman for the start-up of the first experiments at R3B.

- IFIC: Berta Rubio, Vice-president of the NUSTAR Council, scientific advisor to the MICIN (Spanish Ministry for Science and Innovation) in FAIR RRB (Resource Review Board), member of the NUSTAR panel.

- Experimental campaigns led by IFIC members in 2022:

  - S444 (Spokespersons R. Gernhäuser, O. Tengblad, IEM). Commissioning of CALIFA, partly designed and built at the IEM to study Nuclear Reactions.

  - Hypernuclei: (C. Rappold, EMI): A new line of experiments was initiated to study hypernuclei through ionic reactions.

  - S505 (Spokespersons: J.L. Tain, A.I. Morales, E. Nacher, IFIC): First experiment with the DTAS spectrometer designed and built at IFIC to study Beta Disintegrations.

HEALTH

INSTRUCT-ERIC

MILESTONES 2022:

It has been the first year that the two Instruct Centre-ES facilities were operational (the Instruct Image Processing Centre (I2PC) and the CNB-CSIC Electron CryoMicroscopy Service), the latter receiving the highest number of admissions of all the Instruct Centres. The metrics of use and activity were: regarding access, the CryoMicroscopy Service executed a total of six projects and 11 iNEXT-Discovery projects (H2020 transnational access project), while the I2PC executed 10 access projects. In terms of training activities, the I2PC organised three Instruct courses with the participation of the Electron CryoMicroscopy Service, and also hosted two three-month stays (from the UK and Netherlands). In terms of technological development, the I2PC implemented a pilot Instruct R&D project requested by the Netherlands.

EURO-BIOIMAGING-ERIC (EUUBI)

MILESTONES 2022:

- EuBI was successful in all Horizon Europe programme calls (€1.4 million) for the ISIDORe, canSERV, Agroserv, eRImote, AI4Life, EOSC4Cancer, ByCOVID, and EOSC-Future projects.
- Work is underway on the agreement governing the membership of Spanish nodes in EuBI.
- Instituto Carlos III has been appointed as the institutional representative in EuBI. The Fundación Biofisika Bizkaia will act as scientific coordinator of the Spanish nodes and will be responsible for collecting contributions from the different centres and paying for the Spanish contribution.
- The national nodes are composed as follows: SR-Superresolution (CRG, ICFO); Meso-Mesoscopic Imaging (ICFO, IRB); Livin-Live Animal Imaging (CRG, IRB, UB); BIM-CV-Biomedical Imaging (IIS La Fe); ALM-Bilbao-Advanced Microscopy (Achucarro, IBF(CSIC)).

IBISBA (EU-IBISBA)

MILESTONES 2022:

- Work has been carried out within the PREP-IBISBA (Industrial Biotechnology Innovation and Synthetic Biology Accelerator Preparatory Phase) project to define the future structure of ERIC-IBISBA.
- Two new partners, the University of Cork (Ireland) and the Universidad Politécnica de Valencia (UPV, Spain), have signed the MoU-IBISBA during this period.
- The UPV is incorporated as a component of the Spanish node together with the UAB and the CSIC.
- The Institute for Integrative Systems Biology (I2SysBio) (CSIC-UV) has also joined IBISBA to strengthen the CSIC sub-node with the CIB and the CNB.
- The incorporation of new partners has been proposed for 2023, including other Spanish institutions, to consolidate the Spanish node of IBISBA.
- During the PREP-IBISBA consortium meetings it was decided that the IBISBA Steering Committee should be consolidated during 2022/2023.

ENVIRONMENT

EUROPEAN PLATE OBSERVATION SYSTEM (EPOS-ERIC)

MILESTONES 2022:

- Activities linked to tasks carried out within the EPOS-SP Project and defined within the WPs, with CSIC participation in the different meetings held to define the path to follow for the definition of the Spanish EPOS node (EPOS-ES).
- Signing and publication of the EPOS Agreement made up of the institutions that collaborate financially to cover the membership fee. Generation and signing of the EPOS General Programme of Action, by all the institutions and/or centres intending to participate in EPOS.
- Preliminary design of the structure of the Spanish node to be constituted as the National Geoscientific Data Infrastructure (EPOS-ES).
- Resource raising activities, with the aim of structuring the Spanish EPOS node, disseminating information and recruiting technical staff:
  - CSIC's own calls for proposals, funded with its own resources: INFRA20005 grant within the framework of the CSIC Programme in Large European Research Infrastructures, Call 2022: €100 thousand.
  - National Projects: EPOS-ES Network – AEI (Spanish state research agency) Call for proposals, €60 thousand.

- E EPOS Infrastructure in w coordinates):
  - DT-GEO: A Digital Twin for GEOphysical extremes, Grant ID 101058129 HORIZON-INFRA-2021-TECH-01-01 (Total Budget: €15 million; Project Coordinators CSIC R. Carbonell, Arnau Foch), 2022-2025.
  - CHEESE II: Center of Excellence for Exascale in solid Earth, Grant ID 101093038. (European High Performance Computing Joint Undertaking, Total Budget €7.8 million; Project Coordinator CSIC Arnau Folch €7.8 million.
  - Geo-INQUIRE Geosphere INfrastructures for QUestions into Integrated Research Grant ID: 101058518 HORIZON-INFRA-2021-SERV-01 (Total Budget €14 million Project Coordinator GFZ).

INTEGRATED EUROPEAN LONG-TERM ECOSYSTEM, CRITICAL ZONE AND SOCIO-ECOLOGICAL RESEARCH (ELTER)

MILESTONES 2022:

- Incorporation of three new nodes to the Spanish network: Guadalquivir Estuary operated by IFAPA-Andalusian Institute for Research and Training in Agriculture, Fisheries, Food and Ecological Production, the Blanes Bay Observatory operated by CEAB-CSIC and the Picos de Europa National Park, operated by IHCantabria and thus to eLTER and ILTER.
- Annual meeting of LTER-Spain organised in December with the attendance of representatives from all nodes and the election of Begoña García from IPE-CSIC as the new national coordinator.
- Development of PyVPP and PhenoApp, for consultation and downloading of phenology data from the eLTER network sites incorporated in the eLTER service portfolio.
- AEI Strategic Network Grant: Strengthening the LTER-Spain network: structure, data management plan and visibility. RED2022-134958-E. MICIN (Ministry of Science and Innovation).

DISTRIBUTED SYSTEM OF SCIENTIFIC COLLECTIONS (DISSCO)

MILESTONES 2022:

- Meeting of the first General Assembly of the NN-DiSSCo-ES, approving the Terms of Reference (ToR) specifying the mission, objectives and governance of the NN-DiSSCo-ES. The National Working Group and a Scientific and Technical Committee were created, and the incorporation of four new CSIC centres was reported. In May, the CSIC's proposal *'Consolidation and leadership actions of the Spanish node in DiSSCo'* in the Large European Research Infrastructures programme was awarded and funded (€99,926.07, ref. INFRA20012), with participation of CSIC research staff, including the head of GBIF-ES. In the same month, a fifth CSIC centre joined the programme.
- The Node's information has been updated internationally at the AG GETAF52 in Jerusalem.

AEROSOLS, CLOUDS AND TRACE GASES RESEARCH INFRASTRUCTURE (ACTRIS)

MILESTONES 2022:

- In June 2022, the MICIN formalised Spain's membership as a founding partner of the European distributed research infrastructure **ACTRIS**.
- The CSIC ACTRIS network of stations has offered transnational access (TNA) to foreign researchers and companies through the ATMO-ACCESS project (H2020, INFRAIA-03-2020).
- In the framework of the RI-URBANS project (H2020, LC-GD-9-1-2020), coordinated by IDAEA-CSIC, the Barcelona station (BCN-AIS), together with those of Athens and Paris, participates as a Pilot to investigate the effect on health of new atmospheric aerosol metrics.
- BCN-AIS is one of only five European stations that have completed the first labelling phase for recognition as an ACTRIS National Facility (NF). BCN-AIS is currently in the second implementation phase and is operationally supported by the ACTRIS Topic Centres.

EUROPEAN CONTRIBUTION TO THE INTERNATIONAL ARGO PROGRAMME (EURO-ARGO ERIC)

MILESTONES 2022:

- The Spanish contribution to Argo (**Argo España**), coordinated by IEO-CSIC in collaboration with the ICTS SOCIB maintained an active fleet of 20 profiling buoys. To keep this fleet active, two buoys were deployed in the western Mediterranean.

- In ad on of the EA-RISE pilot p o to the full depth of the ocean (Deep Argo), two prototype buoys were deployed to determine whether the accuracy and stability of the current sensors and calibration methods are capable of detecting changes at abyssal depths on climate scales. The results of this pilot phase, published as project deliverables, and pending publication in a scientific journal, indicate that without *in-situ* calibration measures, Deep Argo sensor use is not recommended.

- Free and open access to Argo data represents a new paradigm in ocean studies, fully aligned with the commitment of CSIC to open science. The creation of the **Argo Online School** by Argo-España places the Spanish contribution at the forefront of the use, dissemination and diffusion of Argo data.

- A call for tenders was made for the grant for the acquisition of scientific-technical equipment for 2021, for updating and improving the Spanish contribution to Argo, amounting to €655,777.73, guaranteeing the contribution of Argo-España until the year 2025.

SOCIAL & CULTURAL INNOVATION

EUROPEAN RESEARCH INFRASTRUCTURE FOR HERITAGE SCIENCE (E-RIHS)

MILESTONES 2022:

- E-RIHS has moved forward in 2022 in its establishment as an ERIC. A Horizon Europe project for the prepara tory phase (E-RIHS IP, G.A. 101079148) has been applied for and awarded, starting in October 2022, and the Interim General Assembly (iGA) has prepared the documentation for the Step 2 submission to the European Commission.

- The iCNN (Interim National Node Committee), with participation as national coordinator of Dr. Emilio Cano (CENIM-CSIC), has continued to make progress in the scientific and distributed organisational aspects of E-RIHS. In the national node, work has been carried out between the MICIN, MCD and CSIC (as node co-coordinator) to ensure the payment of Spain's participation fee, and in the implementation of a pilot call for national access, with funding from the 2022 call for large CSIC infrastructures.

GENERATIONS AND GENDER PROGRAMME (GGP)

MILESTONES 2022:

Award in 2022 of a European project (GGP-5D: The Generations and Gender Programme Preparatory Phase Project) whose Grant Agreement will be signed in 2023. PI: Diego Ramiro (IEGD-CCHS).

ADDITIONAL INFORMATION

CSIC also participates in the following ESFRIs:

EINSTEIN TELESCOPE (ET)

https://www.et-gw.eu/ in the field of physical sciences and engineering.

EUROPEAN BRAIN RESEARCH INFRASTRUCTURES (EBRAINS)

https://www.ebrains.eu/ in the health sector.

OPEN SCHOLARLY COMMUNICATION IN THE EUROPEAN RESEARCH AREA FOR SOCIAL SCIENCES AND HUMANITIES (OPERAS)

https://roadmap2021.esfri.eu/projects-and-landmarks/browse-the-catalogue/operas/

EU-OPENSCREEN-ERIC

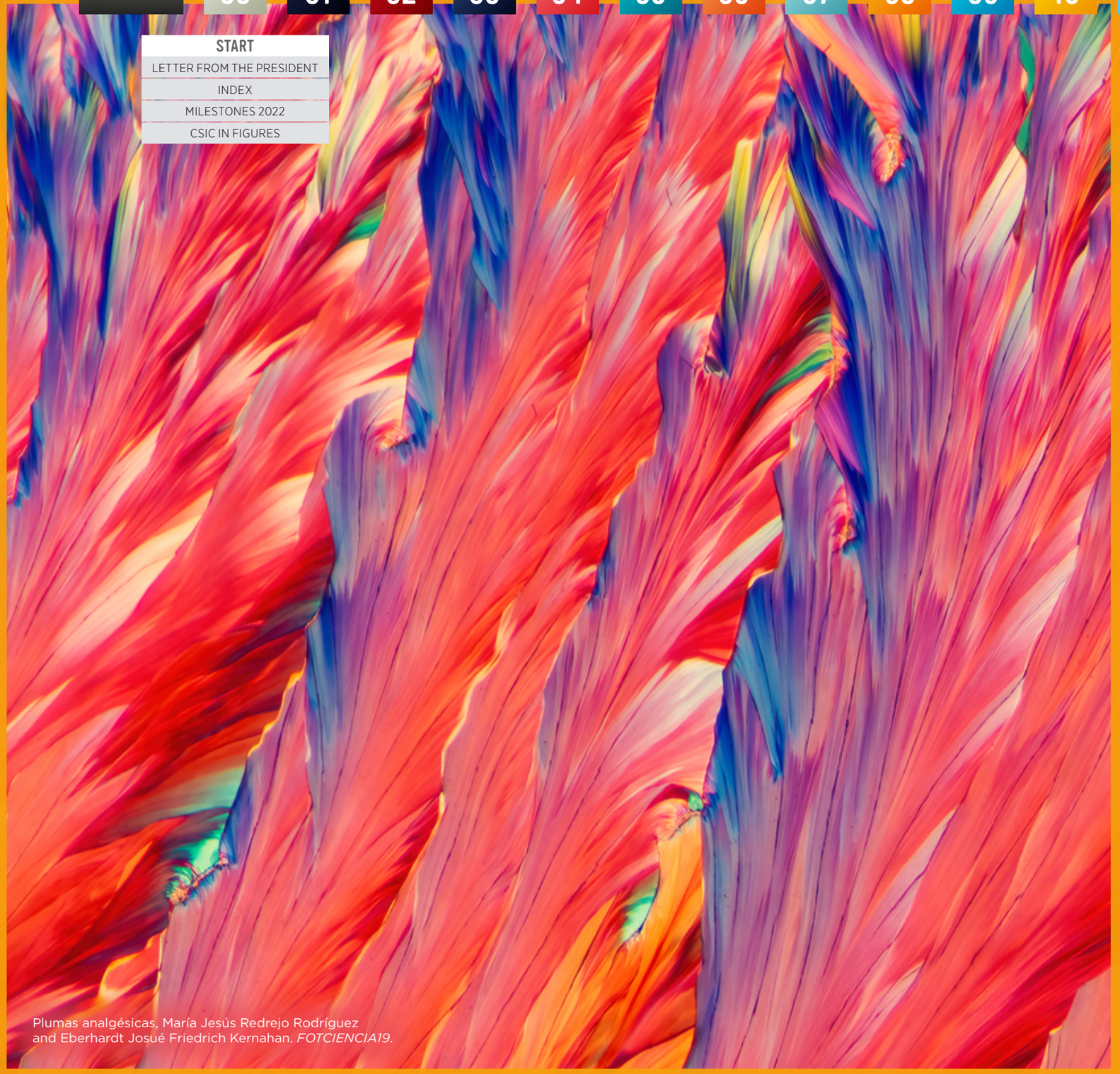
https://www.eu-openscreen.eu/ in the field of biological chemistry.

A DISTIBUTED INFRAESTRUCTURA FOR LIFE-SCIENCE INFORMATION (ELIXIR)

https://elixir-europe.org/ in the field of bioinformatics.

HIGH LUMINOSITY LARGE HADRON COLLIDER (HL-LHC)

https://home.cern/science/accelerators/high-luminosity-lhc in the field of physical sciences and engineering.



Plumas analgésicas, María Jesús Redrejo Rodríguez and Eberhardt Josué Friedrich Kernahan. *FOTCIENCIA19*.

8

WOMEN AND SCIENCE

08 WOMEN AND SCIENCE

CSIC EQUALITY STRUCTURES

In order to promote the inclusion of the gender perspective as a cross-cutting category in science and to implement the equality strategy, the CSIC has two internal bodies: the Delegate Committee for Equality (CDI) and Women and Science Committee (CMyC), in addition to its own working groups in the organisation's institutes and centres (CI). [web link].

EXECUTIVE BOARD
in compliance with Law 3/2007 on Equality

Delegate Committee for Equality (CDI)

www.csic.es/es/el-csic/ciencia-en-igualdad/igualdad-en-el-csic
comisiondelegadadeigualdad@csic.es

Reports to General Secretariat

Mission

Application of the principle of equal opportunities for all CSIC staff.

Composition

Joint body Administration / Trade Unions.

- Trade Unions: 4 members from the most representative trade unions of the CSIC.
- Administration: 4 members, of which 2 are representatives of the Women&Science Committee.

Functions

- Development of the CSIC Equality Plan as a tool for establishing measures to achieve equality.
- Annual evaluation of the equality plan and improvement of the plan if necessary.
- Development and monitoring of the CSIC Protocol for prevention and intervention against sexual and gender-based harassment.

Since 2011

ICU Equality Committees

COMITÉ DE IGUALDAD ICU

ci_icu@csic.es

Reports to the ICU Board

Mission

Help to implement the 3rd CSIC Equality Plan in the day-to-day reality of each centre.

Composition

- Constituted as working groups of the Board of Institutes.
- Governed by the provisions set forth in the Guide for the formation and operation of Equality Committees in CSIC Institutes and Centres.
- List of Equality Committees.

Functions

- Support for the implementation of the CSIC Equality Plan in force at any given moment.
- Dissemination and promotion of CSIC equality policies.
- Diagnosis of the equality situation in each ICU and promotion of equality in its organisational and functional structures.
- Contact point in each ICU for equality issues.

Since 2019

Women&Science Committee (CMyC)

www.csic.es/es/el-csic/ciencia-en-igualdad/mujeres-y-ciencia
cmyc@csic.es

Reports to the President's Office

Mission

Advisory Commission of the Presidency to study the likely causes that hinder women's access to and progress in scientific careers and to propose actions to remove barriers.

Composition

- Executive Vice-Presidency: appointed by the Presidency.
- Eight members elected from among the research staff of the CSIC's Global Research Areas.
- Four members appointed by the Presidency.
- President's Office provides Women&Science Committee Secretariat.

Functions

- Make women researchers' work at CSIC more visible.
- Facilitate the scientific career of young female researchers.
- Produce annual reports with gender-disaggregated statistics on CSIC research staff.
- Include the gender perspective in research.
- Remove biases in the selection of research staff.

Since 2002

CSIC D FOR EQUALITY

The Delegate Committee for Equality (CDI) is the joint and executive body in which the representation of trade union organisations and the Administration converge, whose scope extends to diagnosing and proposing actions in the field of equality that affect all public employees at the CSIC.

Comisión Delegada de Igualdad (CDI)

The situation of all women at the CSIC is analysed by the Delegate Committee for Equality through the annual assessment of the CSIC Equality Plan. Throughout 2022 it has carried out different activities, all of which are related to achieving equality for all CSIC staff. Milestones:

THIRD CSIC EQUALITY PLAN: APPROVAL

The plan incorporates the learning acquired to date and is fully aligned with the *'Third Plan for Equality between Women and Men'* in the Spanish National Government and its public bodies, thus renewing the organisation's commitment to the principles of equal treatment, equal opportunities and non-discrimination. This Plan and its subsequent evaluations already encompass the new National Centres (NCs) INIA, IEO and IGME.

SIXTH EVALUATION OF THE SECOND CSIC EQUALITY PLAN: PREPARATION AND PUBLICATION

This report assesses compliance in 2021 with the Second Equality Plan (which did not yet include the NCs), highlighting the following conclusions:

The number of women and men working at the CSIC is balanced. However, a more detailed analysis shows that this balance is broken when analysing certain variables, which should be corrected in the future:

- Women suffer from a higher level of temporary employment: they account for 54% of staff with a non-stable employment relationship.
- There is a focus of imbalance in the area of research staff activity where the proportion of women ranges from around 51% in pre-doctoral (temporary) positions to almost 26% in the highest positions of the research career (research professors). The last 10 years have seen a shift from a scissors graph to a pincer graph with little improvement at the top of the career ladder.
- Regarding the directorates of research institutes and centres, the employment ratio of women is only 22%, while in management positions it is 61%.
- There is a general imbalance in favour of men for productivity bonuses (PRO) awarded across all staff categories, exceeding 30% in some cases.

PROMOTION OF TRAINING in gender equality, prevention of sexual and gender-based harassment and incorporation of gender analysis in research, through courses, both open and directed, included in the CSIC Training Plan 2022.

FIFTH EDITION OF THE CSIC GENDER EQUALITY ACCREDITATION LABEL

The aim of the award is to value and recognise those CSIC institutes, centres and units that have stood out for running relevant activities in the area of equality, to promote the gender perspective as a cross-cutting category in all aspects of the CSIC's operation and to advance in the promotion of measures aimed at eliminating the barriers that women encounter in undertaking their profession. In its fifth edition it was awarded to the IFIC (**Institute for Corpuscular Physics**). The CNB (National Biotechnology Centre) and the CFTMAT (Institute of Theoretical Physics) received runners-up prizes. The award ceremony was held on 15 February 2023 at the CSIC headquarters.

CSIC W COMMITTEE

The CSIC Women and Science Committee (Spanish acronym CMyC) is the advisory body to the Presidency, whose mission is to study the possible causes hindering both women's access to, and progression in, a research career at the CSIC and to propose actions to eradicate existing barriers for women researchers, all within the framework established by the European Research Area [Web link].

COMISIÓN DE MUJERES Y CIENCIA DEL CSIC
CMyC

Milestones 2022:

WOMEN RESEARCHERS' REPORT 2022

The report prepared by the Committee highlights the following points:

- The percentage of women researchers on the staff is 37.5%. There is still chronic under-representation in the CSIC scientific ranks in some sub-areas such as Physical Science and Technology and Natural Resources.
- The percentage of female Research Professors (26.4%) has decreased slightly compared to previous years and this is also reflected in the increase in the CSIC's Glass Ceiling Index (GCI).
- The inferior promotion of women in the highest scientific categories translates into a lower number of five-year and six-year merit periods awarded, translating into lower financial remuneration of women.
- On the positive side, the leadership of CSIC women scientists in national, European and international projects is high and comparable to their presence in the institution, as is their contribution to technology transfer as inventors of patents.

THE PRESIDENCY'S FLAGSHIP PROJECT *'EQUALITY'* (PEP-EQUALITY)

Project run jointly by CSIC's Women and Science Committee and Delegate Committee for Equality.

Within the framework of the Third CSIC Equality Plan, a series of challenges and priority objectives have been identified for the 2022-2025 period, with the proposal of specific projects. In 2022, the Special Intramural Project ***'Gender analysis of promotion at the CSIC scientific categories'*** has been launched, led by IPP-CSIC (Institute of Public Policies).

PARTICIPATION IN THE "PILOT ASSESSMENT ACTIVITIES FOR THE EUROPEAN KNOWLEDGE AND SUPPORT FACILITY ON GENDER EQUALITY PLANS (GEPS) IN RESEARCH AND INNOVATION ORGANISATIONS" OF THE EUROPEAN COMMISSION.

In 2022 the CSIC was selected by the European Commission's Directorate-General for Research and Innovation, in collaboration with the company Ecorys, to contribute to the monitoring of the implementation of gender equality plans in R&I within the European research framework.

COLLABORATION ON THE PIONERAS CSIC WEB

Web managed by the Scientific Information Resources for Research Unit with participation of the Women and Science Committee.

WOMEN AND SCIENCE COMMITTEE MEMBERS PARTICIPATION IN EVENTS, LECTURES, PUBLICATIONS, WORKING GROUPS, EXHIBITIONS, ROUND TABLES, DISSEMINATION AND TEACHING, ETC., ON GENDER ISSUES IN SCIENCE.

The following activities, among others, are noteworthy:

- Teaching in the Basic Course on Equality run by the MICIN and in the course on "Gender mainstreaming in local public policies" at the Universidad Pablo de Olavide.
- Speeches at the FECYT conferences on equality of the Court of Auditors and Scientific Diplomacy with the Network of Associations of Spanish Researchers and Scientists Abroad (RAICEX).

Figure 8.) for 2022.

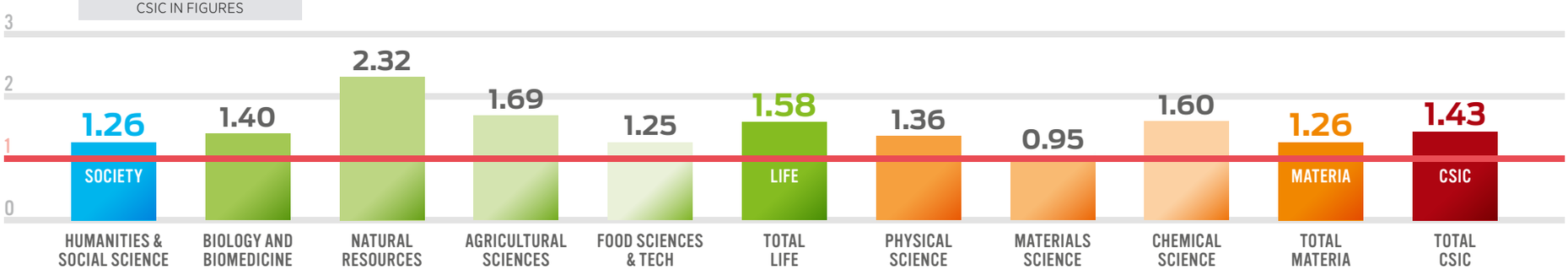


Figure 8.2 Distribution of research staff by sex in research career categories or levels at the CSIC on 31/12/2022.

Figure 8.3 Percentage of permanent, postdoctoral and predoctoral female researchers by Core Area in 2022.

EQUALI CSIC INSTITUTES, CENTR

The Institutes, Centres and Units (ICUs) have Equality Committees and working groups made up of staff volunteers, who help to implement the CSIC Equality Plans in the daily running of each centre.

As of 31 December 2022, a total of **52** Equality Committees had been set up in the CSIC's ICUs, representing 42% of the total number of ICUs.

Many and varied actions have been taken by the different ICU Equality Committees, especially focused on disseminating women's references, participating in and creating events for 11 February, 8 March and 25 November, as well as various dissemination and training activities.

The report on equality activities and needs in the research ICUs at the CSIC (*La igualdad de los centros de investigación del CSIC: mapeo sobre actividades y necesidades de sus comités de igualdad*), carried out by the MICIN, gives a comprehensive overview of the situation of the CSIC Equality Committees.

During 2022, the "Inter-centre Equality Committee" at the Universidad Autónoma de Madrid collaborated in the translation into English of the *'CSIC Prevention and Intervention Protocol against Sexual Harassment and Harassment on grounds of Sex'*.

CSIC'S PARTICIPATION IN EQUALITY AND SCIENCE EVENTS

11TH FEBRUARY, INTERNATIONAL DAY FOR WOMEN AND GIRLS IN SCIENCE

This initiative promoted by the UN included more than 200 activities and outreach initiatives to **make the work of women researchers visible, undo stereotypes and encourage girls and boys to take an interest in science**. International Day of Women and Girls in Science.

8TH MARCH, INTERNATIONAL WOMEN'S DAY

Drafting and dissemination of a joint message by the CDI and CMyC to all staff.

25TH NOVEMBER - INTERNATIONAL DAY FOR THE ELIMINATION OF VIOLENCE AGAINST WOMEN

Drafting and dissemination of a joint message by the CDI and CMyC to all staff. The CDI has produced and distributed to all staff an information leaflet on the CSIC Protocol against Sexual Harassment and Harassment on grounds of Sex.

The ICU Equality Committees have actively participated in each of these events, with the organisation of a host of diverse activities.

GENER[AL DATA CSIC RESEARCH AND PREDOCTORAL STAFF] FROM A GENDER PERSPECTIVE (PERIOD 2018-2022)

	2018			2019			2020			2021			2022		
	WOMEN	MEN	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN	TOTAL
PREDOCTORAL/ RESEARCHER STAFF	2,014	2,893	**4,907**	1,994	2,847	**4,841**	2,113	2,966	**5,079**	2,454	3,374	**5,828**	2,569	3,452	**6,021**
REST OF STAFF	3,206	2,529	**5,735**	3,186	2,514	**5,700**	3,341	2,626	**5,967**	4,218	3,284	**7,502**	4,417	3,450	**7,867**
TOTAL	**5,220**	**5,422**	**10,642**	**5,180**	**5,361**	**10,541**	**5,454**	**5,592**	**11,046**	**6,672**	**6,658**	**13,330**	**6,986**	**6,902**	**13,888**

GENERAL DATA CSIC RESEARCH AND PREDOCTORAL STAFF FROM A GENDER PERSPECTIVE (PERIOD 2018-2022)

	2018			2019			2020			2021			2022		
GROUP	WOMEN	MEN	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN	TOTAL
PREDOCTORAL	653	608	**1,261**	619	602	**1,221**	698	684	**1,382**	748	735	**1,483**	789	746	**1,535**
POSTDOCTORAL	286	364	**650**	302	353	**655**	321	375	**696**	366	423	**789**	473	546	**1,019**
RAMÓN Y CAJAL	40	58	**98**	51	74	**125**	50	71	**121**	38	53	**91**	41	56	**97**
DISTINGUISHED RES.	10	30	**40**	11	33	**44**	11	33	**44**	19	37	**56**	20	40	**60**
OTHER RESEARCHERS	2	2	**4**	8	2	**10**	11	6	**17**	10	7	**17**	-	-	**-**
SENIOR SCIENTIST	570	844	**1,414**	565	831	**1,396**	596	877	**1,473**	775	1,051	**1,826**	769	1,037	**1,806**
RESEARCH SCIENTIST	292	535	**827**	283	526	**809**	279	522	**801**	334	610	**944**	325	599	**924**
RESEARCH PROFESSOR	161	452	**613**	155	426	**581**	147	398	**545**	164	458	**622**	152	428	**580**
TOTAL	**2,014**	**2,893**	**4,907**	**1,994**	**2,847**	**4,841**	**2,113**	**2,966**	**5,079**	**2,454**	**3,374**	**5,828**	**2,569**	**3,452**	**6,021**

Source: GESPER.

9

SCIENCE AND SOCIETY

SCIENTIFIC CULTURE AND CITIZEN SCIENCE

The mission of the CSIC's department for Scientific Culture and Citizen Science, which reports to the Presidency, is to generate new scientific projects involving the public, while at the same time reinforcing outreach actions to bring science closer to society.

In 2022, a total of **18,000 science outreach initiatives** were carried out by CSIC institutes, centres and institutional delegations with an **investment of €5,216,356**.

- Face-to-face activities were attended by over 1,000,000 people:
  - 1,770 conferences
  - + 1,800 guided tours
  - + 3,400 workshops
  - 94 original competitions
  - 99 exhibitions
- Non-face-to-face activities carried out exceeded 1,100.
  - + 1,100 videos
  - 19 mobile applications
  - 250 science websites and blogs

DISSEMINATION AND COMMUNICATION

CSIC WEBSITE

- The **News** section published around 104 news items and seven interviews related to scientific culture, 45 of which were sent to the mass media as press releases.
- More than 700 events were announced in the **Web Agenda** section.

SOCIAL MEDIA

In 2022 the **@CSICdivulga** account considerably increased its activity in networks compared to the previous year, both in terms of number of followers and publications.

- Twitter **@CSICdivulga**: 109,249 followers. Nearly 800 tweets of own content.
- Facebook **CSIC Divulga**: 11,295 followers. Nearly 640 publications on the page.
- Instagram **@csicdivulga**: 11,550 followers. 200 posts and more than 650 stories.
- Youtube **CSIC Divulga**: 3,840 subscribers. 49 videos uploaded to the channel.

BLOGS

Blog Ciencia para llevar. Hosted by the newspaper 20minutos.es. In 2022 it had 720,842 visits from 402,947 different users and published 47 entries (572 accumulated) on various scientific topics.

Blog La Cuadratura del Círculo. Hosted at *eldiario.es*. In 2022 published 36 posts with 100,770 impressions.

OUTREACH APPS

Arbolapp and **Arbolapp Canarias** continued to be available for download and to increase their dissemination. On the **web**, alone, they had a total of 237,630 users.

CAN'T [illegible] EVENTS

- First edition of **CSIC de Cine**, the CSIC's summer cinema, where **more than 1,200 people** enjoyed cinema and science at the central campus in Madrid. The project brought together the public and CSIC research staff, who introduced the films from a scientific perspective, addressing different knowledge areas. The programme included: *Don't Look Up, Alcarràs, El buen patrón* and *Atrapa la bandera*. All the colloquiums were interpreted in Spanish sign language and three films were subtitled for the deaf.

Screening of *'Don't Look Up'* on the steps of the CSIC.

- **CSIC X+** held over the Christmas period, brought science to **over 20,000 people**. Its website received more than 17,000 visits. To commemorate the scientist Santiago Ramón y Cajal, a huge model brain was constructed to house hands-on laboratories, LABX+, CSIC X+ at the CSIC headquarters in Madrid.

- **International Year of Glass at the CSIC**, was commemorated with initiatives to raise awareness of the properties and multiple applications of glass. Two travelling and virtual exhibitions were launched: **La Edad del Vidrio** (The age of glass) and **Vidrio: presente y futuro circular** (Glass, a circular present and future). The exhibitions, which visited 11 venues, attracted **over 60,000 visitors**.

- **Madrid Fair for Science and Innovation**, held at IFEMA, with the participation of five CSIC institutes: RJB (Royal Botanical Garden), MNCN (National Museum of Natural Sciences), IGME (Spanish Geological Survey Institute), IEO (Spanish Institute of Oceanography) and INIA (National Institute for Agricultural and Food Research and Technology). **More than 40,000 people** visited the four-day-long fair.

- **European Researchers' Night** held **more than 120 activities**, face-to-face and online, with the participation of numerous CSIC centres and specialists in Andalucía, Aragon, Baleares Canarias, Cataluña, Comunitat Valenciana, Galicia and Madrid.

- **22nd edition of Science and Technology Week**: **an event offering 250 free activities**, such as scientific tours, video games, escape rooms and a festival of scientific songs, held in 12 autonomous regions of Spain.

SPECIAL PROJECTS

- **Ciudad Ciencia**: The *'Science City'* project present in 55 municipalities in Spain, brings science and technology news closer to the local environment by working with local councils. In 2022, to celebrate its **tenth anniversary**, the project has renewed its image and organised a meeting at the CSIC with local representatives from the municipalities in the network. During the 2021-22 academic year, **more than 80 activities** were held and attended by **over 20,200 people**.

Around 2,300 people participated in *'Esta semana hacemos ciencia'* (Let's do science week) in Aspe (Alicante).

- **"Women Scientists and Global Change. Conversations with CSIC researchers on the challenges in the 21st century"** is a space for interviews to make known women scientists at CSIC and their research related to global change. In 2022, three interviews were conducted and published on **the CSIC website** and in audiovisual format on **the CSIC Divulga YouTube channel** (6,066 views, with an average of 430 views per video).

- In the *emos de?* cycle of conferen d at the general public were held in nine cities (Valencia, Barcelona, Oviedo, Madrid, Logroño, Zaragoza, San Sebastián, Valladolid and Burgos) with approximately 2,000 attendees and around 40,900 online reproductions.

- **The CSIC's Plan for the identification and conservation of scientific instruments of historical interest** has begun a study to catalogue around one hundred instruments of historical interest at the **IEO (Spanish National Institute of Oceanography)** at its headquarters in Fuengirola, Malaga, and has completed the cataloguing of several dozen historical instruments destined for the recently inaugurated **'Enrique Moles' Historical Laboratory of Physics and Chemistry**.

'Enrique Moles' Historical Laboratory of Physics and Chemistry, holding a permanent exhibition of scientific instruments of historical interest at the CSIC.

SCIENCE EDUCATION AND DIDACTICS

THE CSIC AT SCHOOL

In 2022, a total of **11** **scientific training courses** were given to teachers from different autonomous regions. The **'10th Scientific meeting between children, teachers and CSIC researchers'** was organised and, coinciding with the thirtieth anniversary of the **CSIC at School programme**, the *'Seventh Conference between teachers, training advisors and scientists'* was held.

CIENCIA EN EL BARRIO – STREET SCIENCE

Ciencia en el Barrio brings outreach activities to the most vulnerable districts of Madrid and, as of May 2022, to **Seville**. as well. A total of 16 centres of different types make up the network: 12 Secondary Schools (IES), two Adult Education Centres (CEPA) and a Therapeutic Education Centre - Day Hospital, as well as a Centre for the Elderly. For the first time, the CSIC headquarters in Madrid hosted the Street Science Fair: **Feria Ciencia en el Barrio**, which amassed more than 600 students. During the academic year, this project reached nearly 7,500 people, with numerous inclusive and egalitarian activities.

Celebration of the first "Street Science Fair" at the CSIC headquarters.

COMPETITIONS AND CONTESTS

FOTCIENCIA

In 2022, the **FOTCIENCIA18** photo exhibition was inaugurated, with great reception, at the **Círculo de Bellas Artes in Madrid** and toured **various locations**, attracting **over 17,000 visitors**. In parallel, and with the Cajal Year as a backdrop, the **19th edition of FOTCIENCIA**, was launched in 2022, with the submission nearly 600 images.

Inauguration of FOTCIENCIA18 at the Círculo de Bellas Artes in Madrid.

INSPIRACIENCIA

The CSIC Delegation in Cataluña continued to promote the **Inspiraciencia**. scientific short story competition. In its twelve editions, a total of 5,500 stories were submitted. In addition to the traditional Institutional Prize and the Public Prize, a special Artificial Intelligence Prize was included as a novelty, thanks to the collaboration with the IA.HUB-CSIC network.

ILUSTR

Illustraciencia is an ever-growing project, with the celebration of the 9th Ilustraciencia International Award for Scientific and Nature Illustration, the 2nd Illustraciencia Meeting on Scientific Illustration, which took place at the MNCN, as well as **the exhibition** of the selection of works from the 9th edition of the competition, among other initiatives, such as online courses and outreach events.

RAPconCIENCIA

This scientific rap competition (RAPwithSCIENCE) attracted 200 young people aged under 17, who took part in the **second edition of RAP conCIENCIA**, creating songs with lyrics about science and scientists. The winners of the competition participated with the rappers De la Lastra and Arché in the composition and recording of their songs.

POPULAR SCIENCE PUBLICATIONS

In 2022, new titles were published in the two popular-science collections: 11 in the **¿Qué sabemos de?** collection and three in the **Divulgación**, collection, as well as author interviews, talks and book clubs, and the science-for-reading podcast **"Ciencia para leer"**.

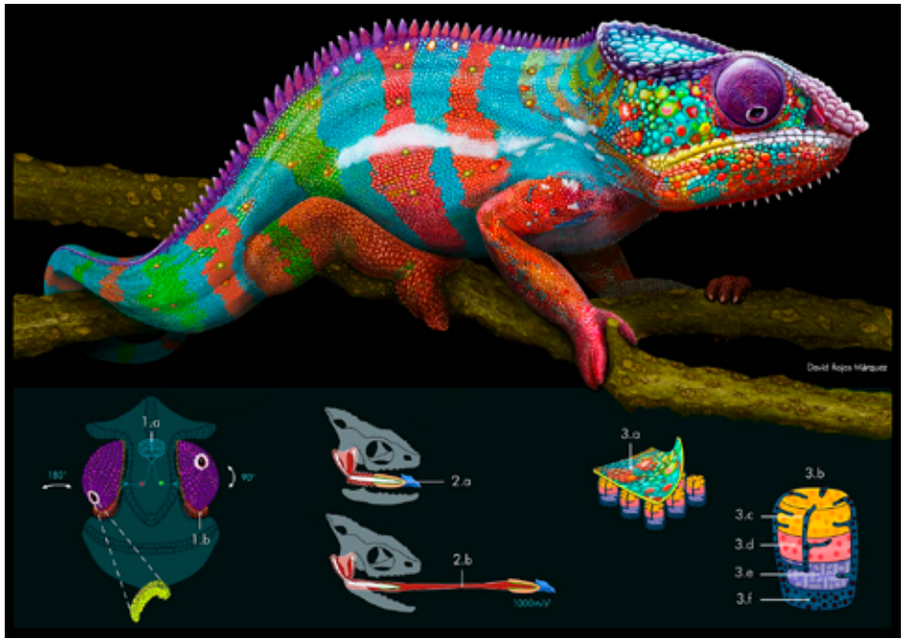


Illustration by David Rojas Márquez, winner of Ilustraciencia 2022.

LARGE OUTREACH FACILITIES

REAL JARDÍN BOTÁNICO - ROYAL BOTANICAL GARDEN

The **RJB** spans over 265 years of history and its mission is to promote knowledge, conservation and enjoyment of plants and their natural habitat.

Activity highlights 2022:

- The RJB welcomed 485,440 visitors, an increase of 235,440 over the previous year.
- The official RJB website received **1,280,000** visits.
- The community of RJB **social media** followers reached **146,424**.
- Preparation, by the RJB Herbarium, of the largest and finest **collection of current Spanish grapevine varieties** and presentation to the media (work started in 2018 in collaboration with IMIDRA).

Specimen of Vitis vinifera L. of the morate variety, from the El Encín vine collection (IMIDRA). This material has been included in the herbarium of the RJB under accession number MA-01-00950514.

- Collaboration of the RJB Historical Archive in organising **two exhibitions** of reproductions of drawings from the Spanish Scientific Expeditions on *'Botanical Art of the Spanish Scientific Expeditions'*, held in the Botanical Garden of Tallinn and *'Quito Botanical Art in the Spanish Scientific Expeditions'* in Quito.

The director of the RJB, Esteban Manrique, opening the exhibition organised by the Spanish Embassy in Latvia "Botanical art of the Spanish scientific expeditions" in the Botanical Garden of Riga, with attendance of Speaker of Spanish Congress, Meritxell Batet, members of the Chamber of Deputies and the president of Latvia's Saeima (Parliament), Inara Murniece.

- Memb[illegible]e Museos y Centros de la Cie[illegible]ssociation of Museums and Centres of Science and Technology of Spain).

- The Technical Unit of Informatics for Biodiversity, an instrument for **knowledge transfer from the RJB**, has established various collaborations. The most important ones are contracts for Technological Support and Training which include the Museu de Ciències Naturals de Barcelona. It has also provided advice on computer management of scientific collections to the MNCN, Doñana Biological Station, Balearic Centre for Biodiversity and the University of Michigan Herbarium and Museums.

- Start of the **TánDEM programme** under the Recovery and Resilience Plan for the training of 20 people under 30 years of age to obtain a professionalism qualification in "Production of seeds and nursery plants".

- Visibility of the collection of bulbous plants and rare or endangered species of the Spanish high mountain flora in the flowerbeds, on display tables.

- New projects such as the FECYT-funded *'El jardin acesible'* (The open garden), which seeks to open up the RJB and encourage participation in educational programmes for groups or individuals, regardless of their cognitive level, and for highly vulnerable groups and those at risk of social exclusion.

- **Workshop schools:** *'Quercus'* ended in May 2022. Launch of *'Ginkgo biloba'* to train 12 young people in "Installation and maintenance of gardens and green areas" and eight in "Management of tree and palm tree maintenance".

- New programme of **school activities** in collaboration with RENFE-Cercanías public transport.

- ***'Cine en el Jardín'*** open-air cinema at the RJB screened films and documentaries related to the environment, rural areas and climate change.

- Other events: *'European Researchers' Night'*; 'Science Week'; Organisation of the 'XV Edition of the RJB Science Marathon'; 'Science Fair', restarted in 2022 with an activity within the 'Sustainable Gardens' project, financed by the FECYT.

MUSEO NACIONAL DE CIENCIAS NATURALES – NATIONAL MUSEUM OF NATURAL SCIENCES

Spain's MNCN is dedicated to scientific areas ranging from palaeobiology and geology to ecology and climate change, environmental biology and biodiversity. For 251 years, the MNCN has been conveying to society what our planet is like and how it has changed, following the diversity it has harboured from the origin of life to the present day.

Activity highlights 2022:

- The Museum received 251,373 visitors, an increase of 44,267 over the previous year.

- The official website received **more than two million** visits.

- The community of followers on MNCN **social network** profiles reached **65,000**.

- **International Forum of Directors of Natural History Museums** with the participation of the directors of the museums of Washington DC, New York, Cambridge, Rio de Janeiro, London, Paris, Leiden, Brussels, Frankfurt, Vienna, Stockholm and Copenhagen, attended by more than 200 people.

International Forum of Natural History Museum Directors.

- Inauguration of the **new Espacio-CSIC** facilities, showcasing the research being carried out at the organisation to the public. Two projects were presented: *'The world's first paediatric exoskeleton'*, Dr Elena García Armada, (CAR); *'Bacteria that reduce the environmental impact of plastics'*, Dr Isabel Pardo Mendoza, (CIB).

New *Espacio-CSIC* facilities.

- Inaug**bitions**:
  - *'Pioneers of Doñana: Art and Nature in Unexplored Spain'* is a unique set of original illustrations and other materials related to Abel Chapman and Walter J. Buck's legendary works *Wild Spain* (1893) and *Unexplored Spain* (1910).
  - *'Astronauts'*: exhibits more than 200 objects related to life and work in space and delves into space exploration. It includes the NASA Neurolab mission dedicated to Santiago Ramón y Cajal.

Astronauts' exhibition.

- Production of the **documentary** *'Evolución. 250 años del Museo Nacional de Ciencias Naturales'* looking at 250 years of evolution at MNCN, which received the award of the 31st edition of the International Biennial of Scientific Film and Image BICC 2022-23.
- **Projects to raise awareness of the natural legacy and citizen involvement**: *'Paleo en el Barrio: Ciencia de proximidad'* (Paleo in the Neighbourhood), *'Un museo de todos y para todos: MNCN accesible'* (A museum of everything for everyone) and *'ODS e inclusión: juntos por un planeta sostenible, justo e igualitario'* (SDGs and inclusion: together for a sustainable, fair and equal planet). Publication of ***'Ciencia Signada'***, which compiles 250 scientific terms translated into Spanish Sign Language.
- **Other events:** The *'European Researchers' Night'* with +700 attendees; 'Science Week' with + 1,300 attendees; 'Summer Museum', urban camp with 520 participants; XIII Science Congress for Schools; II Environment and Accessibility Festival; Celebration of 'Falling Walls Lab Spain 2022', national phase of the Falling Walls Lab international competition.

MUSEO GEOMINERO – GEOMINERO MUSEUM

This museum is dedicated to the conservation, research and dissemination of the geological, palaeontological and mineralogical heritage and has important collections of minerals, rocks and fossils from all Spanish regions, from former colonial territories and from significant deposits in the world record.

Activity highlights 2022:

- The Museum received **47,108** visitors, an increase of 12,996 over the previous year. There were 409 guided tours.
- The official **website** received **6,942 visits**, with a total of 11,107 page views.
- The community of followers of the Museum's **social media** profiles reached **16,292** people.
- In the field of educational programmes, **116 workshops were** held for schools and the general public. Outstanding events include: the apprentice geologist workshop, the mineral resources workshop and the fossil recognition workshop.
- Participation in the events:
  - *'Madrid es Ciencia'* Science Fair.
  - Open Government Week.
  - 'Madrid Otra Mirada'.
  - Science Week.

Activities carried out at 'Madrid es Ciencia' Science Fair: mineral resources workshop, fossil recognition workshop and identification of specimens on a computer screen using Dino-Lite.

Visitors at the Museo Geominero.

MUSEO [illegible] SEVILLA – SEVILL[illegible]M

This museum's mission is to provide information and training in the scientific-environmental field for the citizens in Seville, aspiring to offer quality content and an information and entertainment service.

Activity highlights 2022:

- The Museum welcomed **44,057 visitors**, doubling the number for 2021 and returning to pre-pandemic numbers.
- The Museum's official **website** received **86,112** visits.
- The community of followers of the Museum's **social media** profiles reached **32,711**.
- Inauguration of two exhibitions: *'Los mapas y la primera vuelta al mundo. La expedición de Magallanes y ElCano'* with maps from the Magellan and ElCano expedition and *'Francisco Coello. 1822 - 2022: Pionero de la Cartografía moderna'* looking at this pioneer of modern cartography.
- Exhibitions in the format of photographic galleries like the one on slavery entitled: *'La esclavitud y el legado cultural de África en el Caribe'*, or *'De la mano de CABD'* and *'Secretos Ocultos del Desierto'* (Hidden Secrets of the Desert).
- Premiere of two films at the Planetarium: *'Un ratón en la Luna'* (A Mouse on the Moon) y *'Dinosaurios'*.

CASA DE LA CIÈNCIA DEL CSIC – VALENCIA'S HOUSE OF SCIENCE

Valencia's outreach facilities, known as the "house of science", is located in the centre of the city and contributes to improving the visibility and social projection of the CSIC in the Comunitat Valenciana by bringing the scientific and technical activity of its research institutes within reach of society.

Activity highlights 2022:

- The official **website** received **40,248** visits.
- The community of followers on **social media** hit **14,586**.
- Publication of **30 videos** on the YouTube channel *'Casa de la Ciència'* which accumulated **173,679** views.
- Exhibitions: *'Alexander Von Humboldt: En la naturaleza todo está conectado'* (Alexander Von Humboldt: In nature everything is connected), *'Fotciencia 17'*, *'La lógica del humor'* (The logic of humour) and *'La esclavitud y el legado cultural de África en el Caribe'*, that received more than 6,000 visits.
- Series of lectures on Citizen Science with global vision and recent developments, and another on chemistry, sustainability, environment and health with a total of 12 lectures.
- Publication of 152 press releases and news items on **the Delegation's website**.

LA RESIDENCIA DE ESTUDIANTES – MADRID STUDENTS' RESIDENCE

- Multiannual series such as *'Agora for Science'*, *'Mathematics at the Residence'*, the *'Trivulgando'* meetings: **Trivulgando**. Research, society and dissemination and science in action events, and others such as the conferences on fundamental physics or the *'European Researchers' Night'*.
- The year's programme was dedicated to thought and creation with the participation of the philosophers Carlos Thiebaut and Nuria Sánchez Madrid; the writers Sara Mesa, Lorenzo Silva, Juan Bonilla, Ana Merino and Juan José Millás; the palaeontologist Juan Luis Arsuaga; the composer José María Sánchez-Verdú, and the poet Piedad Bonnett. It was completed with more than a dozen concerts, opera-based activities, poetry readings, film screenings and theatrical performances.
- Exhibition '**Bores. Madrid-París**' (1898-1972) in the Transatlantic Pavilion of the Residencia.

RESIDENCIA DE INVESTIGADORES – BARCELONA'S RESEARCHERS' RESIDENCE

- Numerous outreach events were held in 2022, such as the lecture series '**Lunes de Ciencia**', featuring ¡SOS! Aquí la Tierra. Desafíos y retos del Cambio Global, Ciencia Editada, Inspiraciencia, ¿Qué sabemos de?
- "**Orígenes**": through two interactive talks-workshops, an astrophysicist and an archaeologist from the CSIC put the time-scales of the universe and the stars into perspective with that of our species, and the origin of our ways of life in prehistoric times.
- Gaudeamus PROJECTA Awards Ceremony.

CSIC COMMUNICATIONS DEPARTMENT

CSIC COMMUNICATIONS DEPARTMENT, FIGURES FOR 2022

Source: Acceso 360 / Brandwatch / Own tool

MEDIA IMPACT

PRESS	15,925
RADIO	1,372
TELEVISIÓN	1,190
DIGITAL MEDIA and SOCIAL NETWORKS (including Twitter)	81,860

TOTAL MEDIA APPEARANCES
100,347

CSIC COMMUNICATION IN SOCIAL NETWORKS

TWITTER	990,600
FACEBOOK	55,730
INSTAGRAM	65,700
YOUTUBE	108,000
LINKEDIN	81,975

TOTAL FOLLOWERS/SUBSCRIBERS
1,302,005

MEDIA INTERVIEWS MANAGED

1,371

PRESS RELEASES

494

VIDEOS

34

MILEST

Throughout 2022, the Communications Department (**Comunicación CSIC**) continued its task of disseminating the organisation's scientific and institutional activity.

- Media coverage of the **Transfiere Forum**, a professional and multi-sectoral European forum for knowledge and technology transfer held in Malaga. Interviews with CSIC representatives were recorded. The technology presented by CSIC focused on grape-harvesting robots, nuclear-fuel monitoring cameras and photons to treat cancer.

- Publication of two new issues of the **monographic journal *CSIC Investiga: Energy*** and ***Digital Sociedad***. Preparation of a special issue on the European Union's Horizon 2020 Framework Programme, exclusively in English, for distribution from the organisation's Delegation in Brussels.

- Bi-weekly collaboration with the radio programmes ***'A hombros de gigantes'*** and ***'No es un día cualquiera'***, broadcast at weekends on Radio Nacional de España.

- Start of a long-term collaboration with Spanish television, RTVE, to broadcast the institution's research, projects and achievements through audiovisual media channels: the television programme ***'La Aventura del Saber'*** broadcasts videos produced by the CSIC both on air and through its social networks. Some examples include audiovisual pieces on the CSIC's milestones in innovation, the 90th anniversary of IQFR (Rocasolano Institute of Physical Chemistry) and a study showing that neuron production is continuous throughout life.

- On the occasion of the climate summit in Glasgow, **COP26**, the programme ***'Objetivo Planeta'***, on RTVE's "Canal 24h", presented by Lorenzo Milá, featured the participation of Fernando Valladares, researcher at the MNCN. The same RTVE programme also broadcast a programme on soil as the planet's vital ecosystem, with the participation of Ana Rincón, researcher at ICA (Agricultural Sciences Institute).

- One of the most publicised news items in the media during 2022 was the discovery that the **saliva of the wax worm** contains enzymes capable of degrading plastic. The video produced to spread this news item has been viewed more than 2,100 times on the YouTube channel run by CSIC Communications department.

- Dissemination of the news of the development of a **robotic dog**, by research staff at the ITEFI (Institute for Physical and Information Technologies), with the skills and capacity to guide dependent or disabled people. Countless media channels echoed this news, disseminated by means of a press release and a video, the latter hitting more than 4,800 views on YouTube.

- CSIC participation in the international and simultaneous press conference on capturing the first ever image of the **black hole at the centre of the galaxy**.

- Organisation of the **first meeting of CSIC communications staff, with the aim of** improving internal coordination and sharing knowledge, experiences and useful proposals for carrying out their daily work. The event, organised in the auditorium of the RJB (Royal Botanical Garden), was attended by around 120 people from almost all of the ICUs at the CSIC.

CSIC EDITORIAL OFFICE

The mission of the Editorial Office (**Editorial CSIC**) is to disseminate research, technological development, innovation and scientific culture through its publications.

Editorial CSIC manages the organisation's Publishing Programme, which is part of the General Plan for Official Publications. The **2022 Publishing Programme** resulted in the signing of **20 co-publication and co-financing agreements** with different publishers, and public and private institutions. The activity carried out throughout 2022 is as follows:

BOOKS

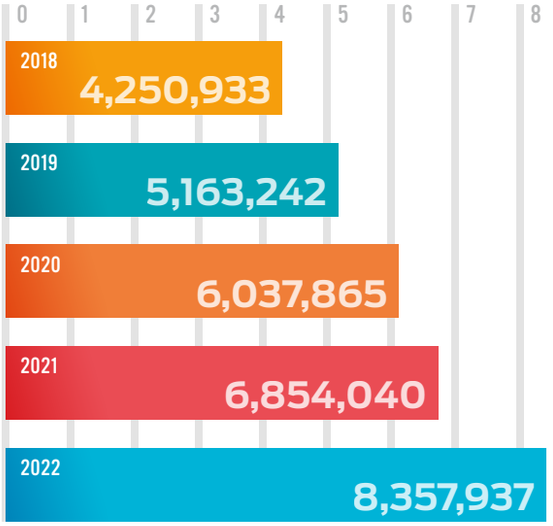
New book titles totalled 78, in print and electronic format, eight in electronic format distributed free of charge, four reprints and three reissues.

The platform **Libros CSIC. Edición electrónica** provides access to 1,562 titles, 550 of which are free, and has more than 12,500 registered users. In 2022, nearly 1,500,000 visits have been registered, which represents an increase of almost 22% compared to 2021.

JOURNALS

In 2022 the CSIC **took over three journals** published by INIA (2) and IGME (1), previously national centres. This brings the number of journals published by Editorial CSIC up to 40 (13 in Science and Technology, 21 in Arts and Humanities and 6 in Social Sciences). Fifteen of these are published in print and electronic PDF format, while 25 are in electronic format alone.

Figure 9.4.1
Cumulative visits to **Libros.csic.es**.



All journals are published in open-access format in their electronic edition and together they reached **95 issues**, **making 1,000 articles available** in **open access**.

The platform **Revistas científicas del CSIC. Edición electrónica** offers **free access to more than 40,000 documents**.

Figure 9.4.2
Number of files available from **Revistas.csic.es**.

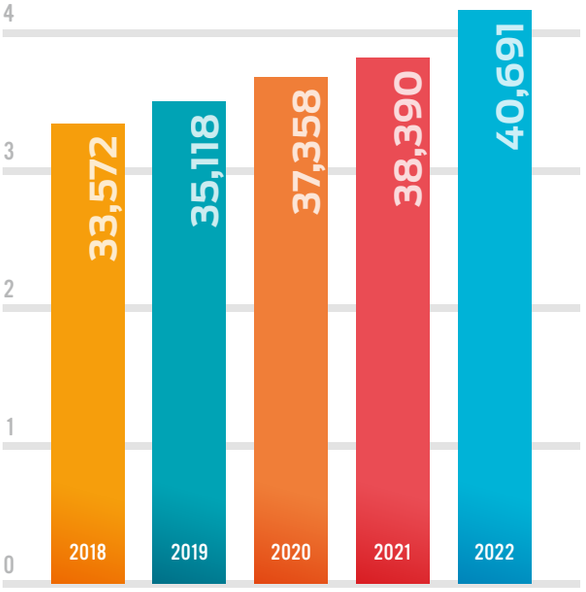


Table 9.4 ls in international databases.

CSIC JOURNALS	No. OF JOURNALS	WoS SCI	WoS SSCI	WoS JCR	WoS JCI	WoS A&HCI	WoS ESCI	WoS TOTAL	SCOPUS	ERIH Plus	FECYT quality label
SCIENCE & TECHNOLOGY	13	9	-	9	10	-	1	10	13	No aplica	10
SOCIAL SCIENCES	6	-	3	3	6	3	1	6	6	6	6
ART & HUMANITIES	21	-	1	1	21	18	3	21	21	21	21
TOTAL	**40**	**9**	**4**	**13**	**37**	**21**	**5**	**37**	**40**	**27**	**37**

DISTRIBUTION AND DISSEMINATION OF THE EDITORIAL COLLECTION

During 2022 around **21,500** copies of **monograph issues**, while dissemination reached 6,000.

About **6,000** copies of **journals** in print format, with around 2,000 distributed for dissemination and exchange.

New **book** titles in electronic format amounted to **87** (20 available as free downloads).

PARTICIPATION IN NATIONAL AND INTERNATIONAL TRADE FAIRS

International book fairs in Buenos Aires (Argentina); Bogotá (Colombia); Frankfurt (Germany); Guadalajara (Mexico); University students (Filuni), Mexico; LIBER in Madrid (Spain).

Madrid and Granada Book Fairs, Spain.

Presentation of the book *La Expedición Balmis*, Casa de América de Madrid.

OTHER DISSEMINATION ACTIONS

CATALOGUES AND WEBSITES

The complete catalogue and new publications can be consulted at **editorial.csic.es**, **libros.csic.es**, **revistas.csic.es**; at **Catalogo de publicaciones de la AGE**, and on the **DILVE** platform.

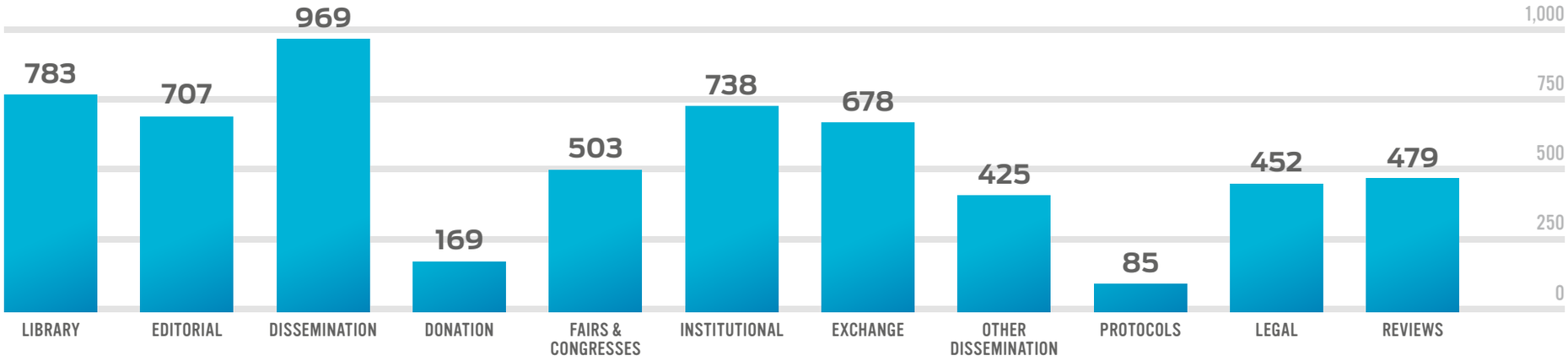
SOCIAL MEDIA

Editorial CSIC has 10,400 followers on Facebook, almost 3,400 on Instagram and 1,600 on Twitter.

PRESENTATION OF FOUR BOOKS AND INTERVIEW

for the RTVE programme *Parlamento* at the Madrid Book Fair.

Figure 9.4.3 Dissemination of monographic issues in 2022.



EXHIB
OF THE CS

- Sculptures by Alicia Martin: Orbital, in the central building of the CSIC and *Otras bibliotecas (other libraries)*, in the Editorial building.
- Installation of cubes and panels to commemorate the 80th anniversary of Editorial CSIC.

Sculptures by Alicia Martin: *'Orbital and Otras bibliotecas'.*

Cubes from the exhibition to mark 80 years of Editorial CSIC history.

CSIC SCIENCE BOOKSHOP

- Presentation of five of CSIC's books.
- Series of conferences (4) on the book collection *'¿Qué Sabemos de?'*.
- Book Day celebratory event with a talk by Patricio Pron on his book 'No, do not think about a white rabbit. Literature, money, time, influence, falsification, criticism, future'.
- Recording of interviews with CSIC research staff about what they read: **Y tú, ¿qué lees?** (8) as part of 'Book Month' at the CSIC.
- Organisation of the First Intergenerational Reading Club.

Poster for the *First Intergenerational Reading Club.*

PRIZES AND AWARDS

Best popular science work went to the MNCN for *'Nuestra investigación al alcance de tu mano' (Our research at your fingertips)* and best co-publication with a private publisher for *'The Balmis. Expedition: first model of global fight against pandemics'*, awarded to the CSIC by the Spanish University Publishers' Union.

SCIENTIFIC INFORMATION RESOURCES FOR RESEARCH

The CSIC Network of Libraries and Archives, its on-site and/or digital services and the automated management of bibliographic and archival collection as well as its digital collections are coordinated and managed by the Scientific Information Research Resources Unit. This unit (Spanish acronym, URICI) offers scientific information services to support the CSIC's research activity, being organised as a complete, homogeneous and high-quality horizontal system, developing an outstanding interlibrary cooperation, both nationally and internationally.

Table 9.5.1 Basic data CSIC Libraries and Archives Network in 2022.

USERS	
19,437	OWN USERS
5,765	EXTERNAL USERS
68,562	LIBRARY ACCESS
1,843	ACTIVE READERS

LIBRARY SERVICES IN 2022	
16,797	LOANS
64,719	RENEWALS
12,550	DOCUMENT RETRIEVAL SERVICE TRANSACTIONS
4,215	SURAD DOCUMENT RETRIEVAL SERVICE TRANSACTIONS
342,280	VIRTUAL LIBRARY CONSULTATIONS
2,042,235	DOWNLOADS OF E-JOURNALS (ARTICLES)
66,820	DOWNLOADS OF E-BOOKS (BOOKS AND CHAPTERS)
537,679	DATABASE SEARCHES
8.2 M	DOWNLOADS FROM DIGITAL.CSIC
33,177	VISITS TO SIMURG
281,680	REMOTE ACCESS (SIR) - 103,782 PAPIS
223,044	VISITS TO THE WEBSITE
470	VIRTUAL HELPDESK AND REFERRAL SERVICE ENQUIRIES
22,046	TWITTER FOLLOWERS
6,237	FACEBOOK FOLLOWERS

RESEARCH SUPPORT SERVICES IN 2022	
400,415	PUBLICATIONS INDEXED IN GESBIB
27,591	RECORDS CREATED IN DIGITAL.CSIC
2,302	ARTICLES FUNDED UNDER THE OPEN ACCESS PUBLISHING SUPPORT PROGRAMME
3,312	AUTHORS WITH A PROFILE ON DIGITAL.CSIC
550	DOI ASSIGNED IN 2021
23,413	AUTHORS WITH ORCID IDENTIFIER

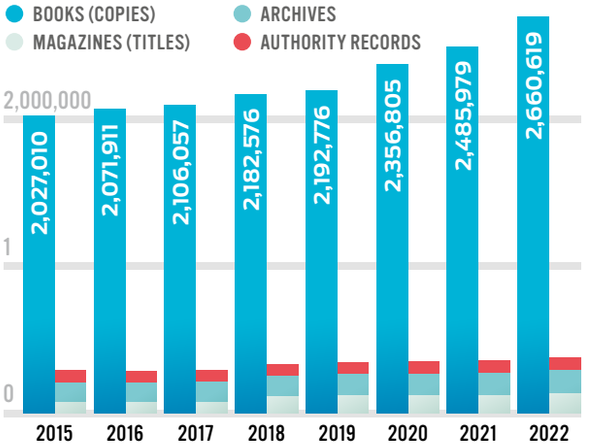
INFORMATION RESOURCES

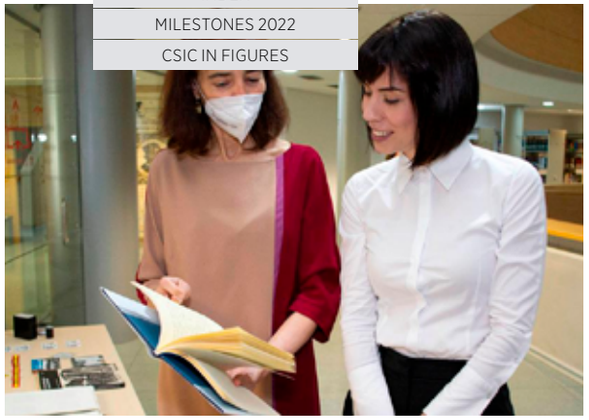
VIRTUAL LIBRARY AND CATALOGUE

The CSIC **Virtual Library**:

- Provides access to the CSIC Library and Archives Network Catalogue (CIRBIC), an essential source of information for locating printed and digital documentary collections.
- Provides access to databases, journals and e-books subscribed through various publishing platforms.

Figure 9.5.1 Growth of the CSIC Libraries and Archives Network Catalogue in 2022.





Minister Diana Morant visits TNT-CCHS Library.

2,646,734
DOWNLOADS/SEARCHES

9,547,068.87 € (VAT included)
CSIC INVESTMENT IN ACCESS
TO INFORMATION RESOURCES

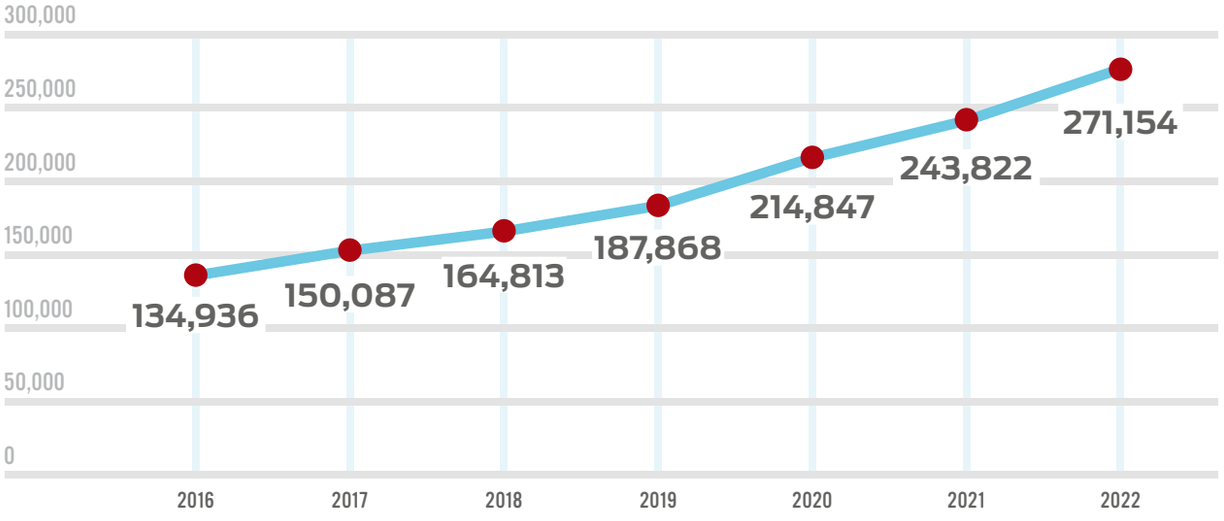
The Scientific Information Research Resources Unit manages the processes associated with the management of the CSIC collection (print-digital) through the GESBIB-Subscriptions module, and coordinates the management of institutional licences for WOS and SCOPUS through the national negotiation with the Spanish Foundation for Science and Technology (Spanish acronym FECYT) and the Cambridge Structural Database System National Licence, with CSIC acting as National Access Contact for 40 Spanish universities and research centres.

DIGITAL INSTITUTIONAL REPOSITORY.CSIC

- Growth of the repository by 27,591 items, reaching a total of 271,154 items.
- Highlights include the launch of the third edition of the open access **Portal Monitor Mandato CSIC**; the incorporation of the IGME repository in DIGITAL.CSIC; the incorporation of the **UN Sustainable Development Goals taxonomy**; the development of **the first datathon** DIGITAL.CSIC, in collaboration with the BIFI (Institute of Biocomputing and Physics of Complex Systems), within the framework of the European EOSC SYNERGY project; the development of the **FAIR EVA** tool, which measures the degree of alignment of research datasets with the FAIR principles; participation in the Interdisciplinary Thematic Platform (PTI) for Science and Digital Innovation and the launch of the **Portal Pioneras CSIC**, paying homage to women pioneers in the history of Spanish science.

Fair-evaluator.

Figure 9.5.2 Trends in item number for Digital.CSIC.



SIMURG DIGITISED COLLECTIONS

In 2022, the collection of digitised CSIC collections available on the **Simurg portal** received 33,177 visits and a total of 437,587 pages were downloaded.

Unicum.

MOBILE LIBRARY APP

Launch of the **mobile application** for the CSIC Libraries and Archives Network, which provides access to the catalogue, enables browsing or loan renewal, consultations and requests, as well as other functions such as access to Digital.CSIC, consultation of the Open Access publication support programme or information on the libraries in the Network.

SERVICES

LIBRARY SERVICES

- Increased use of virtual services such as off-campus access to the virtual library through the PAPI **Remote Access Service**.
- Members of the 100% DIGITAL Plan numbered 41 CSIC institutes, meeting the scientific information needs of institutes and centres that do not have a library service.

RESEARCH SUPPORT SERVICES

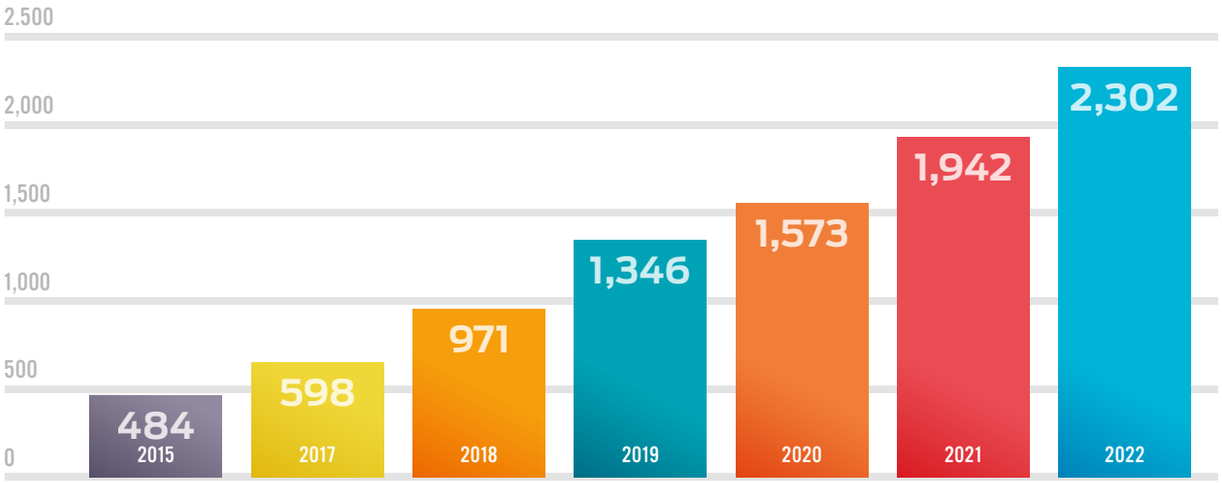
OPEN ACCESS PUBLISHING SUPPORT PROGRAMME

- Funding of 2,302 articles by CSIC corresponding authors.
- Signing of two reading and publication agreements, OA: AIP and The Royal Society.

DIGITAL.CSIC: CSIC INSTITUTIONAL REPOSITORY

In 2022, services have been provided through the repository such as the delegated archiving of works; the ex officio uploading of research results from the centres in the 100% DIGITAL Plan; Open Access mandate monitoring; support for data management planning; DOI assignment, and the creation of profiles for research staff, groups and projects.

Figure 9.5.3 Open Access Publication Support Programme. Number of articles.



GesBIB PUBLICATIONS

GesBIB offers services on bibliometric indicators to help in the project application process for calls, offering a complete overview of CSIC's publication activity at various institutional levels. In 2022 the following were performed:

- 153 reports for CSIC institutes and departments on request.
- Upload of historical publications completed; retrospective upload completed up to 1993.
- 400,000 total publications indexed, with the associated processes of duplicate detection, error correction, etc.
- Preparation of the "**Guide to the CSIC scientific signature: institutional affiliation**", which includes a **CSIC affiliation search engine**.

PLAGIARISM VERIFICATION SERVICE

CSIC continues to subscribe to Turnitin's anti-plagiarism tool, iThenticate. In 2022, 184 users applied the tool and 376 uploaded documents for validation. iThenticate validated 2,574 documents in 2022.

OPEN SCIENCE FACILITIES

Active collaboration with several facilities whose ultimate goal is to promote open science: arXiv, COAR, DataCite, DOAB/OAPEN, DOAJ, Dspace, OpenCitations, PCI Peer Community In.

Figure 9.5.4 CSIC data uploads to GESBIB.

INDEXED PUBLICATIONS	CSIC INSTITUTE PUBLICATIONS	INDEXED AUTHORS*	AUTHORS WITH CSIC ID	AUTHORS WITH ORCID
400,415	373,348	92,955	33,468	23,413

AUTHORS WITH DIGITAL.CSIC PROFILE	INDEXED JOURNALS	INDEXED BOOKS	INDEXED SERIALISED BOOKS	BIBLIOMETRIC INDICATORS
3,312	37,055	6,320	2,309	682,846

10

CSIC MANAGEMENT REPORT

10 CSIC MANAGEMENT REPORT

OUTSTANDING MILESTONES IN MANAGEMENT FOR 2022

- CSIC is the **agency responsible for executing €126.7 million in funds from the Recovery, Transformation and Resilience Plan**, which is managed centrally by the CSIC's central management body (ORGC) and involves 70 research institutes in its implementation.

- One of the highlights of 2022 was the **cyber-attack** suffered and successfully overcome, thanks to concerted effort, which has led to the start of close collaboration with the General Secretariat for Digital Administration and the CCN (National Cryptologic Centre), which is enabling important progress in the review of the ICT structure at CSIC.

- As of the opening of the 2022 financial year, the **Sorolla 2 economic management and SIC3 accounting applications** have come into use, bringing the CSIC into line with the rest of the public bodies forming the General State Administration of Spain.

- Implementation of improvements in the management of the national centres INIA, IEO and IGME. Accordingly, internal management tools have been adopted, highlighting the labour pool, as well as improvement of their infrastructures by promoting projects for the construction, restructuring and modernisation of facilities.

- New impetus to the **Management Office** as the unit coordinating institutes' and centres' management with the different ORGC units in administrative and management activities, including: advice and support, organisation of training courses, assistance in the incorporation of new managers and liaison work, among others.

- Launch of the ***SIMPLIFICA Project***, aimed at seeking and implementing formulas to simplify common administrative processes and reduce internal bureaucracy, with the participation of staff from the entire organisation.

- **The CSIC's institutional response** to various types of **external applications for information**: (i) the Spanish Parliament, responding to 157 parliamentary initiatives received; (ii) the various ministerial departments, assessing 80 national regulations; (iii) the public, having processed 44 requests for access to information through the transparency portal, responding to 408 requests received through the infocsic mailbox, processing 95 complaints and suggestions through the Q&S mailbox, and resolving 66 formal queries on data protection issues.

OUTST[illegible]TION ON AREAS INVOL[illegible]MANAGEMENT

The functioning of the administrative organisation, economic-financial and budgetary management and internal control, personnel management, assets management, contracting tenders and works and infrastructures, as well as the planning and management of IT development are functions whose management is carried out by the General Secretariat of the CSIC, which also undertakes the management and coordination of managing the research institutes and centres, providing the necessary technical and administrative support. In 2022, the most outstanding information for each of these areas was as follows:

ECONOMIC PERFORMANCE

- 2022 was the **first year with a single budget** after the incorporation of INIA, IEO and IGME into CSIC. The initial budget was €1,122 million and the final budget was €1,390 million.
- The **CSIC's** total **revenue** exceeded **€1,120** million: ministerial funding amounted to more than €568 million while competitive revenue exceeded €531 million, representing €202 million more than the previous year.
- **Recognised liabilities** for the year amounted to **€1,036** million, €263 million more than in 2021. This increase in expenditure was mainly due to the incorporation of the National Centres, the increase in staff costs (€87 million), current expenditure on goods and services (€66 million) and real investments (€52 million). In the distribution of expenditure, staff costs continued to account for the largest portion (more than 63%).
- The implementation rate of the expenditure budget, conditioned by the management of the Recovery, Transformation and Resilience Plan grants and their longer implementation deadlines, has been set at 75%. For the 463A "Scientific Research" programme, with a total budget of €1,162 million, the rate has risen to 83% (€968 million).
- In 2022, a **surplus of more than €84 million** was achieved, replenishing the cash surplus in order to guarantee the execution of all the research projects obtained. These include aid received for executing the Recovery, Transformation and Resilience Plan projects - the correct use of the rest of the allocated funding, as well as having a certain capacity for autonomous action for co-financing of scientific projects, calls for subsidies for basic infrastructure and equipment, construction of new buildings with European co-financing, support for institutes in financial difficulties, etc.

Consolidated development: revenue by funding source 2021-2022.

	2021		2022	
FUNDING	AMOUNT (€)	%	AMOUNT (€)	%
SPANISH STATE	468,624,199.96	64.00	568,679,117.29	64.00
COMPETITIVE	329,002,586.65	35.87	531,696,541.18	35.87
ESF/ERDF	1,614,644.37	0.13	20,462,785.89	0.13
TOTAL	**799,241,430.98**	**100.00**	**1,120,838,444.36**	**100.00**

Source: SCG.

Trends itemised by type of expenditure: 2021-2022.

	2021		2022	
TYPE OF EXPENDITURE	AMOUNT (€)	%	AMOUNT (€)	%
STAFF COSTS	525,328,679.06	67.94	653,742,457.93	63.10
OTHER EXPENSES	159,655,357.21	20.65	283,381,492.11	27.35
INVESTMENTS	88,248,446.07	11.41	98,860,052.62	9.54
TOTAL	**773,232,482.34**	**100.00**	**1,035,984,002.66**	**100.00**

Administ… 22.

CHAPTERS	INITIAL BUDGET	INITIAL BUDGET INCREASES	DECREASE INITIAL BUDGET	FINAL BUDGET	RECOGNISED REVENUE	REVENUE RECEIVED	PENDING RECEIPT
CHAPTER 3 TAXES, PUBLIC FEES AND OTHER REVENUES	52,729,670.00	-	-	52,729,670.00	63,876,904.70	32,589,799.01	31,287,105.69
CHAPTER 4 CURRENT TRANSFERS	442,423,060.00	12,856,774.33	53,218.37	455,226,615.96	459,502,967.77	229,855,235.81	229,647,731.96
CHAPTER 5 CAPITAL GAINS	2,780,540.00	-	-	2,780,540.00	2,683,192.57	1,778,341.60	904,850.97
CHAPTER 6 DISPOSAL OF REAL INVESTMENTS	27,000.00	-	-	27,000.00	-	-	-
CHAPTER 7 CAPITAL TRANSFERS	388,932,310.00	227,144,123.57	285,000.00	615,791,433.57	565,654,556.44	498,236,429.78	67,418,126.66
CHAPTER 8 FINANCIAL ASSETS	205,964,090.00	-	-	205,964,090.00	-	-	-
CHAPTER 9 FINANCIAL LIABILITIES	29,000,000.00	28,312,904.95	-	57,312,904.95	29,120,822.88	1,187,527.84	27,933,295.04
TOTAL	**1,121,856,670.00**	**268,313,802.85**	**338,218.37**	**1,389,832,254.48**	**1,120,838,444.36**	**763,647,334.04**	**357,191,110.32**

Administrative expenditure budget 2022.

CHAPTERS	INITIAL CREDIT	CREDIT MODIFICATIONS	FINAL CREDIT	RECOGNIZED EXPENSE	AVAILABLE CREDIT
CHAPTER 1 STAFF COSTS	504,189,860.00	-	504,189,860.00	435,231,136.91	1,924,339.87
CHAPTER 2 CURRENT EXPENDITURES ON GOODS AND SERVICES	219,938,010.00	-4,280,215.49	215,657,794.51	215,225,543.87	-20,023,026.15
CHAPTER 3 FINANCIAL EXPENSES	1,446,180.00	-	1,446,180.00	4,793,863.00	-3,439,529.75
CHAPTER 4 CURRENT TRANSFERS	12,327,510.00	15,000.00	12,342,510.00	10,043,178.85	1,789,326.57
CHAPTER 6 REAL INVESTMENTS	378,063,410.00	255,172,028.52	633,235,438.52	315,608,998.17	277,641,661.16
CHAPTER 7 CAPITAL TRANSFERS	4,385,790.00	-	4,385,790.00	1,902,135.69	2,483,654.31
CHAPTER 8 FINANCIAL ASSETS	328,270.00	-	328,270.00	34,932,734.72	-34,604,464.73
CHAPTER 9 FINANCIAL LIABILITIES	1,177,640.00	17,068,771.45	18,246,411.45	18,246,411.45	-
TOTAL	**1,121,856,670.00**	**267,975,584.48**	**1,389,832,254.48**	**1,035,984,002.66**	**225,771,961.28**

Source: SCG.

HUMAN

- In 2022, CSIC personnel numbered **13,888** staff members, an increase of 558 compared to 2021, distributed according to the following categories:

RESEARCHER	4,489
RESEARCHER IN TRAINING*	1,334
TECHNICIAN/SUPPORT	6,705
MANAGEMENT/ADMIN/SERVICES	1,360
TOTAL	13,888

* Pre-doctoral.

- **Selection processes**
  - **Civil servants in the scientific and technical categories** of the Public Research Organisations. The selection processes corresponding to the public employment offers of 2019, 2020, 2021 and 2022 have been carried out. For the 2022 public employment offers, the number of positions awarded to the CSIC for the scientific categories was 317 open access/397 internal promotion and for the technical categories 238 open access/102 internal promotion.
  - **Permanent staff employment.** Publication of the process for admission by the general system of open access and internal promotion in the professional groups M3, M2, M1, E2 and E1 subject to the IV Single Collective Agreement for the General State Administration's labour staff, in which CSIC announced 225 vacancies and which are currently being processed.
  - **Stabilisation processes.** Publication of the rest of the selective stabilisation processes affecting the CSIC: **1,749 vacancies** for entry, by open access, as permanent staff in the professional groups M3, 1G, M2, 2G, M1, 3G, E2, 4G, E1, subject to the IV Collective Agreement; **174** vacancies for the recruitment of permanent staff, Senior Graduate outside the Agreement and Middle Graduate outside the Agreement; **74** vacancies for the recruitment of permanent staff, PhD-holders outside the Agreement; **one** vacancy for the recruitment of permanent staff, with the category of sailor, subject to the agreement of the Oceanographic Vessel "García del Cid".
  - Incorporation of 98 of the 100 candidates who passed the selection process for permanent staff, PhD-holders outside the agreement, in the framework of the process of stabilisation of temporary employment launched in 2021.

Distribution of staff by employment relationship, functional grouping and gender.

	RESEARCHER			RESEARCHER IN TRAINING			TECHNICIAN / SUPPORT			MANAGEMENT / ADMIN /SERVICES			TOTAL		
EMPLOYMENT RELATIONSHIP	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
PUBLIC EMPLOYEE	2,064	1,246	**3,310**	-	-	**-**	838	1,132	**1,970**	385	542	**927**	3,287	2,920	**6,207**
CONTRACT EMPLOYEE	100	58	**158**	-	-	**-**	335	171	**506**	125	137	**262**	560	366	**926**
TEMPORARY EMPLOYEE	544	477	**1,021**	660	674	**1,334**	1,800	2,429	**4,229**	51	120	**171**	3,055	3,700	**6,755**
TOTAL	**2,708**	**1,781**	**4,489**	**660**	**674**	**1,334**	**2,973**	**3,732**	**6,705**	**561**	**799**	**1,360**	**6,902**	**6,986**	**13,888**

Source: GESPER.

Staff dist

	RESEARCHER			RESEARCHER IN TRAINING			TECHNICIAN / SUPPORT			MANAGEMENT / ADMIN / SERVICES			TOTAL		
CORE AREA	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
SOCIETY	198	138	**336**	27	35	**62**	87	109	**196**	24	46	**70**	336	328	**664**
LIFE	1,453	1,049	**2,502**	341	486	**827**	1,786	2,632	**4,418**	329	398	**727**	3,909	4,565	**8,474**
MATERIA	1,035	569	**1,604**	292	153	**445**	994	802	**1,796**	92	155	**247**	2,413	1,679	**4,092**
CENTRAL SERVICES*	22	25	**47**	-	-	**-**	106	189	**295**	116	200	**316**	244	414	**658**
TOTAL	**2,708**	**1,781**	**4,489**	**660**	**674**	**1,334**	**2,973**	**3,732**	**6,705**	**561**	**799**	**1,360**	**6,902**	**6,986**	**13,888**

* Includes delegations/REBIS.

Staff distribution by geographical location and functional grouping.

	RESEARCHER			RESEARCHER IN TRAINING			TECHNICIAN / SUPPORT			MANAGEMENT / ADMIN / SERVICES			TOTAL		
AUTONOMOUS REGION	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
ANDALUCIA	451	259	**710**	88	115	**203**	600	610	**1,210**	98	102	**200**	1,237	1,086	**2,323**
ARAGON	107	77	**184**	43	32	**75**	108	108	**216**	14	29	**43**	272	246	**518**
PRINC. DE ASTURIAS	48	50	**98**	14	10	**24**	52	98	**150**	14	11	**25**	128	169	**297**
ILLES BALEARS	52	36	**88**	11	8	**19**	40	58	**98**	5	8	**13**	108	110	**218**
CANARIAS	32	14	**46**	6	10	**16**	39	41	**80**	9	7	**16**	86	72	**158**
CANTABRIA	37	19	**56**	13	8	**21**	34	57	**91**	8	9	**17**	92	93	**185**
CASTILLA-LA MANCHA	8	3	**11**	2		**2**	6	18	**24**	2	1	**3**	18	22	**40**
CASTILLA Y LEON	48	35	**83**	8	35	**43**	50	71	**121**	12	20	**32**	118	161	**279**
CATALUÑA	419	260	**679**	87	100	**187**	388	433	**821**	59	88	**147**	953	881	**1,834**
EXTREMADURA	5	3	**8**		1	**1**	8	4	**12**			**0**	13	8	**21**
GALICIA	85	62	**147**	11	18	**29**	111	219	**330**	31	40	**71**	238	339	**577**
LA RIOJA	7	7	**14**	1	1	**2**	8	12	**20**	1	1	**2**	17	21	**38**
COM. DE MADRID	1,091	753	**1,844**	246	216	**462**	1,195	1,597	**2,792**	255	433	**688**	2,787	2,999	**5,786**
REGIÓN DE MURCIA	54	42	**96**	14	12	**26**	80	85	**165**	17	8	**25**	165	147	**312**
COM. FORAL NAVARRA	6	4	**10**	2	2	**4**	5	11	**16**	2	-	**2**	15	17	**32**
PAIS VASCO	24	8	**32**	5	1	**6**	9	4	**13**	3	1	**4**	41	14	**55**
COM. VALENCIANA	230	144	**374**	109	105	**214**	240	304	**544**	29	40	**69**	608	593	**1,201**
ROMA	4	5	**9**	-	-	**-**	-	2	**2**	2	1	**3**	6	8	**14**
TOTAL	**2,708**	**1,781**	**4,489**	**660**	**674**	**1,334**	**2,973**	**3,732**	**6,705**	**561**	**799**	**1,360**	**6,902**	**6,986**	**13,888**

Source: GESPER.

- **Temp** of **4,436 contracts**, of which ugh the labour-pooling system and 1,316 through calls for applications within the framework of subsidised programmes, including pre-doctoral contracts, youth guarantee, Juan de la Cierva in its training and incorporation modalities and Ramón y Cajal.

- Implementation, together with other ORGC units, of the measures included in the HRS4R 2021-2023 Action Plan, grouped around four main axes: (1) Ethical and professional aspects (2) Recruitment and selection (3) Working conditions and (4) Training and development.

- Preparation and implementation of the **2022 Training Plan**. A total of **231 courses were** given to 5,677 people, receiving an average rating of 4 out of 5.

- **Occupational risk prevention.** The technical team of CSIC's six regional prevention services imparted compulsory training to 2,820 people on prevention and protection measures for general and specific risks in the workplace, as well as specific training to 236 people.

  - The **Ramón Tobar 2021 Award** was presented to the Marine Technology Unit on the occasion of the implementation of the Safety Management System (SMS) on the oceanographic vessel Sarmiento de Gamboa.

INFRASTRUCTURES AND HERITAGE

- Within the framework of the CSIC Infrastructures Strategic Plan, audits of installations in CSIC buildings were begun with the aim of improving efficiency and reducing energy expenditure, in compliance with the measures established in Royal Decree 14/2022 on energy saving and efficiency measures and reduction of energy dependence on natural gas.

- The **asset management** of CSIC includes the administration of its 561 properties, both rural and urban, amounting to over 102 million m2 and more than 809,000 m2 built in Spain, Rome and Brussels; undertaking the registration (approximately 14,000) and de-registration (4,500) of movable assets; and managing its historical and cultural assets.

- Highlights of government procurement in 2022:

  - Holding of 424 contracting committees at which 994 contracts were awarded for a total value of more than €218 million.

  - Start of the construction of the Oceanographic Vessel Odón de Buen, with a final cost of €84,330,950.

- New headquarters have been managed for the IPLA, SOCIB, IAM, IIM-UTM, IBE, IRNASA, CI2A, IQM, IQOG, I3M, IEO PALMA, P4 INIA-CISA, Remodelling P3 INIA-CISA and the Serrano 150 headquarters in Madrid and the maintenance and rehabilitation of existing buildings representing over 150 works.

INFORMATION AND COMMUNICATION TECHNOLOGIES

- In 2022, work has begun on a project to develop a **CSIC Systems Strategic Plan** to drive the institution's comprehensive digital transformation.

- A major project in the area of server infrastructures has been carried out, modernising the entire corporate storage architecture runtime to provide a cross-corporate disaster recovery system between corporate data processing centres.

- The email architecture has been improved and proactive measures have been taken to provide rapid response in updating services with weaknesses, as well as the implementation of the unattended configuration system.

- A project for monitoring and protecting the Corporate Hosting hosts has been completed as part of the specialised tasks of improving infrastructure security.

- One t is the integrated management patch automation system, which allows not only the distribution of information but also the deployment and incorporation of all the channels that operate in the relationship with users, both internal and external, i.e., the public.

- With regard to **communications and security**, it is worth highlighting the start of new phases of the Communications and Security Infrastructures Renewal and Improvement Plan, initiated in 2015, particularly focused on the improvement and renewal of network infrastructures, both cabling and high-performance network electronics, and the updating and expansion of wireless communications equipment (Wi-Fi) in more than thirty ICUs, representing an investment of around €3 million.

- As a result of the renewal of firewall equipment initiated at the end of 2021, it has been possible to implement more advanced security measures and offer a range of security services with greater features and capabilities: a) implementation of "two-factor authentication"; b) incorporation of the CSIC into the National Government's Cybersecurity Operations Centre (Spanish acronym COCS), which will entail the gradual adoption and implementation of various security services offered by COCS; c) deployment of an endpoint protection system (Endpoint Detection and Response-EDR), which complements the protection that was previously offered by the corporate antivirus.

CSIC AS EUROPEAN-FUNDING IMPLEMENTATION AGENCY

- In 2022, the amount of funds from the **Recovery, Transformation and Resilience Plan** amounted to **€126.7** million (€76 million through the general state budget [Spanish acronym PGE] and the rest incorporated from the previous year) to implement projects included in investments under Component 17 of the Plan for Institutional Reform and Capacity Building of the National Science, Technology and Innovation System, specifically:

  - Investment 1. Complementary plans with the Autonomous Regions: 'Quantum Areas' project with €17.2 million and 'Green Energy and Hydrogen' project with €17.4 million.

  - Investment 2. Strengthening the capacities, infrastructures and equipment of SECTI actors: two projects for the construction of high security laboratories for new pathogens and a new plant breeding infrastructure with €37.5 million.

  - Investment 5. Knowledge Transfer: one project with €0.4m

  - Investment 6. Health: 'Ageing and Pandemics' project with €28.2 million.

  - Investment 7. Environment, climate change and energy: 'Energy transition, plastics and climate change' project with €24.9 million.

Within the framework of these projects, 310 new staff contracts and 1,800 minor contracts were signed and 76 procurement files were processed, involving 70 research institutes in their implementation.

- In addition to Recovery, Transformation and Resilience Plan funds, the CSIC is an executor of projects financed with **ERDF** funds:

  - Scientific and Technological Infrastructures Programme, with the construction of CI2A, the new IRNASA headquarters and the new IAM headquarters.

  - LifeWatch ERIC programme, with the implementation of the project 'Sustainability for Mediterranean hotspots in Andalusia (SUMHAL)' (€13 million) articulated through the Interdisciplinary Thematic Platform (PTI+) ECOBIODIV+.

Fundación General CSIC

11

CSIC GENERAL FOUNDATION

CSIC GENERAL FOUNDATION

In 2022 the FGCSIC (CSIC General Foundation) has consolidated the strategy launched in 2021 aimed at **promoting public-private collaboration in the field of scientific research, innovation and knowledge enhancement**. To achieve this, its activity is organised around the main pillars described below:

ACTIVITY IN SCIENCE, STRATEGY AND CORPORATE SOCIAL RESPONSIBILITY

These actions are aimed at promoting and managing private funding to develop public-private programmes which, with scientific research as the guiding thread, respond to market and societal challenges.

SEARCH FOR NEW PARTNERS

- Progress in defining a plan to attract private funding:
  - Approval of new forms of collaboration for entities that wish to join the FGCSIC without being trustees.
  - Redesign of different returns that the FGCSIC offers to its partners, mainly improving tax deductions, positive impacts on visibility, reputation, and positioning, access to innovation sources and corporate compliance with corporate social responsibility or innovation policies.
- Organisation of events:
  - In collaboration with the Fundación CEOE, **How to make CSR policies linked to science and innovation profitable** at the RJB (Royal Botanical Garden), aiming to attract the business sector. It brought together leading representatives of the scientific and business worlds, with the FGCSIC presenting itself as a facilitator of interaction between the two.
  - A conference to connect research and innovation was held in cooperation with the Fundación Cepsa **Conectamos I + I** at the ICB-CSIC aiming to foster links between academic research and industrial interests to establish strategic and sustainable public-private relations.

Event on *'How to monetise CSR policies linked to science and innovation'*.

ComFu

The third edition of ComFuturo was held, integrated within the framework of the COFUND programme of the European Commission's Marie Sokolowski-Curie actions, to attract international research personnel. The presentation ceremony **ComFuturo III. Towards a new generation of global researchers** was attended by the Secretary General for Innovation of the MICIN and the President of the CSIC.

Third edition of ComFuturo. *Towards a new generation of global researchers.*

The **15 recipients of ComFuturo** funding were evaluated and selected from among 82 applicants and will join CSIC institutes and centres in 2023 to carry out their innovative projects for a period of three years.

ACTIVE AGEING

- The premiere on YouTube of an **audiovisual programme**, in television format, which reviews the main milestones achieved by the FGCSIC in this field over the last 12 years, with the presentation of new initiatives. These include the **digital version of the exhibition 'A vivir que son 100 años'** (Live to be 100) which updates and transfers to virtual format the content of the physical exhibition of the same name, which has also continued being exhibited throughout Spain.
- Completion of the ten R&D+i projects on longevity signed by the FGCSIC two years ago aimed at developing innovative products, processes or services to improve the quality of life of the elderly. Publication of a **short, informative video** for each project, summarising their objective and impact.

COURSE ON GOOD SCIENTIFIC PRACTICE

Advanced training aimed at promoting awareness and training in research integrity and good practice among those entering the scientific research career. In 2022, four editions were held, benefiting 160 PhD candidates.

OTHER COLLABORATIVE PROJECTS

Management of public-private collaboration programmes already underway, such as the AXA Chair in Adversarial Risk Analysis run at the ICMAT-CSIC; the PosiGenome project of the IMEDEA-CSIC; and the initiative to promote and articulate research and innovation projects in the field of Neuroscience sponsored by Fundación Humanismo y Ciencia, a foundation for humanism and science.

Recording of the audiovisual on the FGCSIC's ageing research area.

INNOVATION ACTIVITY

The Innovation unit's overall aim is to increase the economic and social value of the R&D carried out by the CSIC through strategies to enhance the value of the knowledge generated in the organisation.

In 2022, the report **Comparison of knowledge valorisation models** was developed, which examines different transfer strategies and models implemented in leading international public and private research institutions. This analysis has served to define processes to address the valorisation challenges facing CSIC projects, technologies and knowledge developed within the FGCSIC programmes, described below:

SEARCH, SELECTION, SUPPORT AND ACCELERATION OF KNOWLEDGE VALORISATION PROJECTS

- Opening of a new call of the **COMTE-Innovation** programme, from which **eight CSIC projects were selected** and which will benefit from intensive and expert mentoring for 24 months in order to fast-track their valorisation.

First meeting of the COMTE-Innovation first edition beneficiaries.

- Colla… …eputy Vice-Presidency for K… …EBTON programme, an initiative with similar objectives and dynamics, to promote two more projects.

Taking into account these actions, plus those of past editions of COMTE, the FGCSIC provides services of valorisation, mentoring, training and advice on their value propositions and business models to 18 CSIC research projects.

TECHNOLOGY WATCH AND COMPETITIVE INTELLIGENCE SERVICE

Design and implementation of the **Competitive Watch** Unit to help entrepreneurs monitor, analyse and understand the technological and competitive environment in which they operate in order to remain competitive, improve their ideas, products and services, and plan future operations. In 2022 the FGCSIC made more than 30 reports and market studies to provide services and add value to its projects and initiatives.

SUPPORT IN THE SEARCH FOR PUBLIC AND PRIVATE, NATIONAL AND INTERNATIONAL FUNDING

LEGAL ADVICE ON PROTECTION, REGULATION, NEGOTIATION AND BUSINESS MANAGEMENT

CREATION OF GLOBAL MANAGEMENT TEAMS FOR ENTREPRENEURIAL PROJECTS, BUSINESS INCUBATORS AND OPEN LABS

EXTERNAL FINANCIAL ADVICE TO ENSURE PROJECT SUCCESS

The Innovation area also works to generate closer ties and knowledge transfer between the world of science and business through different actions. In 2022, the following should be highlighted:

NETWORKING ACTIONS

Conference on the ecological transition, specifically in the field of Critical Minerals, Sustainable Development, Global Change and Geoenergy, at the IGME (Spanish Geological and Mining Institute). A total of 73 B2B meetings were scheduled between representatives of the participating leading companies and IGME scientific staff.

B2B meetings at the networking day at IGME-CSIC

Relations and collaboration with large entities throughout Spain such as Mercadona, Soria Natural, Deloitte, KPMG, Real Fábrica de Tapices, etc. were intensified, promoting initiatives to bring the needs of the market and public administrations closer to the CSIC know-how and technologies.

NEXOFY CHALLENGE PLATFORM

Start of the design and development of Nexofy, a digital platform for public-private collaboration and matching in innovation and corporate social responsibility, which will allow companies to share the challenges and needs they face, to which CSIC research staff can provide solutions.

ECOSYSTEM ACTIVITY

The FGCSIC aims to increase its presence in innovation and entrepreneurship ecosystems and contribute to expanding and strengthening relations between the different constituent actors. Actions taken in 2022:

PARTICIPATION IN BUSINESS FORUMS AND GROUPINGS

Renewal of the agreement between the **FGCSIC and CEIM** Confederación Empresarial de Madrid-CEOE to promote public-private collaboration in matters related to R&D+i and digitalisation; Maintenance of the agreement signed with the Fundación CEOE to promote science-business rapprochement; Active participation in the innovation committees of the CEOE, both of its national employers' association and its regional federations; Collaboration with the Madrid Chamber of Commerce; Attendance at Transfiere, the European forum for science, technology and innovation, and at South Summit; Joining the Forum of Innovative Companies (Spanish acronym FEI).

Signing of the agreement between FGCSIC and CEIM Confederación Empresarial de Madrid-CEOE.

Nexofy matching tool logo.

GAIA-X

Participation of the FGCSIC, as a member, in the constituent assembly of the **GAIA-X Spain**, association, a European initiative that aims to create a single, open and secure data infrastructure, complying with the highest standards of digital sovereignty while promoting innovation.

SUPPORT TO FGCSIC TRUSTEES AND OTHER KEY ACTORS

Support for the CSIC in the organisation and dissemination of some of its institutional activities, such as the 41st edition of the event *'Carrera de la Ciencia'*; the Strategic Management Seminars; the 2nd meeting event 'Encuentro del CSIC', which gathered together more than 1,200 CSIC workers to review recent milestones and discuss future challenges; the organisation of two major conferences together with its patron, the Fundación Ramón Areces. Also, the FGCSIC was selected by the Madrid City Council to carry out the integral management of the evaluation and selection of the second edition of the Margarita Salas Research Awards, which reward the best doctoral theses in the Comunidad de Madrid.

INVESTMENT ACTIVITY

The FGCSIC aims to act as an early investor in results, projects and start-ups from the CSIC or its environment that require proof of concept or are at pre-seed, seed or launch level. To this end, it is working on the following actions:

INVESTMENT FUND MANAGER AND INVESTMENT VEHICLE

Significant progress has been made in establishing an investment fund management company called FGCSIC Science Tech. Its main objective is to facilitate technology transfer by ensuring the necessary financial, human and management resources to accompany the selected investment projects during their developmental phase until they are consolidated as independent and stable companies in the market.

IDENTIFICATION OF CO-INVESTORS

Partnership with industry funding is being sought in order to fast-track the market entry of funded companies.

BUSINESS PLAN STUDIES

The FGCSIC provides legal and financial advice to various business initiatives already underway in which the CSIC is involved, such as the companies Marsi Bionics, Avanther Therapeutics and Sustfibres.

COMMERCIAL EXPLOITATION

In 2022, the FGCSIC worked closely with the CSIC on the study of technology franchises for the development of a model for a Technology Innovation Promotion Agreement between the CSIC and interested private entities. In this arrangement, the FGCSIC would play a key role as a promoter of CSIC assets in the market transfer system.

OTHER STRATEGIC PROJECTS

The FGCSIC is working on other major projects that integrate actions from all the areas described above:

DATOS DE VIDA

This initiative explores how the autonomous and active life of the ageing elderly population can be prolonged by using data collected transparently and non-invasively during their daily activities. Through the application of advanced technologies of architectural space sensing and artificial intelligence, this project aims to create a data space that respects the sovereignty, security and privacy of older people. In 2022, a **significant private financial contribution** has been committed to this goal.

'Datos de Vida' project on ageing.

PLATFORM FOR ADVANCED THERAPIES

The FGCSIC has continued to work together with the CSIC to set up a public-private alliance for the incorporation and coordination of essential public and private agents to create a platform for advanced therapies in Madrid.

ANNEXES

ACRONYM	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
CAB	Astrobiology Centre	Joint	Ctra. de Ajalvir, Km. 4	28850	Torrejón de Ardoz	Madrid	91 520 64 33	http://www.cab.inta-csic.es	direccion.cab@csic.es
CABD	Andalusian Centre for Developmental Biology	Joint	Ctra. De Utrera Km.1	41013	Sevilla	Sevilla	954 97 79 11	http://www.cabd.es	direccion.cabd@csic.es
CABIMER	Andalusian Centre of Molecular Biology and Regenerative Medicine	Joint	Avda. Américo Vespucio, S/N. Isla de la Cartuja	41092	Sevilla	Sevilla	954 46 80 04	http://www.cabimer.es	direccion.cabimer@csic.es
CAR	Centre for Automation and Robotics	Joint	Ctra. de Campo Real Km 0,200 La Poveda	28500	Arganda del Rey	Madrid	91 871 19 00	https://www.car.upm-csic.es	direccion.car@csic.es
CBM	Severo Ochoa Molecular Biology Centre	Joint	C/ Nicolás Cabrera, 1 Campus Cantoblanco UAM	28049	Madrid	Madrid	91 196 44 01	http://www.cbm.csic.es	direccion.cbm@csic.es
CEAB	Centre for Advanced Studies in Blanes	Own	C/ D'acces a la Cala St. Francesc, 14	17300	Blanes	Girona	972 33 61 01/02	http://www.ceab.csic.es/	direccion.ceab@csic.es
CEBAS	Centre for Edaphology and Applied Biology of the Segura Region	Own	Campus Universitario de Espinardo	30100	Murcia	Murcia	968 39 62 00	http://www.cebas.csic.es/	direccion.cebas@csic.es
CENIM	National Metallurgical Research Centre	Own	Avda. Gregorio del Amo Num.8	28040	Madrid	Madrid	91 553 89 00	http://www.cenim.csic.es/	direccion.cenim@csic.es
CFM	Materials Physics Centre	Joint	Pº Manuel de Lardizabal, 5	20018	Donostia-San Sebastián	Guipúzcoa	943 01 87 86	http://cfm.ehu.es/	direccion.cfm@csic.es
CIAL	Food Science Research Institute	Joint	C/ Nicolás Cabrera, 9. Campus de Cantoblanco	28049	Madrid	Madrid	91 001 79 00	http://www.cial.uam-csic.es/	direccion.cial@csic.es
CIB	Margarita Salas Biological Research Centre	Own	C/ Ramiro de Maeztu, 9	28040	Madrid	Madrid	91 837 31 12	http://www.cib.csic.es/	direccion.cib@csic.es
CIDE	Desertification Research Centre	Joint	Ctra. Moncada - Naquera, Km. 4,5	46113	Moncada	Valencia / València	96 342 41 62	http://www.uv.es/cide/	direccion.cide@csic.es
CINC	Cajal International Neuroscience Centre	Own			Alcalá de Henares	Madrid		https://www.cinc.csic.es/es/	
CINN	Nanomaterials and Nanotechnology Research Centre	Joint	Avda. de la Vega 4-6. El Entrego	33940	San Martín del Rey Aurelio	Asturias	985 73 36 44	https://cinn.es	direccion.cinn@csic.es
CNB	National Biotechnology Centre	Own	C/ Darwin, 3. Campus Cantoblanco UAM	28049	Madrid	Madrid	91 585 45 00	http://www.cnb.csic.es/	direccion.cnb@csic.es
CRAG	Agrigenomics Research Centre	Associated	Campus de la Universidad Autónoma de Barcelona. C/ de La Vall Moronta, Edifici Crag.	8193	Cerdanyola del Vallès	Barcelona	93 400 61 00/02	https://www.cragenomica.es	direccion.crag@csic.es
CREAF	Centre for Ecological Research and Forestry Applications	Joint	Edificio C Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 581 13 12	https://www.creaf.es	direccion.creaf@csic.es

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EBD	Doñana Biological Station	Own	Avda. Américo Vespucio Nº 26. Isla de La Cartuja	41092	Sevilla	Sevilla	954 23 23 40/95 446 67 00	http://www.ebd.csic.es/	direccion.ebd@csic.es
EEA	School of Arab Studies	Own	Cuesta del Chapiz, 22	18010	Granada	Granada	958 22 22 90/34 59	http://www.eea.csic.es/	direccion.eea@csic.es
EEAD	Aula Dei Experimental Station	Own	Avda. Montañana, 1005	50059	Zaragoza	Zaragoza	976 71 61 00	http://www.eead.csic.es/	direccion.eead@csic.es
EEHAR	Spanish School of History and Archaeology	Own	Vía di Santa Eufemia, 13	187	Roma	No Consta	+00 (39) 06 68 10 00 01	http://www.eehar.csic.es	direccion.eehar@csic.es
EEZ	Zaidín Experimental Station	Own	C/ Profesor Albareda, 1	18008	Granada	Granada	958 18 16 00	http://www.eez.csic.es/	direccion.eez@csic.es
EEZA	Experimental Station of Arid Zones	Own	Ctra. de Sacramento S/N	4120	La Cañada de San Urbano	Almería	950 28 10 45	http://www.eeza.csic.es/	direccion.eeza@csic.es
GEO3BCN	Geosciences Barcelona	Own	C/ Luis Sole i Sabaris, S/N	8028	Barcelona	Barcelona	93 409 54 10	https://geo3bcn.csic.es	direccion.geo3bcn@csic.es
I2SYSBIO	Institute of Integrative Systems Biology	Joint	C/ Catedrático José Beltrán, 2	46980	Paterna	Valencia / València	963 544 810 / 963 544 782	https://www.uv.es/	direccion.i2sysbio@csic.es
I3M	Institute of Instrumentation for Molecular Imaging	Joint	Camino de Vera S/N Edificio 8B Acceso N, 1ª Planta	46022	Valencia	Valencia / València	96 387 99 07	https://www.i3m.upv.es	direccion.i3m@csic.es
IAA	Institute of Astrophysics of Andalusia	Own	Glorieta de la Astronomía S/N	18008	Granada	Granada	958 12 13 11	http://www.iaa.csic.es	direccion.iaa@csic.es
IACT	Andalusian Institute of Earth Sciences	Joint	Avenida de Las Palmeras Nº 4	18100	Armilla	Granada	958 23 00 00	https://www.iact.ugr-csic.es/	direccion.iact@csic.es
IAE	Institute of Economic Analysis	Own	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 580 66 12	http://www.iae.csic.es/	direccion.iae@csic.es
IAM	Institute of Archaeology-Merida	Joint	Plaza de España, 15	6800	Mérida	Badajoz	924 31 56 61	http://www.iam.csic.es	direccion.iam@csic.es
IAS	Institute of Sustainable Agriculture	Own	Alameda del Obispo, S/N	14004	Córdoba	Córdoba	957 49 92 00/01 02	http://www.ias.csic.es/	direccion.ias@csic.es
IATA	Institute of Agrochemistry and Food Technology	Own	Avda. Catedrático Agustín Escardino Benlloch, 7	46980	Paterna	Valencia / València	96 390 00 22	http://www.iata.csic.es/	direccion.iata@csic.es
IATS	Institute of Aquaculture Torre de la Sal	Own	C/ Torre de la Sal, S/N	12595	Cabanes	Castellón / Castelló de La Plana	964 31 95 00	http://www.iats.csic.es/	direccion.iats@csic.es
IBB	Botanical Institute of Barcelona	Joint	Passeig Migdia, S/N. Parque de Montjuic	8038	Barcelona	Barcelona	93 289 06 11	https://www.ibb.csic.es/es/	direccion.ibb@csic.es
IBBTEC	Institute of Biomedicine and Biotechnology of Cantabria	Joint	C/Albert Einstein, 22. Parque Científico y Tecnológico de Cantabria	39011	Santander	Cantabria	942 20 39 30	https://web.unican.es/ibbtec/es-es	direccion.ibbtec@csic.es
IBE	Institute of Evolutionary Biology	Joint	Passeig Maritim de la Barceloneta, 37	8003	Barcelona	Barcelona	93 230 95 07	http://www.ibe.upf-csic.es	direccion.ibe@csic.es
IBF	Biophysics Institute	Joint	Parque Científico de la UPV/EHU, Barrio de Sarriena S/N	48940	Leioa	Vizcaya	94 601 26 25	http://biofisika.org	direccion.ibf@csic.es
IBFG	Institute of Functional Biology and Genomics	Joint	Zacarias González, 2	37007	Salamanca	Salamanca	923 29 49 00	http://ibfg.usal-csic.es	direccion.ibfg@csic.es

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IBGM	and Genetics	Joint	C/ Sanz y Fores, S/N	47003	Valladolid	Valladolid	983 18 48 01	http://www.ibgm.med.uva.es/	direccion.ibgm@csic.es
IBIS	Seville Institute of Biomedicine	Joint	Avda. Manuel Siurot S/N Campus del Hospital Universitario Virgen del Rocío	41013	Sevilla	Sevilla	95 592 30 00	http://www.ibis-sevilla.es	direccion.ibis@csic.es
IBMB	Barcelona Institute of Molecular Biology	Own	C/ Baldiri Reixac, 4	8028	Barcelona	Barcelona	93 403 46 68	http://www.ibmb.csic.es/	direccion.ibmb@csic.es
IBMCC	Institute of Molecular and Cellular Biology of Cancer of Salamanca	Joint	Campus Miguel de Unamuno	37007	Salamanca	Salamanca	923 29 47 20	http://www.cicancer.org/	direccion.ibmcc@csic.es
IBMCP	Primo Yufera Institute of Molecular and Cellular Biology of Plants	Joint	Ingeniero Fausto Elio, S/N. UPV-Ciudad Politécnica de la Innovación	46022	Valencia	Valencia / València	96 387 78 56	http://www.ibmcp.csic.es	direccion.ibmcp@csic.es
IBV	Institute of Biomedicine of Valencia	Own	C/ Jaime Roig, 11	46010	Valencia	Valencia / València	96 339 17 60	http://www.ibv.csic.es	direccion.ibv@csic.es
IBVF	Institute of Plant Biochemistry and Photosynthesis	Joint	Avda. Américo Vespucio, S/N. Isla de La Cartuja	41092	Sevilla	Sevilla	95 448 95 06	https://www.ibvf.us-csic.es	direccion.ibvf@csic.es
IC	Cajal Institute	Own	Avda. Doctor Arce, 37	28002	Madrid	Madrid	91 585 47 49/50	http://www.cajal.csic.es/	direccion.ic@csic.es
ICA	Institute of Agricultural Sciences	Own	C/ Serrano, 115 Bis	28006	Madrid	Madrid	91 745 25 00	http://www.ica.csic.es/	direccion.ica@csic.es
ICB	Institute of Carbochemistry	Own	C/ Miguel Luesma Castan, 4	50015	Zaragoza	Zaragoza	976 73 39 77	http://www.icb.csic.es/	direccion.icb@csic.es
ICE	Institute of Space Sciences	Own	Carrer de Can Magrans S/N, Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 737 97 88	http://www.ice.csic.es	direccion.ice@csic.es
ICM	Institute of Marine Sciences	Own	Passeig Maritim, 37-49	8003	Barcelona	Barcelona	93 230 95 00	https://www.icm.csic.es/es	direccion.icm@csic.es
ICMAB	Materials Science Institute of Barcelona	Own	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 580 18 53	http://www.icmab.csic.es	direccion.icmab@csic.es
ICMAN	Andalusian Institute of Marine Sciences	Own	Campus Río San Pedro	11519	Puerto Real	Cádiz	956 83 26 12	http://www.icman.csic.es/	direccion.icman@csic.es
ICMAT	Institute of Mathematical Sciences	Joint	C/ Nicolás Cabrera, 13-15 Campus Cantoblanco UAM	28049	Madrid	Madrid	91 29 99 704	http://www.icmat.es	direccion.icmat@csic.es
ICMM	Materials Science Institute of Madrid	Own	C/ Sor Juana Inés de la Cruz, 3. Campus Cantoblanco UAM	28049	Madrid	Madrid	91 334 90 00	http://www.icmm.csic.es/	direccion.icmm@csic.es
ICMS	Materials Science Institute of Seville	Joint	Avda. Américo Vespucio, S/N. Isla de La Cartuja	41092	Sevilla	Sevilla	95 448 95 27	http://www.icms.us-csic.es	direccion.icms@csic.es
ICN2	Centre for Research in Nanoscience and Nanotechnology	Associated	Campus Universidad Autónoma de Barcelona (Bellaterra)	08193	Cerdanyola del Vallès	Barcelona	93 737 26 49	https://icn2.cat/en/	
ICP	Institute of Catalysis and Petrochemistry	Own	C/ Marie Curie, 2 Campus de Cantoblanco	28049	Madrid	Madrid	91 585 48 00	https://icp.csic.es	direccion.icp@csic.es

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ICTAN	Technology and Nutrition	Own	C/ José Antonio Novais, 10	28040	Madrid	Madrid	91 549 23 00	http://www.ictan.csic.es	direccion.ictan@csic.es
ICTP	Institute of Polymer Science and Technology	Own	C/ Juan de la Cierva, 3	28006	Madrid	Madrid	91 562 29 00	http://www.ictp.csic.es/	direccion.ictp@csic.es
ICV	Institute of Ceramics and Glass	Own	C/ Kelsen,5. Campus de Cantoblanco	28049	Madrid	Madrid	91 735 58 40	https://www.icv.csic.es	direccion.icv@csic.es
ICVV	Institute of Vine and Wine Science	Joint	Apdo. Postal Nº 1.042. 26080 Logroño. Finca La Grajera. Ctra. de Burgos Km. 6 (LO-20, Salida 13)	26007	Logroño	Rioja (La)	941 89 49 80	https://www.icvv.es	direccion.icvv@csic.es
IDAB	Institute of Agrobiotechnology	Joint	Avda. de Pamplona, 123 Mutilva	31192	Aranguren	Navarra	948 16 80 00	https://www.idab.csic.es/	direccion.idab@csic.es
IDAEA	Institute for Environmental Diagnostics and Water Studies	Own	C/ Jorge Girona Salgado, 18-26	8034	Barcelona	Barcelona	93 400 61 00	http://www.idaea.csic.es	direccion.idaea@csic.es
IEGD	Institute of Economics, Geography and Demography	Own	C/ Albasanz, 26-28. 3ª Modulo F	28037	Madrid	Madrid	91 602 23 00	http://www.iegd.csic.es/	direccion.iegd@csic.es
IEGPS	Institute of Galician Studies Padre Sarmiento	Joint	Rua de San Roque, 2	15704	Santiago de Compostela	Coruña (A)	981 54 02 20/23	http://www.iegps.csic.es/	direccion.iegps@csic.es
IEM	Institute for the Structure of Matter	Own	C/ Serrano, 113bis, 119, 121 y 123	28006	Madrid	Madrid	91 561 68 00	http://www.iem.csic.es	direccion.iem@csic.es
IEO	Spanish Institute of Oceanography	Own	C/ Del Corazón de María, 8	28002	Madrid	Madrid	913421100	https://www.ieo.es/es/	director@ieo.csic.es
COAC-IEO	A Coruña Oceanographic Centre	Own	Paseo Marítimo Alcalde Francisco Vázquez, 10	15001	Coruña (A)	Coruña (A)	981 21 81 51	https://www.ieo.es/es/web/coruna/	ieo.coruna@ieo.csic.es
COB-IEO	Illes Balears Oceanographic Centre	Own	Muelle de Poniente, S/N.	07015	Palma de Mallorca	Balears (Illes)	971 133 720	http://www.ieo.es/baleares	cob@ieo.csic.es
COC-IEO	Oceanographic Centre of the Canary Islands	Own	La Farola del Mar 22, Dársena Pesquera 1. Parcela 8	38180	Santa Cruz de Tenerife	Sta. Cruz de Tenerife	922 549 400	https://www.ieo.es/es/web/canarias/	ieo.canarias@ieo.csic.es
COCAD-IEO	Oceanographic Centre of Cádiz	Own	Puerto Pesquero, Muelle de Levante, S/N.	11006	Cádiz	Cádiz	956 294 189	https://www.ieo.es/es/web/cadiz/	contacto.cadiz@ieo.es
COG-IEO	Gijón Oceanographic Centre	Own	Avda. Príncipe de Asturias, 70 Bis	33212	Gijón	Asturias	985 309 780	http://www.ieo.es/gijon	ieogijon@ieo.csic.es
COMA-IEO	Oceanographic Centre of Malaga	Own	Puerto Pesquero, S/N.	29640	Fuengirola	Málaga	95 2197124	http://www.ieo.es/malaga	ieomalaga@ieo.csic.es
COMU-IEO	Murcia Oceanographic Centre	Own	Varadero, 1. Lo Pagan	30740	San Pedro del Pinatar	Murcia	968 179 410	http://www.ieo.es/murcia	web.murcia@ieo.csic.es
COST-IEO	Santander Oceanographic Centre	Own	Promontorio de San Martín S/N.	39080	Santander	Cantabria	942 291 716	http://www.ieo.es/santander	ieosantander@ieo.csic.es
COV-IEO	Vigo Oceanographic Centre	Own	Subida a Radio Faro, 50-52	36390	Vigo	Pontevedra	986 492 111	http://www.ieo.es/vigo	ieo.vigo@ieo.csic.es
IESA	Institute of Advanced Social Studies	Own	Pz. Campo Santo de los Mártires, 7	14004	Córdoba	Córdoba	957 76 06 25/27	http://www.iesa.csic.es	direccion.iesa@csic.es

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IETCC	Construction Sciences	Own	C/ Serrano Galvache, 4	28033	Madrid	Madrid	91 302 04 40	http://www.ietcc.csic.es/	direccion.ietcc@csic.es
IFCA	Physics Institute of Cantabria	Joint	Edificio Juan Jordá. Avda. de los Castros S/N	39005	Santander	Cantabria	942 20 14 59	https://ifca.unican.es	direccion.ifca@csic.es
IFF	Institute of Fundamental Physics	Own	C/ Serrano, 113bis y 123	28006	Madrid	Madrid	91 561 68 00/ 590 16 19	http://www.iff.csic.es/	direccion.iff@csic.es
IFIC	Institute of Corpuscular Physics	Joint	C/ Catedrático José Beltrán Martínez, 2	46980	Paterna	Valencia / València	96 354 34 73	http://ific.uv.es/	direccion.ific@csic.es
IFISC	Institute of Interdisciplinary Physics and Complex Systems	Joint	Campus Universitat Illes Balears	07122	Palma de Mallorca	Balears (Illes)	971 17 32 90	http://ifisc.uib-csic.es	direccion.ifisc@csic.es
IFS	Institute of Philosophy	Own	C/ Albasanz, 26-28. 3ª Modulo C	28037	Madrid	Madrid	91 602 23 00	https://ifs.csic.es/es	direccion.ifs@csic.es
IFT	Institute of Theoretical Physics	Joint	C/ Nicolás Cabrera, 13-15 Campus Cantoblanco UAM	28049	Madrid	Madrid	91 299 98 00/02	http://www.ift.uam-csic.es	direccion.ift@csic.es
IG	Institute of Fat	Own	Universidad Pablo de Olavide Edificio 46 Ctra. de Utrera Km 1	41013	Sevilla	Sevilla	954 61 15 50	https://www.ig.csic.es/es/	direccion.ig@csic.es
IGEO	Institute of Geosciences	Joint	C/ Severo Ochoa 7, 4ª Planta	28040	Madrid	Madrid	91 394 48 13	http://www.igeo.ucm-csic.es/	direccion.igeo@csic.es
IGM	Institute of Mountain Livestock	Joint	Ctra. León-Vega de Infanzones (Finca Marzanas-Grulleros)	24346	Vega de Infanzones	León	987 31 70 64 / 71 56	http://www.igm.ule-csic.es/	direccion.igm@csic.es
IGME	Geological and Mining Institute of Spain	Own	C/ Ríos Rosas, 23	28003	Madrid	Madrid	913495700	http://www.igme.es/	
	Almeria Territorial Unit		Ctra. de Sacramento, s/n La Cañada de San Urbano	04120	Almería	Almería	950 281 045		almeria@igme.es
	Córdoba-Peñarroya Territorial Unit		Ctra. Estación, s/n Polígono LA PAPELERA	14200	Peñarroya	Córdoba	957 562 511		litoteca@igme.es
	Granada Territorial Unit		Urb. Alcázar del Genil, 4 Edif. Zulema, Bajo y 1ºC	18006	Granada	Granada	958 183 143		granada@igme.es
	Las Palmas de Gran Canaria Territorial Unit		C/ Alonso Alvarado, 43 - 2ºA	35003	Las Palmas de Gran Canaria	Las Palmas de Gran Canaria	928 366 575 - 928 381 046		canarias@igme.es
	León Territorial Unit		Parque Científico de León Avda. Real, 1. Edificio 1	24006	León	León	987 262 171 - 987 262 182		leon@igme.es
	Murcia Territorial Unit		Avda. Miguel de Cervantes, 45 – 5º A Edificio Expo Murcia	30009	Murcia	Murcia	968 245 012		murcia@igme.es
	Oviedo Territorial Unit		C/ Matemático Pedrayes, 25	33005	Oviedo	Oviedo	985 258 611 - 985 258 656		oviedo@igme.es
	Palma de Mallorca Territorial Unit		Administración Periférica del Estado Carrer de Felicià Fuster, 7	07006	Palma de Mallorca	Palma de Mallorca	971 467 020 - 971 460 011		mallorca@igme.es
	Salamanca Territorial Unit		Plaza de la Constitución, 1 - Planta 3ª	37001	Salamanca	Salamanca	923 265 009		salamanca@igme.es

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	Seville Territorial Unit		Subdelegación de Gobierno Pza. de España - Torre Norte	41013	Sevilla	Sevilla	954 236 611 - 954 236 677		sevilla@igme.es
	Valencia Territorial Unit		C/ Cirilo Amorós, 42 – Entreplanta	46004	Valencia	Valencia	963 943 474		valencia@igme.es
	Territorial Unit Zaragoza		Residencia CSIC Campus Aula Dei Av. Montañana 1005	50059	Zaragoza	Zaragoza	976 555 153 - 976 555 282		zaragoza@igme.es
IH	Institute of History	Own	C/ Albasanz, 26-28 - 2ª Planta	28037	Madrid	Madrid	91 602 23 00	https://ih.csic.es/es	direccion.ih@csic.es
IHSM	Institute of Subtropical and Mediterranean Horticulture La Mayora	Joint	Algarrobo-Costa	29750	Algarrobo	Málaga	95 254 89 90	http://www.ihsm.uma-csic.es/	direccion.ihsm@csic.es
IIBB	Biomedical Research Institute of Barcelona	Own	C/ Rosellón, 161. 6 y 7 Planta	8036	Barcelona	Barcelona	93 363 83 00/25	http://www.iibb.csic.es	direccion.iibb@csic.es
IIBM	Alberto Sols Biomedical Research Institute	Joint	C/ Arturo Duperier, 4	28029	Madrid	Madrid	91 585 44 00/43 95/94	http://www.iib.csic.es	direccion.iibm@csic.es
IIIA	Artificial Intelligence Research Institute	Own	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 580 95 70	http://www.iiia.csic.es/	direccion.iiia@csic.es
IIM	Marine Research Institute	Own	C/ Eduardo Cabello, 6	36208	Vigo	Pontevedra	986 23 19 30	http://www.iim.csic.es/	direccion.iim@csic.es
IIQ	Institute for Chemical Research	Joint	Avda. Américo Vespucio, 49. Isla de La Cartuja	41092	Sevilla	Sevilla	95 448 95 53	http://www.iiq.csic.es	direccion.iiq@csic.es
ILC	Institute for Languages and Cultures of the Mediterranean and the Near East	Own	C/ Albasanz, 26-28 - 1ª Planta	28037	Madrid	Madrid	91 602 23 00	https://ilc.csic.es/es	direccion.ilc@csic.es
ILLA	Institute of Language, Literature and Anthropology	Own	C/ Albasanz, 26-28 - 1ª Planta	28037	Madrid	Madrid	91 602 23 00	https://illa.csic.es/es	direccion.illa@csic.es
IMB-CNM	Barcelona Institute of Microelectronics	Own	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 594 77 00	http://www.imb-cnm.csic.es	direccion.imb-cnm@csic.es
IMEDEA	Mediterranean Institute for Advanced Studies	Joint	C/ Miquel Marqués, Nº 21	7190	Esporles	Balears (Illes)	971 61 18 18	http://www.imedea.uib-csic.es	direccion.imedea@csic.es
IMF	Mila y Fontanals Humanities Research Institution	Own	C/ Egipciacas, 15	8001	Barcelona	Barcelona	93 442 34 89	http://www.imf.csic.es/	direccion.imf@csic.es
IMIB	Joint Institute for Biodiversity Research	Joint	Calle Gonzalo Gutiérrez Quirós 1	33600	Mieres	Asturias	985 10 30 00	https://www.unioviedo.es/IMIB/	direccion.imib@csic.es
IMN-CNM	Institute of Micro and Nanotechnology	Own	C/ Isaac Newton, 8	28760	Tres Cantos	Madrid	91 806 07 00	http://www.imm-cnm.csic.es	direccion.imn-cnm@csic.es
IMSE,CNM	Seville Microelectronics Institute	Joint	Avda. Américo Vespucio, Nª 28. Isla de La Cartuja	41092	Sevilla	Sevilla	95 446 66 66	http://www.imse-cnm.csic.es	direccion.ims-cnm@csic.es
IN	Institute of Neurosciences	Joint	Avda. D. Santiago Ramón y Cajal S/N	3550	Sant Joan D'Alacant	Alicante / Alacant	96 523 37 00	https://in.umh-csic.es/es/	direccion.in@csic.es

ACRONYM		OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
INCAR	and Technology	Own	C/ Francisco Pintado Fe, 26	33011	Oviedo	Asturias	98 511 90 90	http://www.incar.csic.es/	direccion.incar@csic.es
INCIPIT	Institute for Heritage Sciences	Own	Avda. de Vigo S/N	15705	Santiago de Compostela	Coruña (A)	981 590 962	www.incipit.csic.es	direccion.incipit@csic.es
INGENIO	Institute for Innovation and Knowledge Management	Joint	Campus UPV. Camino de Vera S/N Edificio 8E	46022	Valencia	Valencia / València	96 387 70 48	http://www.ingenio.upv.es/	direccion.ingenio@csic.es
INIA	National Institute of Agricultural and Food Research and Technology	Own	Crta. de La Coruña, Km 7,5	28040	Madrid	Madrid	913473900	http://www.inia.es/	
CBGP-INIA	Plant Biotechnology and Genomics Centre	Joint	Parque Científico y Tecnológico, UPM Campus de Montegancedo, Ctra. M-40, Km 38	28233	Pozuelo de Alarcón	Madrid	913364539	https://www.cbgp.upm.es	
CISA-INIA	Animal Health Research Centre	Own	Carretera Algete-El Casar de Talamanca, Km. 8,1	28130	Valdeolmos	Madrid	916 20 23 00	https://www.inia.es/	
ICIFOR-INIA	Institute of Forestry Sciences	Own	Ctra. de La Coruña Km. 7	28040	Madrid	Madrid	91 347 6780	https://www.inia.es/	
INMA	Institute of Nanoscience and Materials of Aragon	Joint	Facultad de Ciencias. C/Pedro Cerbuna,12	50009	Zaragoza	Zaragoza	976 76 28 61	https://inma.unizar-csic.es/	direccion.inma@csic.es
IO	Daza de Valdes Optics Institute	Own	C/ Serrano, 121	28006	Madrid	Madrid	91 561 68 00	http://www.io.csic.es	direccion.io@csic.es
IPBLN	Lopez Neyra Institute of Parasitology and Biomedicine	Own	Avd. del Conocimiento, S/N	18100	Armilla	Granada	958 18 16 21/28/26	https://www.ipb.csic.es/	direccion.ipbln@csic.es
IPE	Pyrenean Institute of Ecology	Own	Avd. Montañana, S/N	50016	Zaragoza	Zaragoza	976 36 93 93	http://www.ipe.csic.es/	direccion.ipe@csic.es
IPLA	Institute of Dairy Products of Asturias	Own	Pº Río Linares S/N	33300	Villaviciosa	Asturias	98 589 21 31	http://www.ipla.csic.es/	direccion.ipla@csic.es
IPNA	Institute of Natural Products and Agrobiology	Own	Avda. Astrofísico Francisco Sánchez, 3	38205	San Cristóbal de La Laguna	Sta. Cruz de Tenerife	922 25 21 44/32 48	http://www.ipna.csic.es/	direccion.ipna@csic.es
IPP	Institute of Public Goods and Policies	Own	C/ Albasanz, 26-28, 3ª Modulo D	28037	Madrid	Madrid	91 602 23 00	https://ipp.csic.es/es	direccion.ipp@csic.es
IQAC	Institute of Advanced Chemistry of Catalonia	Own	C/ Jorge Girona Salgado, 18-26	8034	Barcelona	Barcelona	93 400 61 00/02	http://www.iqac.csic.es	direccion.iqac@csic.es
IQFR	Institute of Physical Chemistry Rocasolano	Own	C/ Serrano, 119	28006	Madrid	Madrid	91 561 94 00 / 91 585 52 47/49	http://www.iqfr.csic.es/	direccion.iqfr@csic.es
IQM	Institute of Medicinal Chemistry	Own	C/ Juan de la Cierva, 3	28006	Madrid	Madrid	91 562 29 00	http://www.iqm.csic.es/	direccion.iqm@csic.es
IQOG	Institute of General Organic Chemistry	Own	C/ Juan de la Cierva, 3	28006	Madrid	Madrid	91 562 29 00	http://www.iqog.csic.es	direccion.iqog@csic.es
IREC	Hunting Resources Research Institute	Joint	Ronda de Toledo, S/N	13005	Ciudad Real	Ciudad Real	926 29 54 50	https://www.irec.es	direccion.irec@csic.es
IRII	Institute of Robotics and Industrial Informatics	Joint	C/ Llorens i Artigues, 4-6, 2º - Edificio U	8028	Barcelona	Barcelona	93 401 57 51	https://www.iri.upc.edu	direccion.irii@csic.es
IRNAS	Institute of Natural Resources and Agrobiology of Seville	Own	Avda. Reina Mercedes, 10	41012	Sevilla	Sevilla	95 462 47 11	https://www.irnas.csic.es	direccion.irnas@csic.es

ACRONYM		OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
IRNASA	and Agrobiology of Salamanca	Own	C/ Cordel de Merinas, 42-54	37008	Salamanca	Salamanca	923 21 96 06	http://www.irnasa.csic.es/	direccion.irnasa@csic.es
ISQCH	Institute of Chemical Synthesis and Homogeneous Catalysis	Joint	Facultad de Ciencias. C/ Pedro Cerbuna, 12. 50009 Zaragoza	50009	Zaragoza	Zaragoza	976 76 12 31/10 00	http://www.isqch.unizar-csic.es	direccion.isqch@csic.es
ITEFI	Leonardo Torres Quevedo Institute of Physical and Information Technologies	Own	C/ Serrano, 144	28006	Madrid	Madrid	91 561 88 06	http://www.itefi.csic.es/es	direccion.itefi@csic.es
ITQ	Institute of Chemical Technology	Joint	Campus UPV. Avda. de Los Naranjos S/N. Edifico 6c	46022	Valencia	Valencia / València	96 387 78 00	http://itq.upv-csic.es/	direccion.itq@csic.es
MBG	Biological Mission of Galicia	Own	Palacio de Salcedo. Carballeira, 8 (Salcedo)	36143	Pontevedra	Pontevedra	986 85 48 00	http://www.mbg.csic.es/	direccion.mbg@csic.es
MNCN	National Museum of Natural Sciences	Own	C/ José Gutiérrez Abascal, 2	28006	Madrid	Madrid	91 411 13 28	http://www.mncn.csic.es/	direccion.mncn@csic.es
OE	Ebro Observatory	Joint	C/ Horta Alta, 38	43520	Roquetes	Tarragona	977 50 05 11	http://www.obsebre.es	direccion.oe@csic.es
RJB	Royal Botanical Garden	Own	Plaza de Murillo, 2	28014	Madrid	Madrid	91 420 30 17	http://www.rjb.csic.es/	direccion.rjb@csic.es

SERVIC TRES

ACRONYM	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
CCHS	Centre for Human and Social Sciences	Own	C/ Albasanz, 26-28 Planta Baja	28037	Madrid	Madrid	91 602 23 00	http://www.cchs.csic.es/	direccion.cchs@csic.es
CENQUIOR	Lora Tamayo Organic Chemistry Centre	Own	C/ Juan de La Cierva, 3	28006	Madrid	Madrid	91 562 29 00	http://www.cenquior.csic.es/	direccion.cenquior@csic.es
CEQMA	Aragon Chemistry and Materials Centre	Joint	Facultad de Ciencias. C/ Pedro Cerbuna, 12. 50009 Zaragoza		Zaragoza	Zaragoza	976 76 12 31 / 10 00		direccion.ceqma@csic.es
CFMAC	Miguel A. Catalan Physics Centre	Own	C/ Serrano, 121	28006	Madrid	Madrid	91 561 68 00	http://www.cfmac.csic.es/	direccion.cfmac@csic.es
CFTMAT	Centre Ffor Theoretical Physics And Mathematics	Joint	C/ Nicolas Cabrera 13-15 - Campus Cantoblanco UAM	28049	Madrid	Madrid		https://www.ift.uam-csic.es/	direccion.cftmat@csic.es
CI2A	Alcala Interdisciplinary Research Centre	Own			Alcalá de Henares	Madrid			
CICCARTUJA	Isla de La Cartuja Scientific Research Centre	Joint	Avda. Américo Vespucio, S/N. Isla de La Cartuja	41092	Sevilla	Sevilla	954 48 95 01	http://www.ciccartuja.es/	direccion.cicic@csic.es
CID	Centre for Research and Development Pascual Vila	Own	C/ Jorge Girona Salgado, 18-26	8034	Barcelona	Barcelona	93 400 61 00	http://www.cid.csic.es/	direccion.cid@csic.es
CMIMA	Mediterranean Marine and Environmental Research Centre	Own	Passeig Maritim, 37-49	8003	Barcelona	Barcelona	93 230 95 00	http://www.cmima.csic.es/	icmdir@icm.csic.es

SPECIALISED TECHNICAL UNITS

ACRONYM	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
CNA	National Accelerator Centre	Joint	C/ Tomas Alba Edison, 7 Isla de Cartuja	41092	Sevilla	Sevilla	954 46 05 53	http://www.centro.us.es/cna	direccion.cna@csic.es
CRF	Centre for Plant Genetic Resources and Sustainable Agriculture	Own	Autovía A-II, Km 36 Finca La Canaleja	28800	Alcalá de Henares	Madrid	918819261	https://www.inia.es/	
REBIS	Seville Researcher Residence and Library	Own	C/ Alfonso XII, 16	41002	Sevilla	Sevilla	954690110	https://www.rebis.csic.es	gerencia.rebis@csic.es
UTM	Marine Technology Unit	Own	Passeig Maritim, 37-49	8003	Barcelona	Barcelona	93 230 95 00	http://www.utm.csic.es	direccion.utm@csic.es

RESEAR[illegible]TIONAL CENTRES TERRITORIAL HEADQUARTERS AND UNITS BY AUTONOMOUS REGION

ANDALUCÍA

INSTITUTES ● 11 own | ● 9 joint

Terriotorial Headquarters IEO ■ 2 | Territorial Units IGME ▫ 4

ACRO.	NAME	TYPE
EBD	Biological Station of Doñana	Own
EEA	School of Arab Studies	Own
EEZ	Zaidin Experimental Station	Own
EEZA	Experimental Station of Arid Zones	Own
IAA	Institute of Astrophysics of Andalucia	Own
IAS	Institute of Sustainable Agriculture	Own
ICMAN	Institute of Marine Sciences of Andalusia	Own
IESA	Institute of Advanced Social Studies	Own
IG	Institute of Fat	Own
IPBLN	Institute of Parasitology and Biomedicine Lopez Neyra	Own
IRNAS	Institute of Natural Resources and Agrobiology Sevilla	Own
CABD	Andalusian Centre for Developmental Biology	Joint
CABIMER	Andalusian Centre for Molecular Biology and Regenerative Medicine	Joint
IACT	Andalusian Institute of Earth Sciences	Joint
IBIS	Institute of Biomedicine of Seville	Joint
IBVF	Institute of Plant Biochemistry and Photosynthesis	Joint
ICMS	Institute of Materials Science of Seville	Joint
IHSM	Institute of Subtropical and Mediterranean Horticulture of La Mayora	Joint
IIQ	Institute of Chemical Research	Joint
IMSE,CNM	Seville Institute of Microelectronics	Joint
COCAD	Oceanographic Centre of Cádiz-IEO	Own
COMA	Oceanographic Centre of Malaga-IEO	Own
	Seville Territorial Unit-IGME	Own
	Córdoba-Peñarroya Territorial Unit-IGME	Own
	Almeria Territorial Unit-IGME	Own
	Granada Territorial Unit-IGME	Own

ARAGÓN

INSTITUTES ● 3 own | ● 2 joint

Territorial Units IGME ▫ 1

ACRO.	NAME	TYPE
EEAD	Aula Dei Experimental Station	Own
ICB	Institute of Carbochemistry	Own
IPE	Pyrenean Institute of Ecology	Own
INMA	Institute of Nanoscience and Materials of Aragon	Joint
ISQCH	Institute of Chemical Synthesis and Homogeneous Catalysis	Joint
	Territorial Unit Zaragoza-IGME	Own

PRINCIPADO DE ASTURIAS

INSTITUTES ● 2 own | ● 2 joint

Territorial Headquarters IEO ■ 1 | Territorial Units IGME ▫ 1

ACRO.	NAME	TYPE
INCAR	Institute for Carbon Science and Technology	Own
IPLA	Institute of Dairy Products of Asturias	Own
CINN	Centre for Research in Nanomaterials and Nanotechnology	Joint
IMIB	Mixed Institute for Biodiversity Research	Joint
COG	Gijón Oceanographic Centre-IEO	Own
	Oviedo Territorial Unit-IGME	Own

S BALEARS

INSTITUTES ● 2 joint

Territorial Headquarters IEO ■ 1 | Territorial Units IGME ▫ 1

ACRO.	NAME	TYPE
IFISC	Institute of Interdisciplinary Physics and Complex Systems	Joint
IMEDEA	Mediterranean Institute of Advanced Studies	Joint
COB	Illes Balears Oceanographic Centre-IEO	Own
	Palma de Mallorca Territorial Unit-IGME	Own

CANARIAS

INSTITUTES ● 1 own

Territorial Headquarters IEO ■ 1 | Territorial Units IGME ▫ 1

ACRO.	NAME	TYPE
IPNA	Institute of Natural Products and Agrobiology	Own
COC	Oceanographic Centre of The Canary Islands-IEO	Own
	Las Palmas de Gran Canaria Territorial Unit-IGME	Own

CANTABRIA

INSTITUTES ● 2 joint

Territorial Headquarters IEO ■ 1

ACRO.	NAME	TYPE
IBBTEC	Institute of Biomedicine and Biotechnology of Cantabria	Joint
IFCA	Institute of Physics of Cantabria	Joint
COST	Santander Oceanographic Centre-IEO	Own

CASTILLA - LA MANCHA

INSTITUTES ● 1 joint

ACRO.	NAME	TYPE
IREC	Hunting Resources Research Institute	Joint

CASTILLA Y LEÓN

INSTITUTES ● 1 own | ● 4 joint

Territorial Units IGME ▫ 2

ACRO.	NAME	TYPE
IRNASA	Institute for Natural Resources and Agrobiology of Salamanca	Own
IBFG	Institute of Functional Biology and Genomics	Joint
IBGM	Institute of Molecular Biology and Genetics	Joint
IBMCC	Institute of Mol. and Cel. of Cancer of Salamanca	Joint
IGM	Institute of Mountain Livestock	Joint
	Salamanca Territorial Unit-IGME	Own
	León Territorial Unit-IGME	Own

CATALUÑA

INSTITUTES ● 13 own | ● 5 joint | ● 2 associated

ACRO.	NAME	TYPE
CEAB	Centre for Advanced Studies of Blanes	Own
GEO3BCN	Geosciences Barcelona	Own
IAE	Institute For Economic Analysis	Own
IBMB	Institute Of Molecular Biology Of Barcelona	Own
ICE	Institute Of Space Sciences	Own
ICM	Institute Of Marine Sciences	Own
ICMAB	Institute Of Materials Science Of Barcelona	Own
IDAEA	Institute For Environmental Diagnostics And Water Studies	Own
IIBB	Biomedical Research Institute Of Barcelona	Own
IIIA	Institute For Research In Artificial Intelligence	Own
IMB-CNM	Institute Of Microelectronics Of Barcelona	Own
IMF	Mila Y Fontanals Institute For Research In The Humanities	Own
IQAC	Institute Of Advanced Chemistry Of Catalonia	Own
CREAF	Consortium Of The Centre For Ecological Research And Forestry Applications	Joint
IBB	Botanical Institute Of Barcelona	Joint
IBE	Institute Of Evolutionary Biology	Joint
IRII	Institute Of Robotics And Industrial Informatics	Joint
OE	Ebro Observatory	Joint
CRAG	Agrigenomics Research Centre	Associated
ICN2	Instituto Catalán de Nanociencia y Nanotecnología	Associated

REGIÓN DE MURCIA

INSTITUTES ● 1 own

Territorial Headquarters IEO ■ 1 | Territorial Units IGME ▫ 1

ACRO.	NAME	TYPE
CEBAS	Segura Centre for Edaphology and Applied Biology	Own
COMU	Murcia Oceanographic Centre-IEO	Own
	Murcia Territorial Unit-IGME	Own

COMUNIDAD VALENCIANA

INSTITUTES ● 3 own | ● 8 joint

Territorial Units IGME ▫ 1

ACRO.	NAME	TYPE
IATA	Institute of Agrochemistry and Food Technology	Own
IATS	Institute of Aquaculture of Torre de la Sal	Own
IBV	Institute of Biomedicine of Valencia	Own
CIDE	Desertification Research Centre	Joint
I2SYSBIO	Institute of Integrative Systems Biology	Joint
I3M	Institute of Instrumentation for Molecular Imaging	Joint
IBMCP	Institute of Mol. y Cel. of Plants Primo Yufera	Joint
IFIC	Institute of Corpuscular Physics	Joint
IN	Institute of Neurosciences	Joint
INGENIO	Institute of Innovation and Knowledge Management	Joint
ITQ	Institute of Chemical Technology	Joint
	Valencia Territorial Unit-IGME	Own

EXTREMADURA

INSTITUTES ● 1 joint

ACRO.	NAME	TYPE
IAM	Institute Of Archaeology	Joint

GALICIA

INSTITUTES ● 3 own | ● 1 joint

Territorial Headquarters IEO ■ 2

ACRO.	NAME	TYPE
IIM	Marine Research Institute	Own
INCIPIT	Institute of Heritage Sciences	Own
MBG	Biological Mission of Galicia	Own
IEGPS	Institute of Galician Studies Padre Sarmiento	Joint
COAC	A Coruña Oceanographic Centre-IEO	Own
COV	Vigo Oceanographic Centre-IEO	Own

ACRO.	NAME	TYPE
IEGD	nography	Own
IFS	Institute of Philosophy	Own
IH	Institute of History	Own
ILC	Institute of Languages and Cultures of the Mediterranean and the Near East	Own
ILLA	Institute of Language, Literature and Anthropology	Own
IPP	Institute of Public Policy and Public Goods	Own
CIB	Centre for Biological Research	Own
CNB	National Centre for Biotechnology	Own
IC	Cajal Institute	Own
ICA	Institute of Agricultural Sciences	Own
ICTAN	Institute of Food Science and Technology and Nutrition	Own
ICIFOR	Institute of Forestry Sciences	Own
CISA	Animal Health Research Centre	Own
MNCN	National Museum of Natural Sciences	Own
RJB	Royal Botanical Garden	Own
CENIM	National Metallurgical Research Centre	Own
ICMM	Institute of Materials Science of Madrid	Own
ICP	Institute of Catalysis and Petrochemistry	Own
ICTP	Institute of Polymer Science and Technology	Own
ICV	Institute of Ceramics and Glass	Own
IEM	Institute for The Structure of Matter	Own
IETCC	Eduardo Torroja Institute of Construction Sciences	Own
IFF	Institute of Fundamental Physics	Own
IMN-CNM	Institute of Micro and Nanotechnology	Own
IO	Institute of Optics Daza de Valdes	Own
IQFR	Institute of Physical Chemistry Rocasolano	Own
IQM	Institute of Medical Chemistry	Own
IQOG	Institute of General Organic Chemistry	Own
ITEFI	Institute of Physical and Information Technologies Leonardo Torres Quevedo	Own
CRF	Centre for Plant Genetic Resources and Sustainable Agriculture	Own
CBM	Centre for Molecular Biology Severo Ochoa	Joint
CIAL	Institute for Research in Food Science	Joint
IGEO	Geosciences Institute	Joint
IIBM	Alberto Sols Biomedical Research Institute	Joint
CBGP	Centre for Plant Biotechnology and Genomics	Joint
CAB	Centre for Astrobiology	Joint
CAR	Centre for Automation and Robotics	Joint
ICMAT	Institute of Mathematical Sciences	Joint
IFT	Institute of Theoretical Physics	Joint
IEO	Spanish Institute of Oceanography	National Centre
IGME	Geological and Mining Institute of Spain	National Centre
INIA	National Institute of Agrarian and Food Research and Technology	National Centre

COMUNIDAD DE MADRID

INSTITUTES 30 own | 9 joint | NATIONAL CENTRES 3

COMUNIDAD FORAL DE NAVARRA

INSTITUTES 1 joint

ACRO.	NAME	TYPE
IDAB	Agrobiotechnology Institute	Joint

PAÍS VASCO

INSTITUTES 2 joint

ACRO.	NAME	TYPE
CFM	Centre for Physics of Materials	Joint
IBF	Biophysics Institute	Joint

LA RIOJA

INSTITUTES 1 joint

ACRO.	NAME	TYPE
ICVV	Institute of Vine and Wine Sciences	Joint

ROMA

INSTITUTES 1 own

ACRO.	NAME	TYPE
EEHAR	Spanish School of History and Archeology	Own

CORE AREA SOCIETY

SOCIETY
LIFE
MATERIA

- *Luis Moreno* (**IPP**), received the national prize for social science research: 'Premio Nacional de Investigación en Ciencias Sociales'.
- *Manuel Lucena Giraldo* (**IH**), elected Director of the Chair of Spanish and Hispanic Studies at the universities of Madrid.
- *Remedios Zafra* (**IFS**), Jovellanos International Essay Award, for her essay *'El bucle invisible'*.
- *José Luis Fernández Martínez* (**IPP**), whose project *'AUTODEMO. The stealth side of participatory democracy: process preferences towards automated decision-making'* was one of the 15 proposals selected by the *Observatorio Social de la Caixa*.
- *Jana Çerna* and *Juan Pimentel* (**IH**), Iberoamerican Award at the 31st International Biennial of Scientific Film and Image.
- *Idoia Murga Castro* (**IH**), winner of the 'Muy Historia y Arte' prize in the second edition of the young women scientists' awards: 'Premios Jóvenes Científicas'.
- *Raquel Ibáñez* and *Rosa Villalón* (**CCHS**), Fotodoc 2022 prize awarded by the Fotodoc Research Group of the Universidad Complutense in recognition of their work on behalf of photographic heritage.
- *Eloísa del Pino* (**IPP**), received the award for people of relevance in social justice, granted by the Asociación de Directoras y Gerentes de Servicios Sociales, for research in social policies and welfare state.
- The ENCAGEn-CM Programme (encage-cm.csic.es), prize in the Research and Training category of the 5th edition of the Fundación Pilares for personal autonomy best practices awards.
- *Eulalia Pérez Sedeño* (**IFS**), winner of the 'Dr Eduardo Charreau' award in the category related to lifetime achievement in social sciences and humanities.
- *Marta Katarzyna*, honourable mention and special distinction from the Embassy of Israel in Poland for her Doctoral thesis co-directed at the **ILC**.
- The journal *Trabajos de Prehistoria*, received the 'Medalla Menga' award for its contribution to scientific dissemination.
- *Enrique García Hernán* (**IH**), Cross of Naval Merit with White Distinctive.
- *Raúl Villagrasa-Elías* (**IH**), bronze medal in the third contest of popular science videos *«Yo investigo. Yo soy CSIC»*.
- *Pablo D'Este* (**INGENIO**, CSIC-UPV), Award for Excellent Research Career in the area of Social Sciences in the first edition of the UPV Research Awards.

CORE AREA LIFE

SOCIETY
LIFE
MATERIA

- *Ana Martínez Gil* (**CIB**), received the National Research Award 'Juan de la Cierva' in the area of technology transfer.
- *José María Valpuesta* (**CNB**), president of the Sociedad de Biofísica de España.
- *Víctor de Lorenzo* (**CNB**), Honorary doctorate by Technical University of Denmark.
- *Luis Enjuanes* (**CNB**), full member of the RACEFN. He is an international member of the US National Academy of Sciences in recognition of his research career and achievements.
- **CABD** (CSIC-Junta Andalucía-UPO), I+I+D+E award in the category of 'Research Centres' in Andalucía awarded by the Academia de Ciencias Sociales y del Medio Ambiente de Andalucía.
- *Nuria Verdaguer* (**IBMB**), appointed member of the Real Academia Española de Ciencias.
- *Ángela Nieto* (**IN**, CSIC-UMH), First Valencian Science Prize 'Santiago Grisolía' awarded by the Generalitat Valenciana.
- *Guillermina López* (**IN**, CSIC-UMH), received the women and innovation award 'Premio Hipatia-Mujer e Innovación' from the newspaper *El Economista*.
- *Ángel Barco* (**IN**, CSIC-UMH), 'XIX Premio Alberto Sols' award for the best scientific publication of the Ajuntament de Sax.
- *Pilar Santisteban* (**IIBM**, CSIC-UAM), recognition for an outstanding scientific career in thyroid physiopathology awarded by the European Thyroid Association 'Aldo Pinchera'.
- *Isabel Varela Nieto* (**IIBM**, CSIC-UAM), AEC-2022 Plaque of Honour awarded by the Asociación Española de Científicos for her research career.
- *Sara Mederos Crespo* (**IC**), Margarita Salas Award for the best Doctoral Thesis of the Comunidad de Madrid and EJN Young Investigator Prize 2022 awarded by the European Federation of Neuroscience Societies.
- *Javier de las Rivas* (**IBMCC**, CSIC-USAL), Innovators 2022 Award from the Junta de Castilla y León.
- *José Alberto Orfao de Matos* (**IBMCC**, CSIC-USAL), Gold Medal awarded by the Faculty of Medicine of the University of Coimbra.
- **IBGM** (CSIC-Universidad de Valladolid), Award from the Asociación Española Contra el Cáncer in recognition of cancer research carried out at the centre.
- *Loreto Martínez González* (**CIB**), CSIC Doctoral Thesis of relevance in the Core Area Life, awarded by the CSIC Postgraduate and Specialisation Department.
- *Santiago Lamas Peláez* (**CBM**, CSIC-UAM), Basic Science Award from the Society for Free Radical Research Europe.
- *María Victoria Lloren-Martín* (**CBM**, CSIC-UAM), 'Gabriela Morreale National Research Award for Young People 2022' in the field of Medicine and Health Sciences.
- *Ana Ortega Molina* (**CBM**, CSIC-UAM), 'Margarita Salas Research Award 2022' for young researchers in the Comunidad de Madrid.
- *Pilar Domingo Colap* (**I2SysBio**, CSIC-UV), 'Young Virologist Award' of Sociedad Española de Virología and the 'Human Health Award', Third Edition of the International Zendal Awards.
- *Andrés Moya Simarro* (**I2SysBio**, CSIC-UV), 19th 'Alberto Sols' award by the Sax City Council, in collaboration with the Generalitat Valenciana, the Diputación Provincial de Alicante, the Universidad de Alicante and the Universidad de Elche Miguel Hernández.
- *Juan Pedro Bolaños* (**IBFG**, CSIC-USAL), Castilla y León 'Prize for Scientific and Technical Research 2021'.
- *Marina García Macia* (**IBFG**, CSIC-USAL), Young Investigator Award 2022 by the European Society of Clinical Investigation (ESCI).

- *Beatr* *az* (**IBFG**, CSIC-USAL), best *ded* by the Sociedad Española de Microbiología (SEM) - 2022.

- *Maria Begoña García* (**IPE**), First CSIC 'Prize for Scientific Dissemination and Citizen Science' for the project *'Adopt a plant'*.

- *Sara Palacio Blasco* (**IPE**), Research Award 2022 of the Real Academia de Ciencias de Zaragoza for her research career.

- *Isabel Sanmartín Bastida* (**RJB**), editor of the US journal *Systematic Biology*.

- *Javier Dieguez Uribeondo* (**RJB**), President International Society of Astacology.

- *Xavier Querol* (**IDAEA**), 'Premio Escarabajo Verde RTVE' in recognition of his work on atmospheric pollution, waste recovery and applied geochemistry.

- *Miguel Delibes de Castro* (**EBD**), The Andalucia medal for environmental merit.

- *Montserrat Vilá Planella* and *Pedro Jordano Barbudo* (**EBD**), appointed to the Real Academia Sevillana de Ciencias.

- *Valentí Rull* (**IBB**), World's Top 2% Scientists, Stanford University.

- *Jesús Martínez Frías* (**IGEO**), European Space Agency Pangaea Award (ESA-PANGAEA 2022) for his contribution as Astronaut Instructor in the UNESCO World Geopark of Lanzarote and Chinijo Archipelago.

- *Juan Manuel García Ruiz* (**IACT**), 'Waltrude und Friedrich Liebau Prize'. Prize for the Promotion of Interdisciplinarity in Crystallography.

- *Joan Martí Molist* (**GEO3BCN**), Honorary Member of the Colegio Oficial de Geólogos.

- *Ángel F. González* (**IIM**), Chair of the International Cephalopod Advisory Council.

- *Anna Traveset* (**IMEDEA**), 'Ramon LLull Award' from the Gobierno Balear for her research career.

- *Manuel Delgado Baquerizo* (**IRNAS**), National Research Award 'Ángeles Alvariño'.

- *Luisa María Lois* (**CRAG**), 'Plaque of Honour Award 2022' from the Asociación Española de Científicos.

- *Ana Isabel Caño Delgado* (**CRAG**), 'Physiologia Plantarum - Plant Physiology Society (SPPS) 2022 award'.

- *Montserrat Díaz Raviña* (**MBG**), Honorary Member of the Sociedad Española de Ciencias del Suelo.

- *Ariadna Sitjà Bobadilla* (**IATS**), 'Concepción Aleixandre Prize'.

- *Amparo Picard Sánchez* (**IATS**), 25th Syva Award for the best doctoral thesis in animal health written and defended in 2021 in Spain, Portugal or Mexico.

- **EEAD**, 'Fidel Pagés' research prize, awarded by the Gobierno de Aragón.

- *Enrique Playán Jubillar* (**EEAD**), 'Aragon Agri-Food Alliance Award' for his agri-food research and innovation.

- *Tadeo Sánchez* (**IRNAS**), 'Ezequiel Martinez Award'.

- *Ana Gutiérrez Suárez* (**IRNAS**), member of the Scientific Advisory Board of the GADEA Foundation for Science (CCA-FGC) in the Environmental and Earth Sciences Area.

- *José Leonardo Velasco Varo* (**IAS**), 'V.S. Pustovoit Prize', the highest award given by the International Sunflower Association.

- *José Alfonso Gómez Calero* (**IAS**), President of the Patronato de las Reservas y Parajes Naturales del Sur de Córdoba.

- *José Luis González Andújar* (**IAS**), appointed Professor at the College of Agriculture and Natural Resources, University of Tehran.

- *Sara del Río González* (**IGM**, CSIC-UNILEON), 'Innovators 2022 Award' by the newspaper *El Mundo de Castilla y León*.

- *Emilio Nicolás* and *Cristina Romero* (**CEBAS**), 'VI Premios Agro de la Región de Murcia' in sustainable agriculture awarded by the newspaper *La Verdad*.

- *Antonio Hernández Cortés* and *Enrique Olmos* (**CEBAS**), Diploma awarded by the Academia de Ciencias de la Región de Murcia for the promotion of research in secondary schools.

- *Alberto Fereres* (**ICA**), among the 100 most relevant Spanish researchers in the field of Agricultural Sciences in the ranking of the scientific website Research.com. Included in the top 5% of the most influential scientists worldwide according to a bibliometric study conducted by Stanford University.

- *Francisco Javier Corpas Aguirre* (**EEZ**), one of the 15 most cited CSIC researchers in the world in his area of research, Botany and Plant Biology.

- *Elías Fereres Castiel* (**IAS**), the most cited Spanish researcher in 2022 in the category: 'Plant Science and Agronomy' and ranking 40 worldwide ('Research' database).

- *José*), included in the list of the 1[illegible]luential CSIC researchers in 2022, published by the Web of Science platform (Clarivate Analytics).

- *Fidel Toldrá Vilardell* (**IATA**), Fellow of the Agricultural and Food Chemistry Division of the American Chemical Society (ACS).

- *Ascensión Marcos*, Full Member of the Real Academia Nacional de Farmacia for her research excellence and scientific career.

- *Mª Isidra Recio Sánchez* (**CIAL**, CSIC-UAM), Corresponding Academician of the Academia de Farmacia de Castilla y León for her research excellence and scientific career.

- *Wenceslao Moreda Martino* (**IG**), Chair of the electronic working group for the revision of CODEX CX-33, Standard for olive oils and olive-pomace oils (2022 -2024).

- *Marta Miguel* and *Marta Garcés* (**CIAL**, CSIC-UAM), SIAL Paris Award for the best innovative product 2022. Recognition awarded to the 100% vegetable meat analogue "Leggie".

- **CIAL**. The product Lipigo® [web link], Nutra Ingredients Awards in 2022.

- *Pedro García Serrano* (**IG**), 'Sixth Prize for the best doctoral thesis, quality and innovation in the agri-food sector' promoted at national level by the Agrobank Chair (Universidad de Lleida).

- *Raquel Manzanero Rodríguez* (**ICTAN**), First runner-up in the 'Madrid City Council 2022 Awards' for academic and research work on healthy and sustainable food systems.

- *Antonio Diego Molina García* (**ICTAN**), Prize in 'FOTCIENCIA 2022' for the photograph 'Galaxia polysaccharida' in the specific category Food and Nutrition.

- **IPLA** is coordinating the first working group on Phage Therapy in Spain. The Thematic Network 'Bacteriophages and Transducer Elements-FAGOMA' has brought together research and clinical staff from hospitals, universities and research centres to hold meetings with the main institutions involved, such as the AEMPS and the ISCIII.

IEO

- 'Medal of Merit for Civil Defence' Silver category with 'BBlue Distinction', awarded by His Majesty Felipe VI of Spain.

- 'Plaque of the Civil Order of Agrarian Merit for Fisheries and Foodstuffs' in the Fisheries Merit Section Gold category, awarded by His Majesty Felipe VI of Spain.

IGME

- 'VIA APIA Prize' awarded by the Asociación de Periodistas de Información Ambiental (Association of Environmental Information Journalists) for 'work as a source of information on the volcanic crisis on La Palma, its continuous and far-reaching effort as a source of information, dissemination and education was tremendously rigorous and valuable, without ever falling into sensationalism or spectacle'.

- 'Medal of Merit for Civil Protection', in the Silver and Blue Distinction category, awarded by the Spanish Ministry of the Interior for the brilliant participation of **IGME** researchers in the volcanic emergency on La Palma.

- *Raúl Pérez López*, 'Cross of Military Merit with White Distinction' awarded by the Ministry of Defence for his work in the service of society in the eruption of La Palma volcano in 2021.

- *Rubén Díez Fernández*, First Prize in the 'XIX Arquímedes' University Competition for Introduction to Scientific Research, in the Experimental, Exact and Environmental Sciences category.

- Participation in the Parade of the Armed Forces on the *Día de la Hispanidad*, invited by the Directorate General of Civil Protection and Emergencies for outstanding work at the service of society during the volcanic eruption in La Palma 2021.

INIA

- *Ana de Castro*, the first woman in history to receive the 'Pierre C. Robert Precision Agriculture Young Scientist Award', an international prize awarded by the International Society of Precision Agriculture (ISPA) (Minneapolis, USA).

- 'Enrique Coris Gruart Award' in the category of Veterinary Medicine, Surgery and Animal Health for the work *'Epidemiological situation of West Nile virus and Usutu virus in Extremadura'* (**CISA**).

- *Ángel Goñi* (**CBGP**, INIA/CSIC-UPM), Margarita Salas Research Award from the Comunidad de Madrid for researchers under 40 years of age.

- *Juncal Espinosa Prieto*, Doctoral Thesis *'Prescribed burning to reduce fire severity: effects on pine forests in the Iberian System'* awarded in the first competition for Doctoral Theses of relevance in 2022 by the CSIC.

SOCIETY, LIFE AND MATERIA

- *Ricardo García García* (**ICMM**), 'Miguel Catalán' Research Award of the Comunidad de Madrid for his scientific career.
- *Andrés Castellanos Gómez* (**ICMM**), 'Miguel Catalán' Research Award of the Comunidad de Madrid to researchers under forty years of age.
- *Lourdes Verdes-Montenegro* (**IAA**), 'Ada Byron' Women in Technology Award 2022.
- *Estel Cardellach*, *Serni Ribó* (**ICE**), 'Arctic Circle Prize' 2022.
- *Alberto Enciso Carrasco* (**ICMAT**, CSIC-UAM-UCM-UC3M), Corresponding Academic Member of the Mathematics Section of the Real Academia de Ciencias Exactas, Físicas y Naturales de España.
- *Marisol Martín González* (**IMN-CNM**), Corresponding Academic Member of the Physics and Chemistry Section of the Real Academia de Ciencias Exactas, Físicas y Naturales de España.
- *Juan García-Bellido Capdevila* (**IFT**, CSIC-UAM), Corresponding Academic Member of the Physics and Chemistry Section of the Real Academia de Ciencias Exactas, Físicas y Naturales de España.
- *Alfonso Saiz López* (**IQFR**), Corresponding Academic Member of the Physics and Chemistry Section of the Real Academia de Ciencias Exactas, Físicas y Naturales.
- *Daniel Maspoch Comamala* (**ICN2**), Corresponding Academic Member of the Physics and Chemistry Section of the Real Academia de Ciencias Exactas, Físicas y Naturales.
- *Diego Córdoba Gazolaz* (**ICMAT**, CSIC-UAM-UCM-UC3M), 'Margarita Salas Medal' for the best career in research-staff supervision, Junior Category.
- *Fernando Carrió* (**IFIC**, CSIC-UV), 'ATLAS' Outstanding Achievement Award.
- *José Cernicharo Quintanilla* (**IFF**), 'Blas Cabrera' National Research Award in Physical Sciences (2022).
- *Alvaro de Rújula Alguer* (**IFT**, CSIC-UAM), Medal awarded by the Real Sociedad Española de Física and the Fundación BBVA.
- *Montserrat Calleja* (**IMN-CNM**), 'Jaume I' New Technologies Award.
- *Santiago Sánchez Solano*, *Manuel Valencia Barrero*, *Ángel Barriga Barrios* (**IMSE-CNM**, CSIC-US), Honorary Doctorate from the Technological University of Havana.
- *Susana Marcos* (**IO**), 'ARVO Gold Fellow Medal'.
- *Luis Fernando Hernández Encinas* (**ITEFI**), 'Cruz al Mérito Policial', cross of merit with 'White Distinction' awarded by the police.
- *Sergio Valenzuela* (**ICN2**), Elected Member of the European Academy.
- *Laura Lechuga* (**ICN2**), Honorary Doctorate from the Universidad de Cadiz.
- *Alicia Durán Carrera* (**ICV**), 'Otto-Schott' Award 2022.
- *Nataly Carolina Rosero-Navarro* (**ICV**), 'Ulrich' Award 2022.
- *Alicia Durán Carrera* (**ICV**), Honorary member of The Worshipful Company of Glass Sellers of London.
- *M. Rosa Palacín Peiró* (**ICMAB**), Miguel Catalán-Paul Sabatier Prize of the French Chemical Society and the Real Sociedad Española de Química.
- *Clara Viñas Teixidorm* (**ICMAB**), Research Award of the Societat Catalana de Química.
- *Andrés Castellanos Gómez* (**ICMM**), 'Felisa Martín Bravo' National Youth Research Award in the area of physical, material and earth sciences.

- *Pilar* [illegible]'inter 2021 EPS Emmy Noetl[illegible] in Physics awarded by the European Physical Society.

- *María Verónica Ganduglia* and *Pirovano Carbonari* (**ICP**), RAICES 2022. (MCTIA) Argentina.

- *Rosa María Menéndez López* (**INCAR**), Mining and Minerals Hall (MMH) 2022.

- *María Concepción Gimeno Floría* (**ISQCH**, CSIC-UNIZAR), 'Rafael Usón' Medal, Organometallic Chemistry Specialist Group of the Real Sociedad Española de Química.

- *Juan de Damborenea González* (**CENIM**), Corresponding Member of the Academia de Ciencias del País Vasco.

- *Jose Luis Serrano* (**INMA**, CSIC-UNIZAR) 'Alfred Saupe Prize' 2022.

- *Ricardo Ibarra* (**INMA**, CSIC-UNIZAR), 'Salvador Velayos Award' 2022.

- *Luis Martín-Moreno* (**INMA**, CSIC-UNIZAR), Member of Real Academia de Ciencia Exactas, Físicas, Químicas y Naturales de Zaragoza.

- *Romà Tauler Ferré* (**IDAEA**), Honorary Doctor by the University of Silesia (Katowice, Poland).

- *Joan Grimalt Obrador* (**IDAEA**), Award for Scientific Excellence by the Societat Catalana de Química.

- *Teresa Blasco* (**ITQ**, CSIC-UPV), 'GERMN-Bruker' Award 2022.

- *Avelino Corma Canós* (**ITQ**, CSIC-UPV), first prize in the 'Ciencia Valenciana Santiago Grisolía' Awards for professional career in the scientific research.

NATION RCH PROJECTS, ACTIONS AND PROGRAMMES

Table 3.4.4 Projects **in force**, by Core Area.

CORE AREA	EXTERNAL FUNDING		
	No. OF PROJECTS	TOTAL FUNDING (€)	ANNUITY 2022 (€)
SOCIETY	161	9,761,175.87	3,391,217.85
LIFE	2,116	401,475,484.42	198,973,854.52
MATERIA	1,081	206,391,081.97	82,405,191.75
CENTRAL SERVICES	1	10,000.00	10,000.00
TOTAL	**3,359**	**617,637,742.26**	**284,780,264.12**

Table 3.4.5 Projects **in force**, by R&D programmes.

R&D PROGRAMS	EXTERNAL FUNDING		
	No. OF PROJECTS	TOTAL FUNDING (€)	ANNUITY 2022 (€)
NATIONAL PLAN	2,564	508,091,309.17	199,833,040.23
AUTONOMOUS REGIONS	626	77,220,030.93	28,791,052.53
FIS	31	4,257,717.32	1,025,931.38
OTHERS	138	28,068,684.84	55,130,239.98
TOTAL	**3,359**	**617,637,742.26**	**284,780,264.12**

Table 3.4.6 Actions **in force**, by Core Area.

ÁREA GLOBAL	EXTERNAL FUNDING		
	No. OF SPECIAL ACTIONS	TOTAL FUNDING (€)	ANNUITY 2022 (€)
SOCIETY	7	110,500.00	48,876.77
LIFE	45	1,429,077.09	416,264.80
MATERIA	30	1,908,010.00	222,150.00
CENTRAL SERVICES	6	380,000.00	15,000.00
TOTAL	**88**	**3,827,587.09**	**702,291.57**

Source: BDC: The area assigned to the project has been used for the distribution by thematic areas.

INSTITUTIONAL RELATIONS AND SCIENTIFIC COLLABORATION

Table 4.2 Associated units 2022. Institutions associated with the CSIC in 2022.

UNIVERSIDAD COMPLUTENSE DE MADRID	6
UNIVERSIDAD DE CASTILLA-LA MANCHA	6
UNIVERSIDAD AUTÓNOMA DE MADRID	5
UNIVERSIDAD DE BARCELONA	5
UNIVERSIDAD DE GRANADA	5
UNIVERSIDAD DE VALLADOLID	4
UNIVERSIDAD JAUME I DE CASTELLÓN	4
UNIVERSIDAD CARLOS III	3
UNIVERSIDAD DE CÓRDOBA	3
UNIVERSIDAD DE HUELVA	3
UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA	3
UNIVERSIDAD DE SANTIAGO DE COMPOSTELA	3
UNIVERSIDAD POLITÉCNICA DE MADRID	3
HOSPITAL NACIONAL DE PARAPLEJICOS DE TOLEDO DEL SERVICIO DE SALUD DE CASTILLA-LA MANCHA	2
INSTITUTO ANDALUZ DE INVESTIGACIÓN Y FORMACIÓN AGRARIA, PESQUERA, ALIMENTARIA Y DE LA PRODUCCIÓN ECOLÓGICA	2
UNIVERSIDAD DE EXTREMADURA	2
UNIVERSIDAD DE LA LAGUNA	2
UNIVERSIDAD DE LAS ISLAS BALEARES	2
UNIVERSIDAD DE MURCIA	2
UNIVERSIDAD DE VALENCIA	2
UNIVERSIDAD DE VIGO	2
UNIVERSIDAD DE ZARAGOZA	2
UNIVERSIDAD POLITÉCNICA DE CARTAGENA	2
UNIVERSIDAD POLITÉCNICA DE CATALUÑA	2
UNIVERSIDAD REY JUAN CARLOS	2
ACHUCARRO BASQUE CENTER FOR NEUROSCIENCE FUNDAZIOA	1
AGÈNCIA DE QUALITAT I AVALUACIÓ SANITÀRIES DE CATALUNYA (AQUAS)	1
BARCELONA INSTITUTE FOR GLOBAL HEALTH (ISGLOBAL)	1
CABILDO INSULAR DE GRAN CANARIA	1
CENTRE DE RECERCA MATEMÁTICA	1
CENTRO DE INVESTIGACIÓN Y TECNOLOGÍA AGROALIMENTARIA DE ARAGÓN	1
CENTRO DE INVESTIGACIONES ENERGÉTICAS, MEDIOAMBIENTALES Y TECNOLÓGICAS, O.A., M.P. (CIEMAT)	1
CONSORCIO PARA LA CONSTRUCCIÓN, EQUIPAMIENTO Y EXPLOTACIÓN DEL SISTEMA DE OBSERVACIÓN COSTERO DE LAS ILLES BALEARS (SOCIB)	1
CTRO. INVESTIGACIÓN PRINCIPE FELIPE	1
DIPUTACIÓN PROVINCIAL DE PONTEVEDRA	1
FUNDACIO INSTITUT MAR D INVESTIGACIONS MEDIQUES IMIM	1
FUNDACIÓN CENTRO DE ESTUDIOS AMBIENTALES DEL MEDITERRANEO (CEAM)	1
FUNDACIÓN CENTRO DE ESTUDIOS DE FÍSICA DEL COSMOS DE ARAGÓN (CEFCA)	1
FUNDACIÓN IMDEA NANOCIENCIA	1
FUNDACIÓN RIOJA SALUD	1
GOVERN DE LES ILLES BALEARS	1
INSTITUTO ANDALUZ DE INVESTIGACIÓN Y FORMACIÓN AGRARIA Y PESQUERA DE ANDALUCÍA	1
INSTITUTO GEOGRÁFICO NACIONAL	1
INSTITUTO MURCIANO DE INVESTIGACIÓN Y DESARROLLO AGRARIO Y MEDIOAMBIENTAL	1
INSTITUTO TECNOLÓGICO Y DE ENERGÍAS RENOVABLES S.A.	1
INSTO. CATALÁN DE PALEOECOLOGÍA HUMANA	1
INSTO. TEC. DEL EMBALAJE, TRANS. Y LOGI	1
UNIVERSIDAD AUTÓNOMA DE BARCELONA	1
UNIVERSIDAD DE ALCALÁ	1
UNIVERSIDAD DE ALICANTE	1
UNIVERSIDAD DE BURGOS	1
UNIVERSIDAD DE CANTABRIA	1
UNIVERSIDAD DE JAÉN	1
UNIVERSIDAD DE LEÓN	1
UNIVERSIDAD DE LLEIDA	1
UNIVERSIDAD DE MÁLAGA	1
UNIVERSIDAD DE NAVARRA	1
UNIVERSIDAD DE SALAMANCA	1
UNIVERSIDAD DE SEVILLA	1
UNIVERSIDAD DE VIC-UNIVERSIDAD CENTRAL DE CATALUÑA	1
UNIVERSIDAD DEL PAÍS VASCO	1
UNIVERSIDAD NACIONAL DE EDUCACIÓN A DISTANCIA-UNED-	1
UNIVERSIDAD PABLO DE OLAVIDE	1
UNIVERSIDAD POMPEU I FABRA	1
UNIVERSITAT DE BARCELONA	1
UNIVERSITAT DE GIRONA	1
	118

Table 4.3 Associated units 2022. CSIC institutes.

MADRID MATERIALS SCIENCE INSTITUTE	7
INSTITUTE OF VINE AND WINE SCIENCES	5
INSTITUTE OF HISTORY	5
AULA DEI EXPERIMENTAL STATION	4
INSTITUTE OF ENVIRONMENTAL DIAGNOSIS AND WATER STUDIES	4
INSTITUTE FOR THE STRUCTURE OF MATTER	4
BIOLOGICAL MISSION OF GALICIA	4
CENTRE FOR EDAPHOLOGY AND APPLIED BIOLOGY OF THE SEGURA RIVER	3
EXPERIMENTAL STATION OF ARID ZONES	3
ZAIDÍN EXPERIMENTAL STATION	3
INSTITUTE OF AGROCHEMISTRY AND FOOD TECHNOLOGY	3
INSTITUTE OF POLYMER SCIENCE AND TECHNOLOGY	3
INSTITUTE OF AGRICULTURAL SCIENCES	3
ALBERTO SOLS BIOMEDICAL RESEARCH INSTITUTE	3
INSTITUTE OF NATURAL PRODUCTS AND AGROBIOLOGY	3
INSTITUTE OF ADVANCED CHEMISTRY OF CATALONIA	3
INSTITUTE OF PHYSICAL CHEMISTRY ROCASOLANO	3
INSTITUTE OF MEDICAL CHEMISTRY	3
GEOSCIENCES BARCELONA	2
MILA Y FONTANALS HUMANITIES RESEARCH INSTITUTION	2
BOTANICAL INSTITUTE OF BARCELONA	2
CAJAL INSTITUTE	2
CATALYSIS AND PETROCHEMISTRY INSTITUTE	2
EDUARDO TORROJA INSTITUTE OF CONSTRUCTION SCIENCES	2
INSTITUTE OF MARINE SCIENCES	2
INSTITUTE OF ADVANCED SOCIAL STUDIES	2
INSTITUTE OF PHILOSOPHY	2
INSTITUTE OF PHYSICS OF CANTABRIA	2
INSTITUTE OF FUNDAMENTAL PHYSICS	2
INSTITUTE OF INNOVATION AND KNOWLEDGE MANAGEMENT	2
INSTITUTE OF SUBTROPICAL AND MEDITERRANEAN HORTICULTURE LA MAJORA	2
INSTITUTE OF NANOSCIENCE AND MATERIALS OF ARAGON	2
INSTITUTE OF NATURAL RESOURCES AND AGROBIOLOGY OF SEVILLE	2
MEDITERRANEAN INSTITUTE FOR ADVANCED STUDIES	2
NATIONAL CENTRE FOR BIOTECHNOLOGY	1
SCHOOL OF ARAB STUDIES	1
ANDALUSIAN INSTITUTE OF EARTH SCIENCES	1
TORRE DE LA SAL AQUACULTURE INSTITUTE	1
INSTITUTE OF ASTROPHYSICS OF ANDALUSIA	1
INSTITUTE FOR INTEGRATIVE SYSTEMS BIOLOGY	1
PRIMO YUFERA INSTITUTE OF MOLECULAR AND CELLULAR PLANT BIOLOGY	1
BIOMEDICINE INSTITUTE OF VALENCIA	1
INSTITUTE OF CERAMICS AND GLASS	1
INSTITUTE OF FORESTRY SCIENCES	1
INSTITUTE OF MARINE SCIENCES OF ANDALUSIA	1
INSTITUTE OF MATHEMATICAL SCIENCES	1
ARTIFICIAL INTELLIGENCE RESEARCH INSTITUTE	1
BIOMEDICAL RESEARCH INSTITUTE OF BARCELONA	1
INSTITUTE FOR CHEMICAL RESEARCH	1
INSTITUTE OF GENERAL ORGANIC CHEMISTRY	1
INSTITUTE OF NATURAL RESOURCES AND AGROBIOLOGY OF SALAMANCA	1
PYRENEAN INSTITUTE OF ECOLOGY	1
NATIONAL MUSEUM OF NATURAL SCIENCES	1
ROYAL BOTANICAL GARDEN	1
TOTAL IN FORCE ON 31/12/2022	**118**

Table 5.6 International Agreements in force 2022.

GERMANY	22	PHILIPPINES	1	PANAMA	1
ANGOLA	2	FINLAND	6	PARAGUAY	1
ARGENTINA	9	FRANCE	29	PERU	9
AUSTRALIA	1	GHANA	2	POLAND	7
AUSTRIA	3	EQUATORIAL GUINEA	1	PORTUGAL	5
BELGIUM	11	GREECE	1	PUERTO RICO	1
BOLIVIA	1	HONDURAS	3	UNITED KINGDOM	10
BRAZIL	18	INDIA	5	CZECH REPUBLIC	3
BULGARIA	1	IRAN	2	DOMINICAN REPUBLIC	2
CANADA	2	IRELAND	1	ROMANIA	1
CHILE	12	ISRAEL	1	RUSSIA	2
CHINA	8	ITALY	22	SOUTH AFRICA	1
COLOMBIA	24	JAPAN	9	SWEDEN	11
REPUBLIC OF KOREA	1	JORDAN	1	SWITZERLAND	4
COSTA RICA	2	KENYA	2	THAILAND	1
CUBA	2	MALAYSIA	2	TAIWAN	1
DENMARK	3	MOROCCO	3	TUNISIA	2
ECUADOR	6	MAURITANIA	1	TURKEY	3
SPAIN	45	MEXICO	22	URUGUAY	3
USA	29	NIGERIA	1	UZBEKISTAN	1
ETHIOPIA	1	NETHERLANDS	4	VENEZUELA	3
					394

Table 6.8 Number of contracts/agreements signed with entities and institutions in force in 2022 and funding committed. Breakdown by type of contracting entity.

TYPE OF CONTRACTING ENTITY	No. IN FORCE	CURRENT FUNDING (€ thousand)	No. SIGNED	FUNDING SIGNED (€ thousand)
ASSOCIATION	78	237.57	27	209.10
CITY COUNCIL OR PROVINCIAL	44	341.56	17	130.94
AUTONOMOUS REGION	178	2,160.92	68	4,353.70
PRIVATE COMPANY	2,292	13,477.52	531	11,269.49
PUBLIC COMPANY	112	1,728.63	22	812.84
FOUNDATION	329	473.13	86	682.42
INTERNATIONAL	1,553	12,393.35	263	9,877.92
MINISTRY	83	14,035.24	20	3,500.67
UNIVERSITY OR PUB. RES. ORG.	755	536.67	87	208.39
OTHERS	1,757	15,005.73	707	15,395.81
TOTAL	**7,181**	**60,390.32**	**1,828**	**46,441.28**

Table 6.9 Number of contracts/agreements signed with entities and institutions in force in 2022 and funding committed. Breakdown by autonomous region.

AUTONOMOUS REGION	No. IN FORCE	CURRENT FUNDING (€ thousand)	No. SIGNED	FUNDING SIGNED (€ thousand)
ANDALUCÍA	748	5,212.66	199	3,973.72
ARAGÓN	208	1,168.27	50	715.65
PRINCIPADO DE ASTURIAS	149	952.15	49	1,122.22
ILLES BALEARS	56	547.5	13	523.6
CANARIAS	77	436.21	21	3,008.10
CANTABRIA	33	302.72	8	1,254.18
CASTILLA - LA MANCHA	41	393.65	19	2,261.12
CASTILLA Y LEÓN	71	111.35	15	91.45
CATALUÑA	866	5,498.96	271	6,999.13
COMUNITAT VALENCIANA	643	5783.4	117	4,210.37
EXTREMADURA	8	4.2	3	5.42
GALICIA	115	788.58	37	1,043.30
COMUNIDAD DE MADRID	3,604	36,327.24	946	17,986.80
REGIÓN DE MURCIA	650	2,242.58	81	2,870.26
COMUNIDAD FORAL DE NAVARRA	41	176.9	11	137.95
PAÍS VASCO	16	1	-	-
LA RIOJA	43	365.39	15	237.98
UNSPECIFIED	3	77.53	-	-
TOTAL	**7,372**	**60,390.29**	**1,855**	**46,441.25**

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