INSTITUT DE FÍSICA CORPUSCULAR

FROM SCIENCE TO SOCIETY

Annual Report 2025

15 aniversari

CSIC
Consejo Superior de Investigaciones Científicas

Vniversitat de València

EXCELENCIA SEVERO OCHOA

webific.ific.uv.es

FROM SCIENCE TO SOCIETY

Founded in 1950, the Instituto de Física Corpuscular (IFIC) is a joint research center of the Spanish National Research Council (CSIC) and the University of Valencia.

Awarded as Excellence Research center Severo Ochoa, IFIC is a leading international research institute dedicated to understanding the fundamental laws of nature. It brings together scientists exploring the smallest particles, the largest cosmic structures, and the technologies that connect them.



IFIC INSTITUT DE FÍSICA CORPUSCULAR

CSIC CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

VNIVERSITAT DE VALÈNCIA

EXCELENCIA SEVERO OCHOA

International Research Center of Excellence

EXCELENCIA SEVERO OCHOA

2015 - 2019, 2024 - 2030

IFIC has been awarded as Research Center of Excellence Severo Ochoa in two occasions.

This is the most prestigious award given by the Spanish Ministry of Science.

IFIC teams participate in more than 20 major international experiments and collaborations with leadership roles in flagship projects.

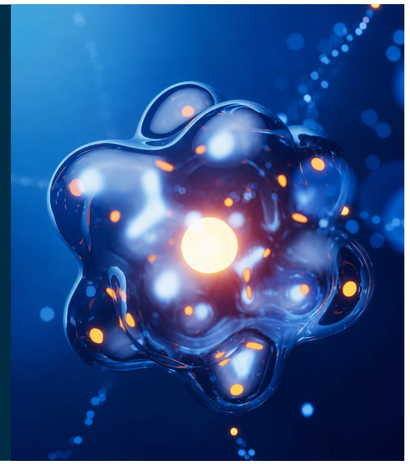


Theory, Experiment and Technology

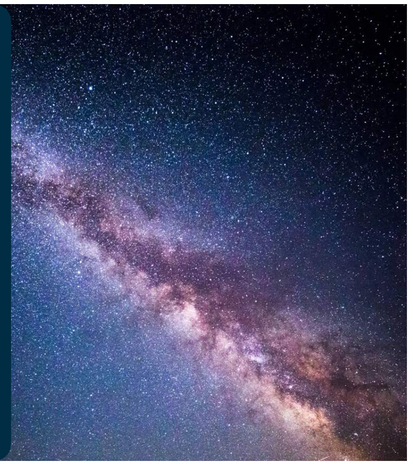
Research at IFIC covers three main areas involving Experimental and Theoretical Physics and the Technology needed to develop them.

Together, these cover a wide range of research areas in fundamental physics.

1. The origin of mass

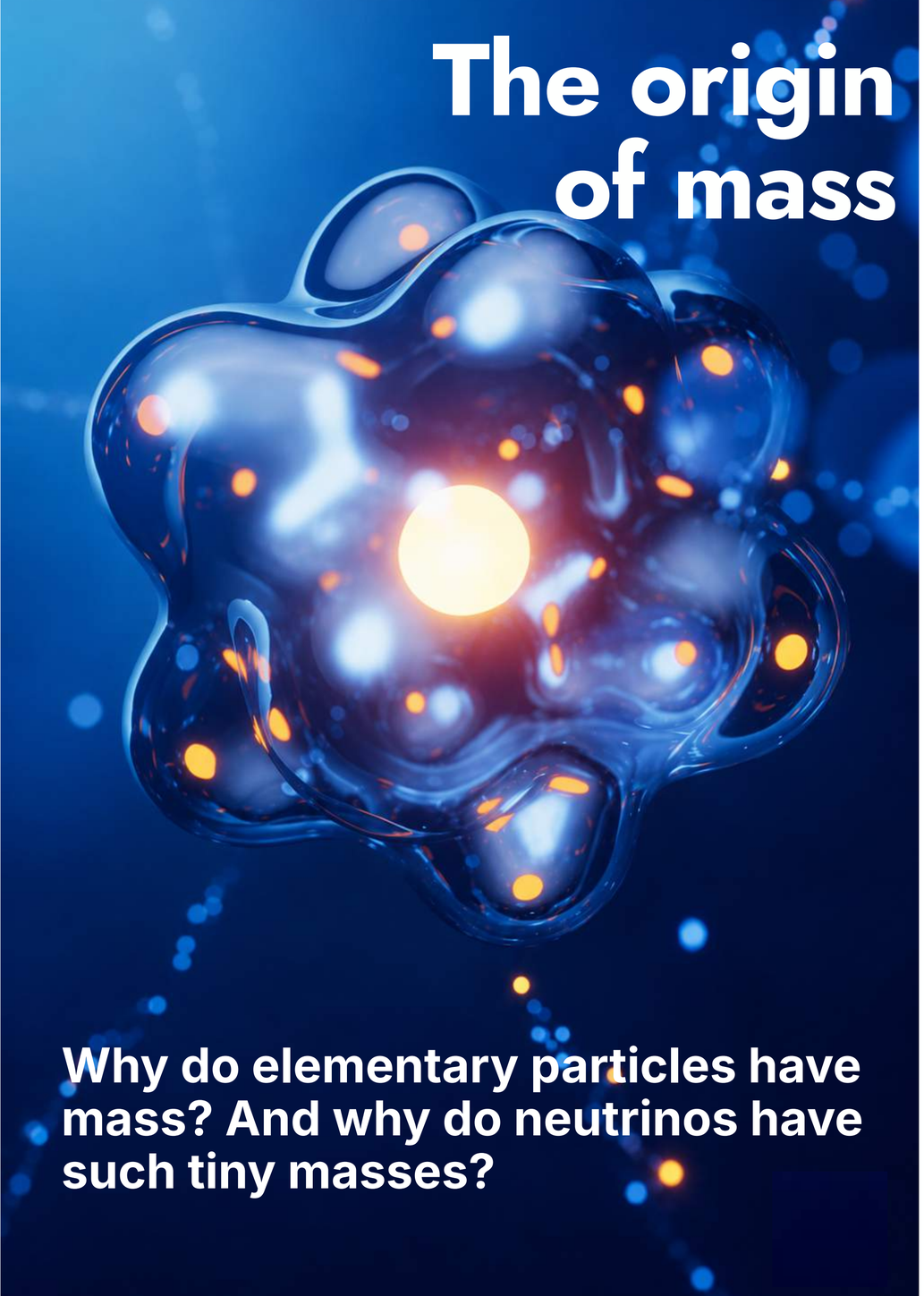


2. The origin of matter



3. Advanced instrumentation and computing



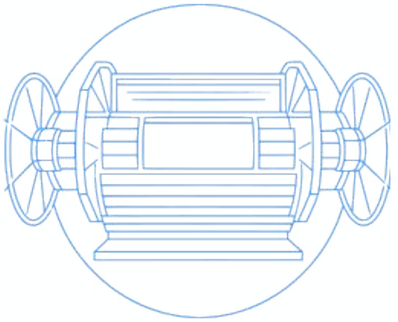


The origin of mass

Why do elementary particles have mass? And why do neutrinos have such tiny masses?

THE HIGGS FORCE

IFIC researchers study the Higgs boson to understand the mechanism that gives mass to elementary particles. They perform precision measurements of Higgs properties and search for signs of new physics beyond the Standard Model.



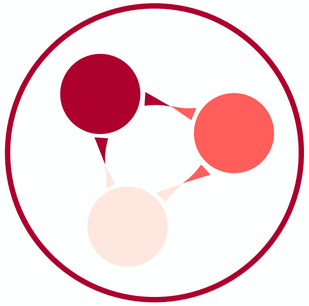
NEUTRINO PHYSICS

Neutrinos are among the most abundan and most mysterious particles in the Universe. IFIC plays leading roles in determining neutrino masses, studying oscillations, and testing whether neutrinos are linked to the origin of matter.



FLAVOUR AND QUARK MATTER

By studying rare particle decays and the behaviour of quarks, IFIC tests the Standard Model with unprecedented precision. We seek experimental evidence of new particles and interactions that could reveal physics beyond current theories.

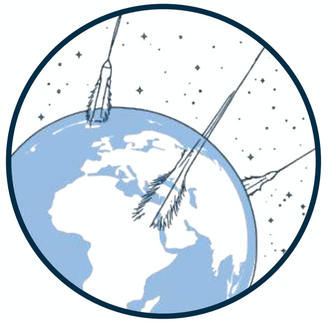


The origin of matter

Why does the Universe contain matter rather than antimatter? What is dark matter? How were the chemical elements created?

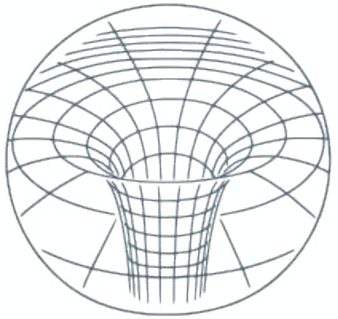
ASTROPARTICLES, DARK MATTER AND COSMOLOGY

IFIC develops theoretical models and participates in leading international experiments searching for dark matter, neutrinos and other cosmic messengers. These studies probe the invisible components that make up most of the Universe.



GRAVITATIONAL WAVES AND BLACK HOLES

Researchers investigate gravity under extreme conditions, studying black holes, neutron stars and gravitational waves. Their work connects particle physics with astrophysical observations to test fundamental theories of the Universe.



THE SYNTHESIS OF NUCLEI

IFIC studies the nuclear reactions that forged the elements inside stars and during explosive cosmic events such as supernovae and neutron-star mergers. Precision measurements of exotic nuclei help explain how the matter that forms planets and life was created.



Advanced instrumentation and computing

Cutting-edge technologies pushing the frontiers of physics.

ADVANCED INSTRUMENTATION AND COMPUTING IN FUNDAMENTAL PHYSICS

Development of radiation detectors, fast electronics, photodetectors and data acquisition systems for particle physics and medical imaging.
High-performance computing, machine learning and large-scale data analysis support experiments that produce petabytes of data while enabling applications in digital health, image analysis and scientific computing.

ADVANCED INSTRUMENTATION AND COMPUTING FOR SOCIETAL CHALLENGES

Technologies developed for fundamental physics are transferred to healthcare, industry and environmental monitoring through innovation projects, public-private collaborations and the institute's technology transfer activities, contributing to economic and societal progress.

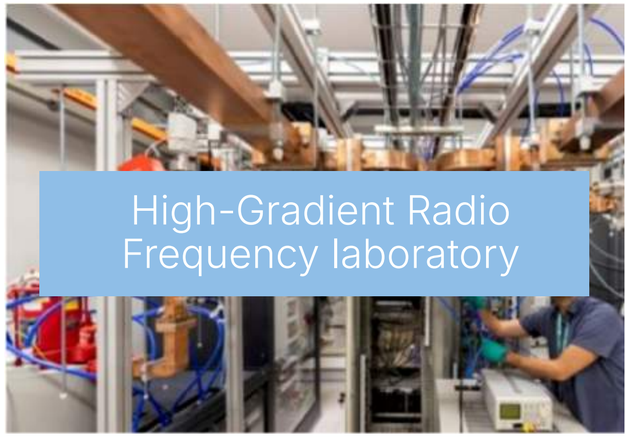
Research facilities

Infrastructures





Computing Center



High-Gradient Radio Frequency laboratory



Clean room



Electronics laboratory



LARAM: Environmental radioactivity laboratory



Pre-clinic image laboratory (PET/CT)

Structure and organization

Governing Board

Carlos Closa Montero, Vicepresidente de Organización y Relaciones Institucionales del CSIC
Isabel Fariñas Gómez, Vicerrectora de Investigación y Política Científica de la UV
Lucía Sanus Vitoria, Vicerrectora de Infraestructuras y Sostenibilidad de la UV
Antonio Chica Lara, Coordinador del Área Global Materia del CSIC

Directorate

Director: Sergio Pastor Carpi (Investigador Científico CSIC)
Vice-directors: Javier Vijande Asenjo (Catedrático de Universidad UV), Emma Torró Pastor (Científica Titular CSIC), María Dolores Cortina Gil (Investigadora Científica CSIC)

Institute Board

Directorate (Sergio Pastor Carpi, María Dolores Cortina Gil , Emma Torró Pastor , Javier Vijande Asenjo), the Institute's Manager (Gerente, Ana Mª Fandos Lario), Heads of Research Departments (Joaquin Poveda Torres, Martin Gonzalez Alonso), representative of doctor-researchers (Alejandro Algora), representatives of support personnel (Mª Teresa Cámara García, Fco. Javier Sánchez Martínez)

Scientific Council (Claustro)

Scientific Advisory Committee

Mari Carmen Bañuls (Max Planck Inst. Quantum Optics/MCQST Munich)
Giacomo de Angelis (INFN Lab. Naz. Legnaro)
Francis Halzen (University of Wisconsin)
Tatsuya Nakada (École Polytechnique Fédérale de Lausanne, EPFL)
Aneesh Manohar (UC San Diego)
Géraldine Servant (DESY & Univ. Hamburg)
Manuella Vincter (Universidad de Carleton & CERN)

Technical Services

- Computing
- Electronics
- Mechanics
- Maintenance

Research Departments

- Experimental Physics
- Theoretical Physics

Management

- Administrative Services
- Outreach
- Library

UCIE
Scientific Unit for Business Innovation

- Innovation Agents

IFIC 75th anniversary

In **2025**, IFIC celebrated its 75th anniversary, three quarters of a century of scientific excellence, innovation, and international collaboration.

Founded in 1950, our institute has grown into one of Europe's leading centres for fundamental physics, advancing our understanding of the Universe while developing technologies with real societal impact.

29 Nov 2025 - 75th anniversary Gala

Olympia Theatre





24 Nov 2025 - Institutional event











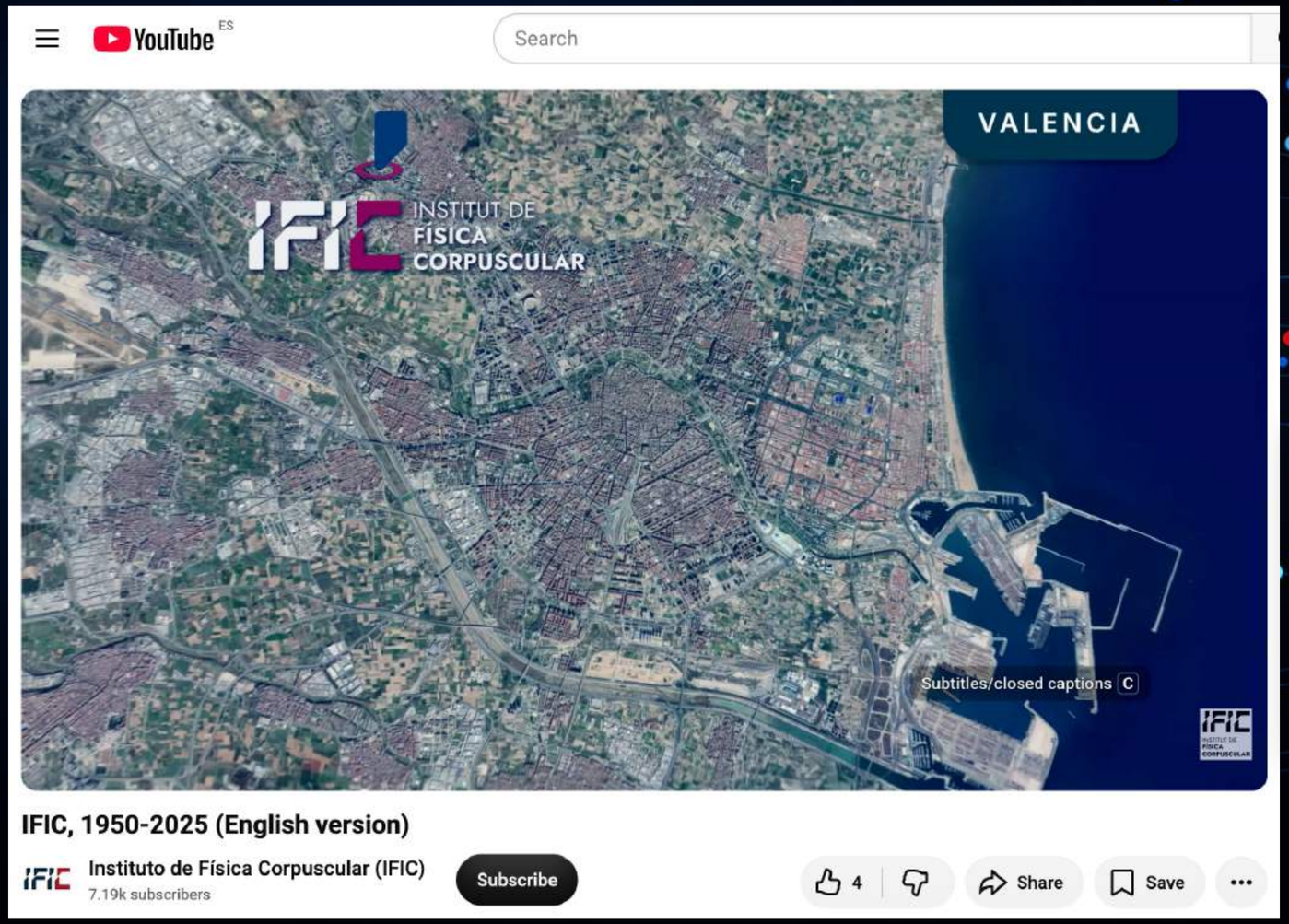
3 Oct 2025 - IFIC Paella

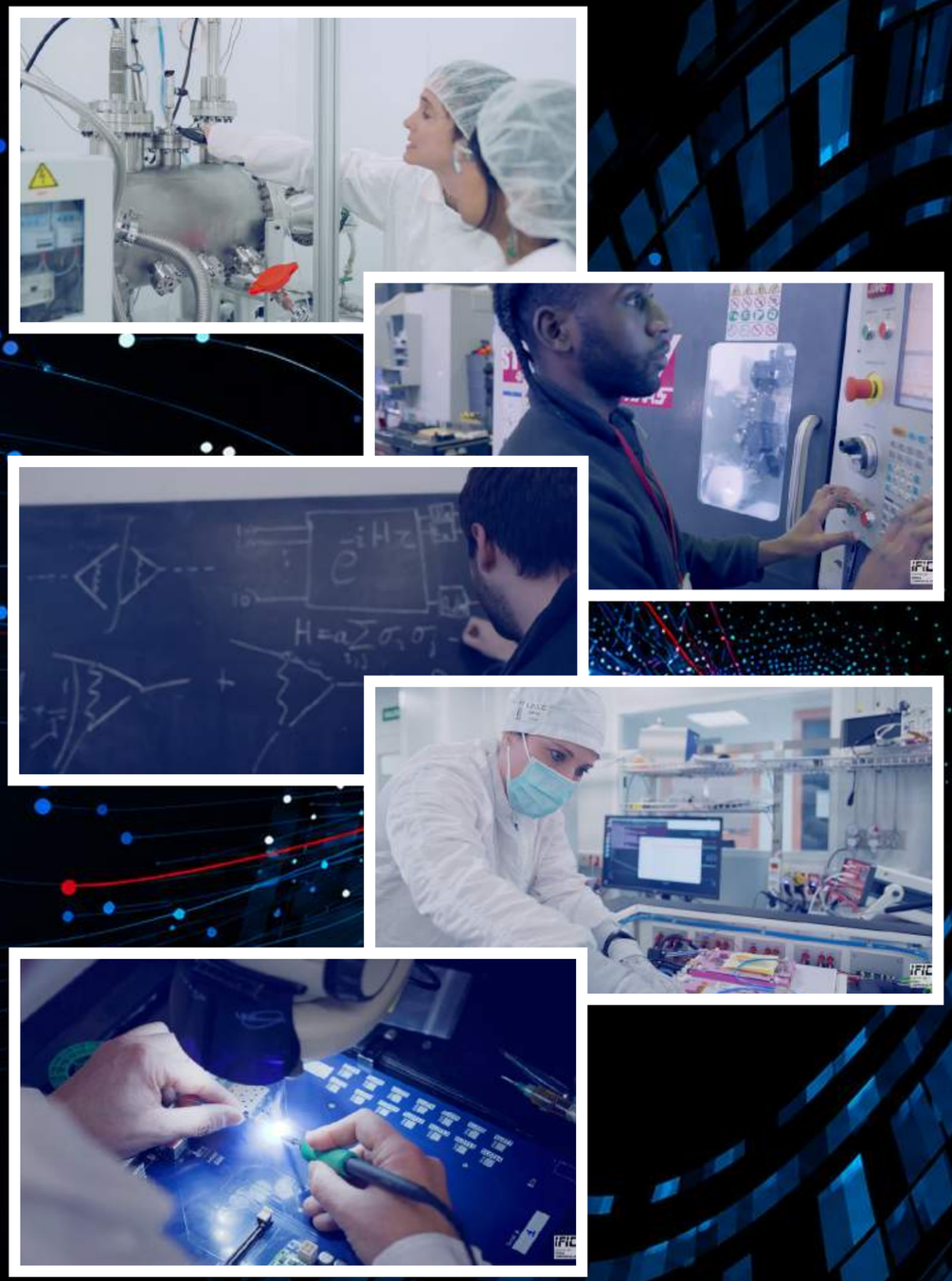
March - June 2025 Conference Series





IFIC 75th anniversary Institutional video





https://www.youtube.com/watch?v=HzEVi906-A8

Highlights of the year

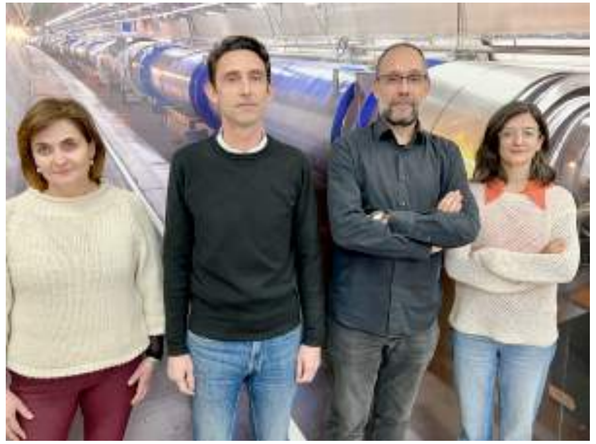
IFIC renews accreditation as Severo Ochoa Centre of Excellence

In June 2025, IFIC received the Severo Ochoa accreditation from Minister Diana Morant, reaffirming its position among Spain's leading research institutes. The distinction recognises IFIC's scientific excellence, global impact, innovation and talent attraction. It provides €5.66 million in funding until 2030 to support IFIC's strategic programme in fundamental physics, advanced instrumentation, quantum technologies, medical physics, artificial intelligence, research training, and technology transfer.



New management team at IFIC

In late 2025, IFIC appointed a new management team led by Sergio Pastor. The new team aims to strengthen IFIC's international scientific impact, foster innovation, and support the institute's role as a Severo Ochoa Centre of Excellence.



New Corporate Identity for IFIC

Coinciding with its 75th anniversary and renewed Severo Ochoa accreditation, IFIC launched a new corporate identity.

INSTITUT DE FÍSICA CORPUSCULAR

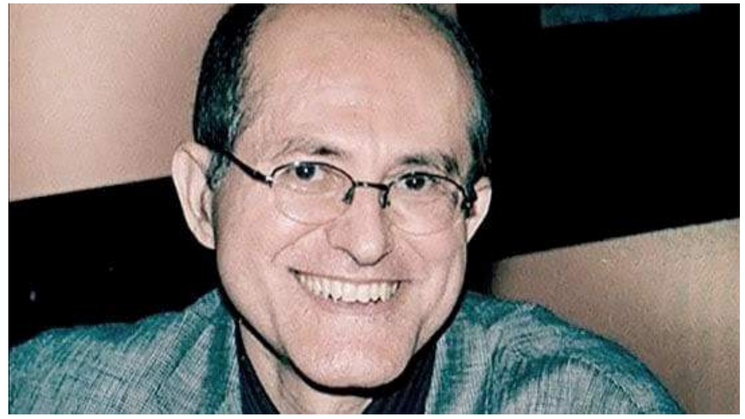
Carmen García receives the National Research Award 2024 in the Physical Sciences Category

Carmen García García, Research Professor at CSIC, received the 2024 National Research Award in Physical Sciences for her internationally recognised work in experimental particle physics. Her career includes major contributions to the ATLAS experiment at CERN, particularly in detector development and searches for new physics.



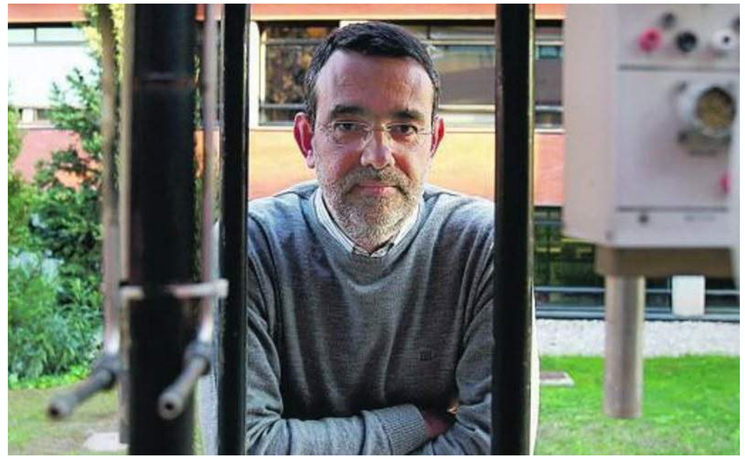
José W. Furtado Valle receives the Margarita Salas Medal from CSIC for the best career in research staff supervision

José W. Furtado Valle, Research Professor at CSIC, received the Margarita Salas Medal (CSIC). The award recognises his long-standing role in training doctoral researchers at IFIC, and his broader contribution to the development of international scientific talent in particle physics.



Antonio Pich Zardoya elected as a new member of the Royal Spanish Academy of Sciences

Antonio Pich Zardoya, Full Professor at UV, has been elected as a member of the Royal Spanish Academy of Sciences in recognition of his contributions to theoretical particle physics. His work has been fundamental in precision tests of the Standard Model, and he has played a key role in advancing Higgs boson and electroweak physics research.



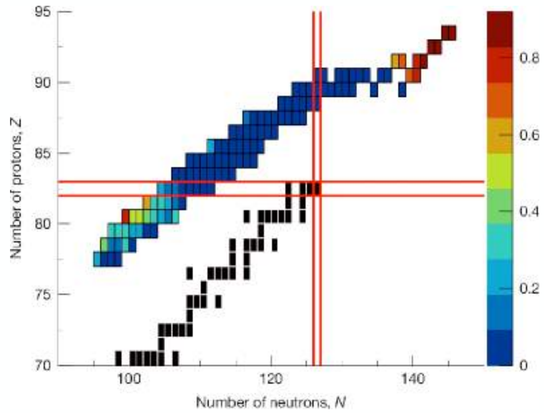


KM3NeT captures the most energetic neutrino ever detected

The KM3NeT detector, located deep in the Mediterranean Sea, has detected the highest-energy neutrino ever observed, with participation from IFIC researchers. This rare event provides new insights into extreme cosmic processes and highlights the detector's ability to study ultra-high-energy neutrinos from the universe.

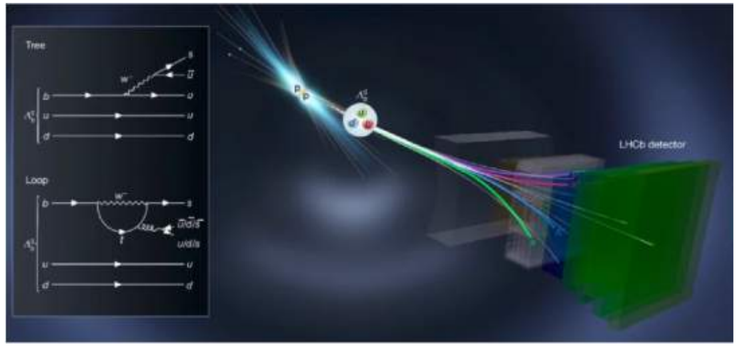
IFIC participates in landmark nuclear fission discovery published in Nature

The Nature publication reports a breakthrough in nuclear fission research involving contributions from IFIC. The study provides new insights into how atomic nuclei split, improving the understanding of fission dynamics and the theoretical models used to describe this process.



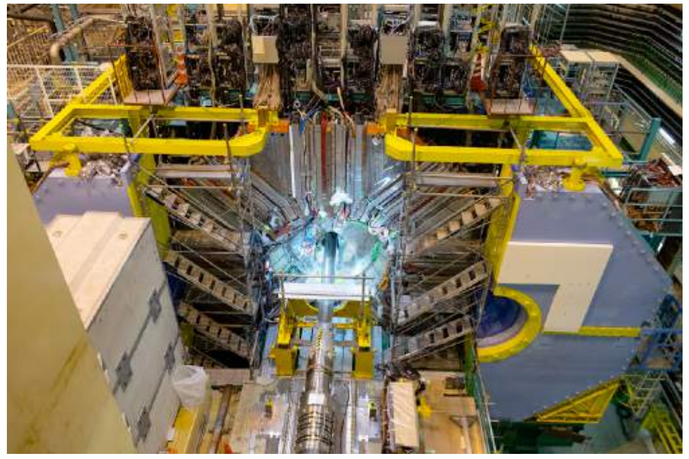
First observation of CP violation in baryons

The LHCb experiment at CERN reported the first observation of charge–parity (CP) violation in baryon decays. This landmark discovery, published in Nature, confirms a long-standing prediction of the Standard Model and provides a crucial new avenue for understanding the imbalance between matter and antimatter in the Universe.



IFIC researcher Carlos Mariñas appointed Deputy Spokesperson of the Belle II experiment in Japan

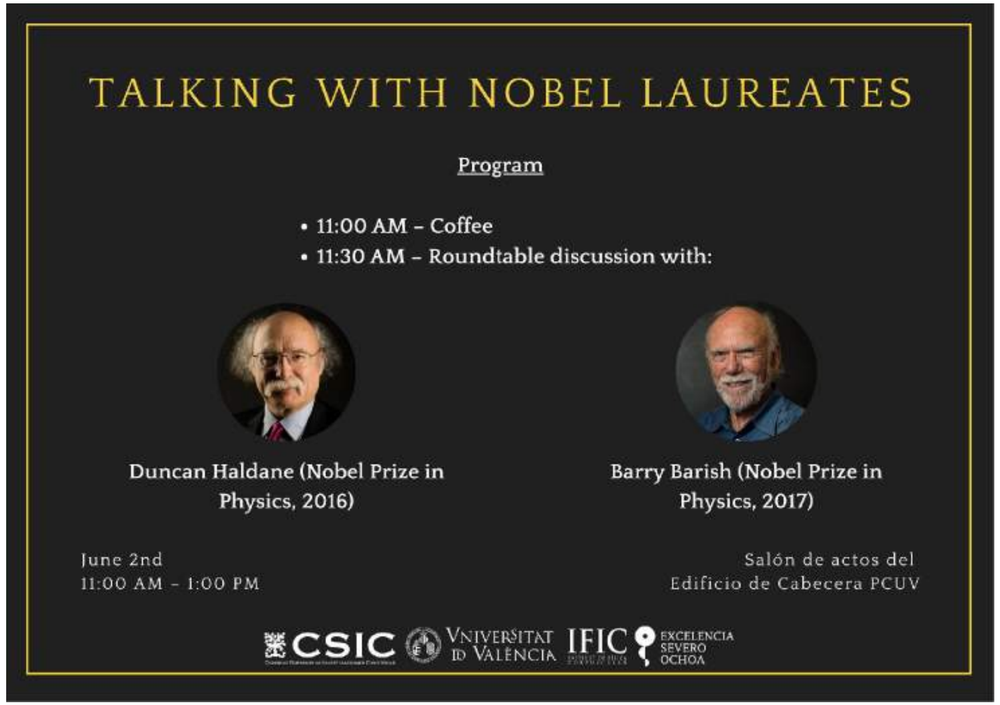
Carlos Mariñas has been appointed Deputy Spokesperson of the Belle II experiment in Japan, an international particle physics collaboration at the SuperKEKB accelerator. He joins the leadership team coordinating the experiment's scientific programme, which searches for physics beyond the Standard Model.





Two Nobel Laureates inspire the next generation of physicists

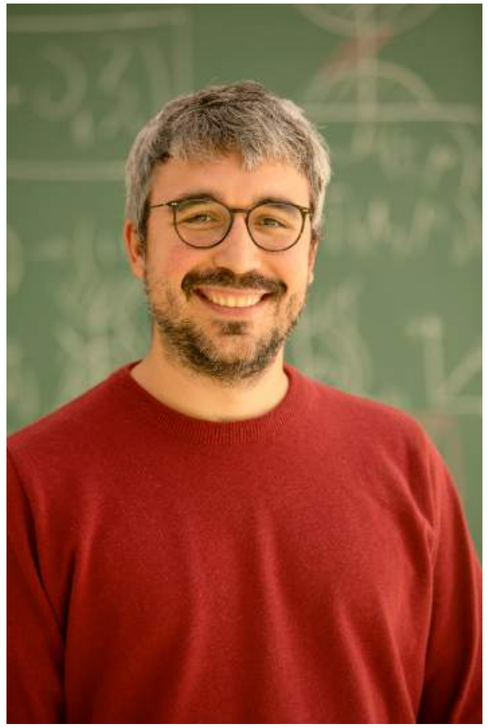
Nobel Prize winners Barry Barish and Duncan Haldane visited IFIC to meet young researchers, sharing insights from the discoveries that gave rise to gravitational-wave astronomy and topological quantum physics.



Artemisa, IFIC's artificial intelligence infrastructure, awarded more than 1 million euros in funding

Artemisa, IFIC’s artificial intelligence infrastructure, received €1.2 million co-funded by the Spanish Ministry of Science and Universities, CSIC and IFIC, to double its computing capacity. The investment will strengthen advanced AI and machine-learning applications in particle physics and other scientific fields, enhancing IFIC’s capabilities in data analysis, simulation, and interdisciplinary research.





Ander Simón and Noemi Rocco join IFIC as ERC Starting Grant recipients



IFIC strengthened its research capacity with the incorporation of Noemi Rocco and Ander Simón, both recipients of prestigious European Research Council (ERC) grants. Rocco will lead the NUQNET project, aimed at advancing the theoretical understanding of neutrino interactions to support next-generation neutrino experiments. Simón’s COLINA project will develop quantum technologies based on trapped ions, with applications in quantum computing, simulation, and precision measurements.

IFIC organizes the 2025 edition of the TeVPA International Conference on Particle Astrophysics

For the first time held in Spain, this conferences gathers leading international researchers to discuss the latest advances in astroparticle physics, including cosmic rays, neutrinos, dark matter, and multimessenger astronomy.

High energies in the high mountains: European school of HEP in the Pyrenees

IFIC played a leading role in the 2025 European School of High-Energy Physics, held in the Pyrenees and organized in collaboration with CERN's. More than 90 PhD students from 37 countries received advanced training in particle physics.



IFIC's leadership in instrumentation showcased by hosting the ANIMMA 2025 conference

The ANIMMA 2025 conference brings together experts from around the world to discuss advances in radiation detection, measurement technologies, and their applications in nuclear science, industry, medicine, and environmental monitoring.

IFIC hosts the concluding event of the Complementary R&D Plan ASFAE

IFIC successfully concluded the ASFAE programme, a complementary R&D&I initiative in astrophysics and high-energy physics that strengthened research capabilities, fostered technological development, and supported the training and recruitment of scientific talent in strategic areas of fundamental physics.

In memoriam

The IFIC community was deeply saddened to bid farewell to two remarkable scientists in 2025. Antonio Ferrer Soria and José Bernabéu Alberola were two of Spain's most distinguished physicists and key figures in the modern development of IFIC. Their vision, dedication and leadership helped shape the institute and the development of particle physics in Spain. They will be missed and remembered by all IFIC’s members, continuing inspiring new generations of scientists.



Antonio Ferrer Soria

With an outstanding scientific career at CNRS, CERN, and IFIC, he played a leading role in establishing IFIC as an internationally recognised research centre and made fundamental contributions to the development of high-energy physics in Spain. He was a key figure in the DELPHI and ATLAS Collaborations, contributing to the development of important detector technologies. His scientific vision, leadership and enduring commitment to IFIC leave an extraordinary legacy.



José Bernabéu Alberola

A pioneering and internationally recognised particle physics theorist, he was instrumental in the advancement of fundamental research and medical physics at IFIC. He was the first Spanish scientist to join CERN’s Theory Division, having trained generations of researchers and received numerous distinctions, including the King Jaume I Award for Basic Research and the Physics Medal of the Spanish Royal Society of Physics.

Human Resources

December 2025

25% women

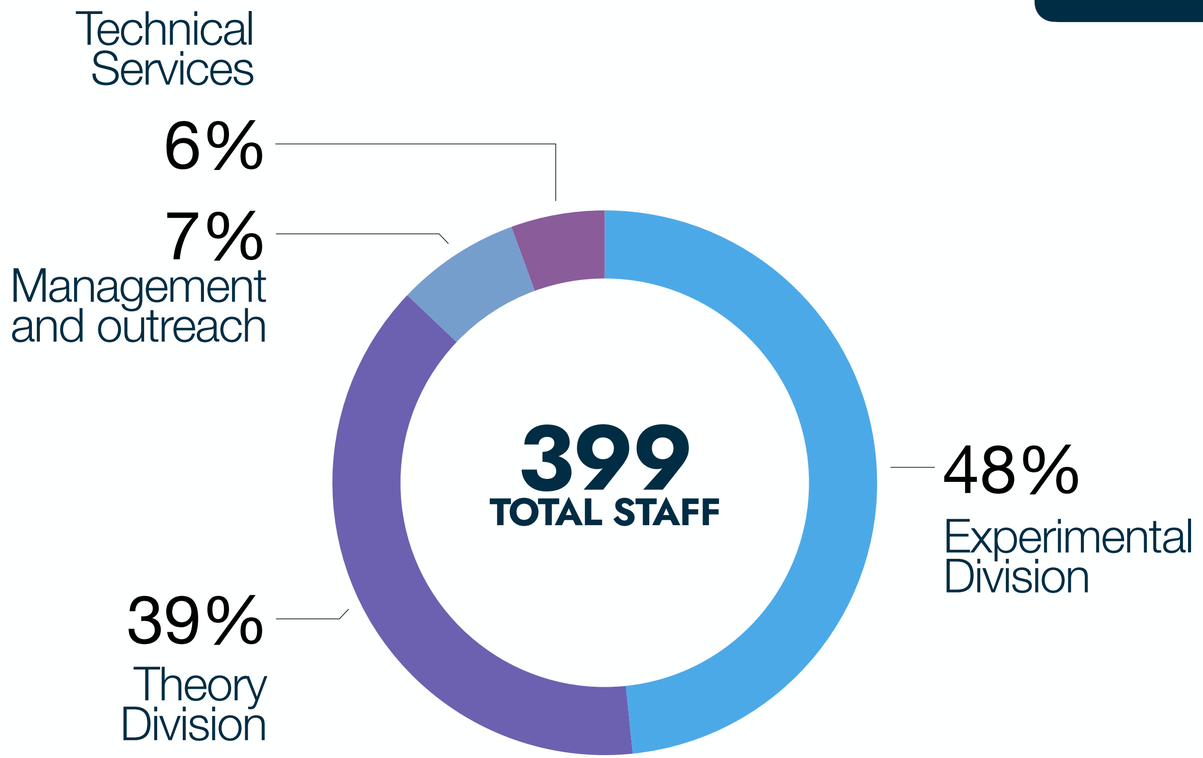
75% men

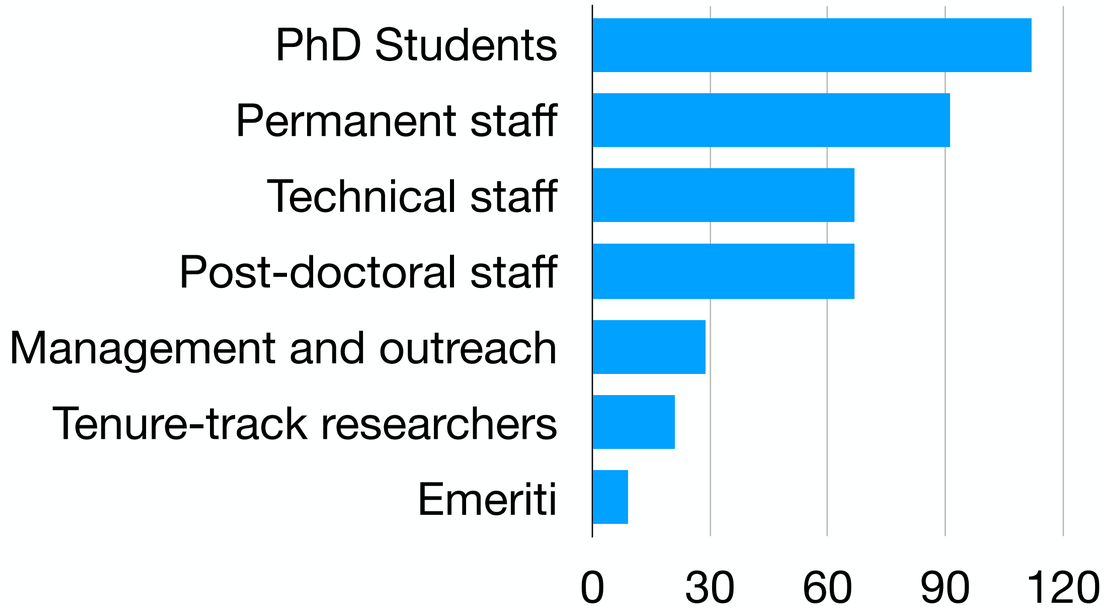
55% CSIC

45% UV

Excellence programs researchers starting in 2025

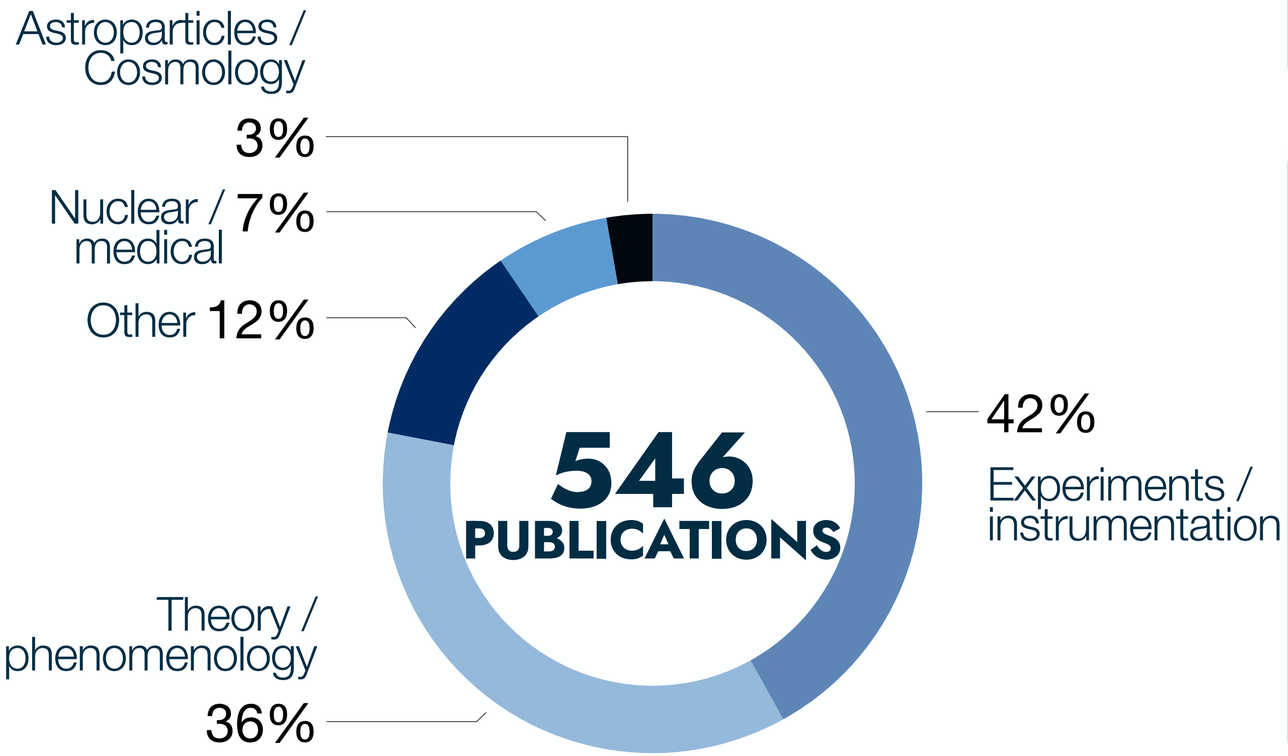
- 2 ERC
- 3 Ramón y Cajal
- 1 La Caixa Junior Leader





Scientific production
Publications

IFIC's results have been published in 546 papers in 82 high quality journals, 90% in first quartile journals



Top 5 journals (by impact factor):

Nature (IF 50.5): 3

Physics Reports (IF 25): 7

Reports on Progress in Physics (IF 20.7): 4

Living Reviews in Relativity (IF 20): 1

Science Bulletin (IF 18): 2

Top 5 journals (by number of papers):

107 Journal of High Energy Physics (IF 5.0)

99 Physical Review D (IF 4.6)

62 European Physical Journal C (IF 4.2)

43 Physical Review Letters (IF 8.1)

35 Physics Letters B (IF 4.3)

Scientific production
Conferences workshops, colloquia and seminars

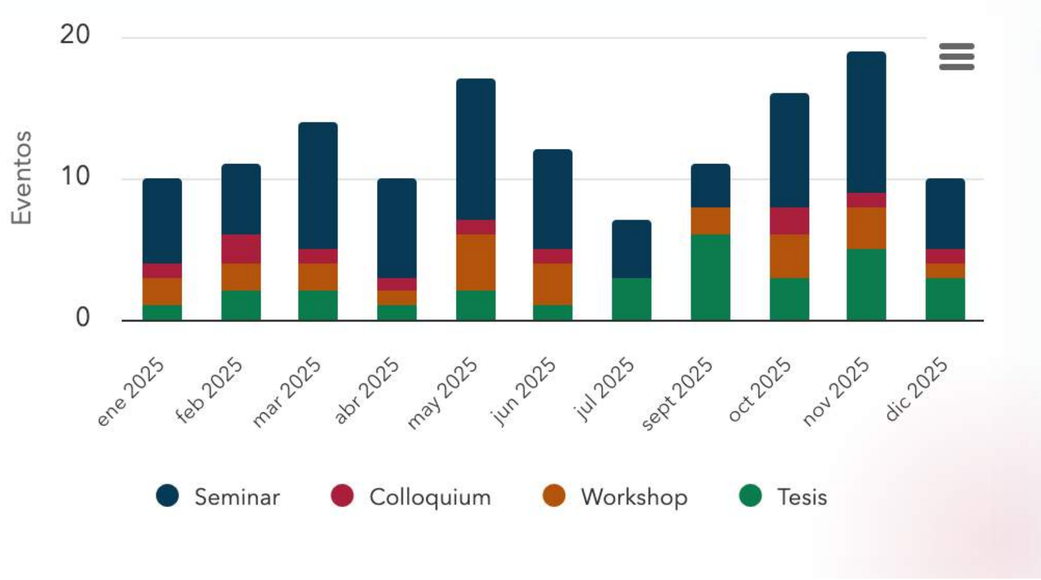
IFIC members have organized

- 24 Conferences and workshops
- 11 Colloquia
- 105 Seminars
  - 74 General seminars
  - 31 Student seminars

IFIC researchers present their results in the main international conferences and workshops.

A total of 417 contributions were presented in 2025:

- 385 talks (15 invited, 40 plenaries)
- 32 posters



Training:
PhD and Master Theses defended at IFIC

Members of IFIC with positions at the University of Valencia are mainly involved in the Degree in Physics, although they also teach in Physics-Mathematics, Chemistry and Engineering.

At the postgraduate level, IFIC participates in two of the Master's Degrees offered by the UV:

- Master in Advanced Physics — IFIC personnel is responsible for two of the four pathways: Theoretical Physics and Nuclear & Particle Physics.
- Master in Medical Physics — under responsibility of IFIC personnel.
- Master in Environmental Radiological Protection (new in 2025) — under responsibility of IFIC personnel.

31 PhD Theses defended (23% Women)

46 Master Theses defended (28% Women)



Every summer, IFIC organises a Summer School program for around 30 under-grad students

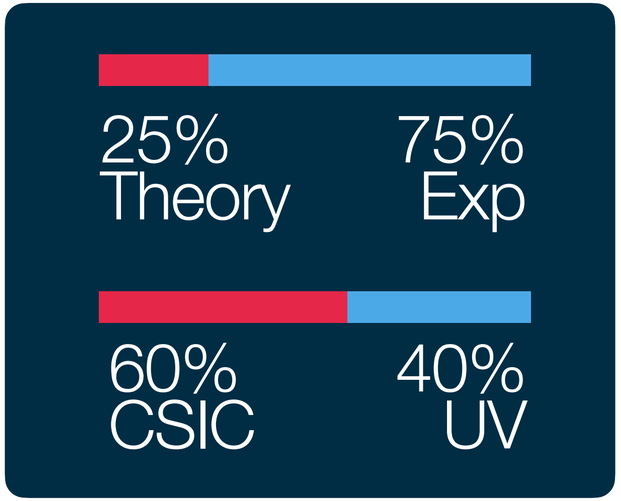


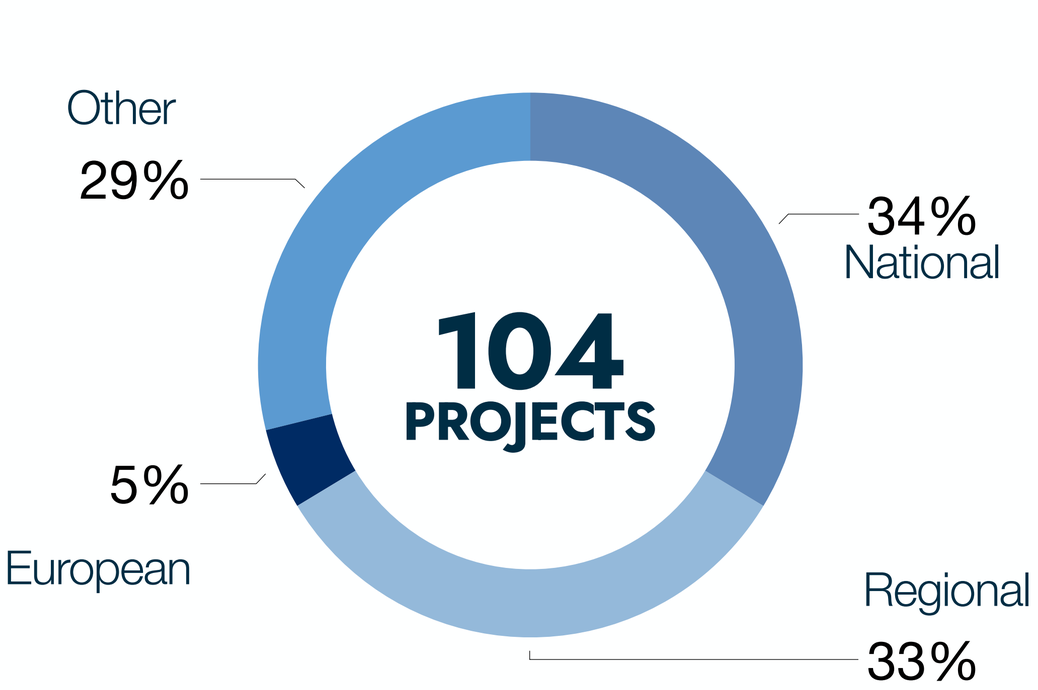
- 2 weeks of talks and visits to IFIC's labs
- Students work with IFIC's mentors in a project

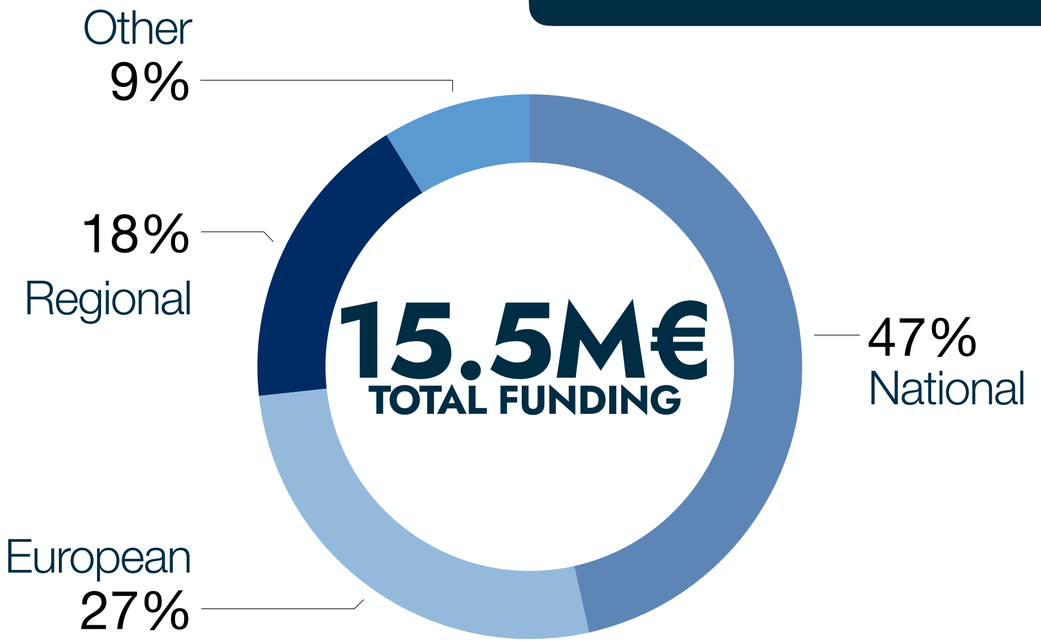
Funding

Projects started in 2025

IFIC receives most of its funding from competitive calls at the Regional, National, European and other international levels.







The full list of projects can be found here:
https://webific.ific.uv.es/web/content/relaci%C3%B3n-de-proyectos-financiados

Tech transfer

2025 highlights

The Scientific Innovation Unit (UCIE) promotes the transfer of knowledge, technologies and expertise developed at IFIC, connecting research with industry, public institutions and society.



€1M+
Funding secured

Artemisa AI infrastructure awarded more than **€1 million** to double its computing capacity.

3
Innovation awards

Two IFIC teams (GN-Vision and LINrem) won the CSIC Activa-T Hackathon, and the **gVirtualXray** platform received the **Dirk Bartz Prize 2025** at EuroVis.

2
Technologies supported towards commercialisation

GN-Vision and LINrem received **€20,000 each** plus mentoring to advance towards spin-off creation.



2
Major innovation networks

Active participation in the **Innoagents Network** and the **Spain Quantum Network**, strengthening links with companies and the regional innovation ecosystem.

Strategic collaborations

New initiatives launched in artificial intelligence, quantum computing, medical physics, environmental monitoring and cancer research through collaborations with universities, hospitals, companies and European partners.

Contributions to society: IFIC's Committees

















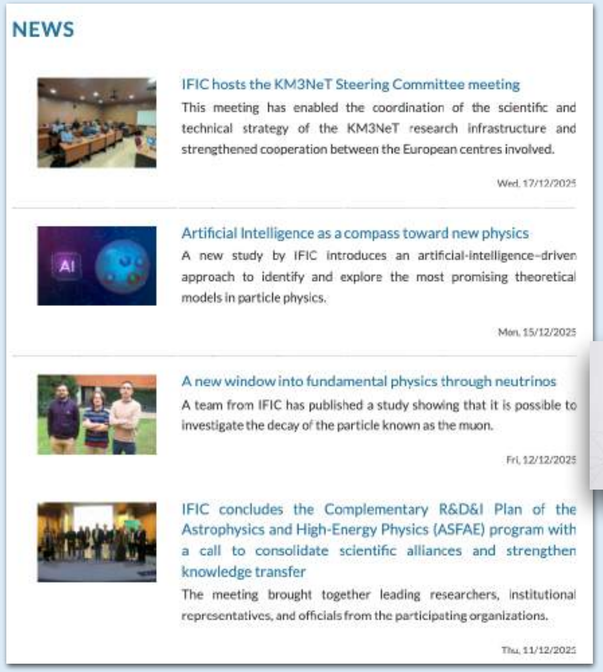


Communication

Committee formed by a team of outreach professionals and the collaboration of a large number of IFIC members

Regular activities:

- IFIC news and social media
- Talks at Secondary and High Schools
- Audiovisual content
- Podcast “Oscilador Armónico” (100 episodes!) @OA_Podcast





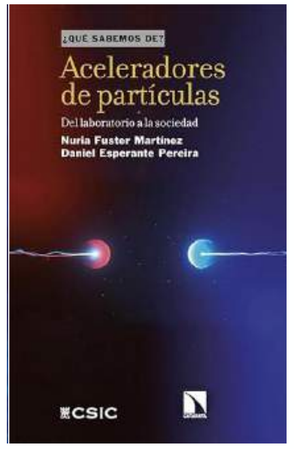


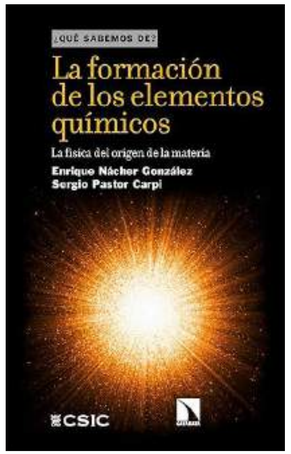


Special events in 2025

- CERN 70 anniversary: audience of 700, open to all society
- IFIC 75 anniversary Gala. Olympia Theater, audience of 1000
- IFIC new Corporate Identity
- IFIC institutional video
- Publication of two books







@IFICorpuscular

@ific_csic.uv



Outreach

Committee formed by a team of outreach professionals and the collaboration of a large number of IFIC members

Regular activities:

- IPOGG International masterclasses (4 sessions!)
- Guided tours, talks at Secondary and High Schools
- Lise Meitner Project
- Annual outreach events: Expociència, 100xciencia, Mednight, Pint of Science



International Particle Physics Outreach Group



















Special events in 2025

- IFIC 75 anniversary: Conference series for the general audience, with 4 talks:
  - C. García García
  - J.J. Gómez Cadenas
  - G. Barenboim
  - A. Casas









Committee for Equality and Diversity (CID)

Formed by 17 IFIC members including a diverse group of research, technical and administration personnel

Regular activities:

- **11F:** International day of women and girls in science
- **8M:** International women's day
- **28J:** International day of LGBTQIA+
- **25N:** International day for the elimination of violence against women





New initiatives in 2025:

- New Code of Conduct at IFIC
- 1st Flavourful Physics Workshop, for LGTBIQ+ diversity in Science
- Cultural Diversity Day at IFIC

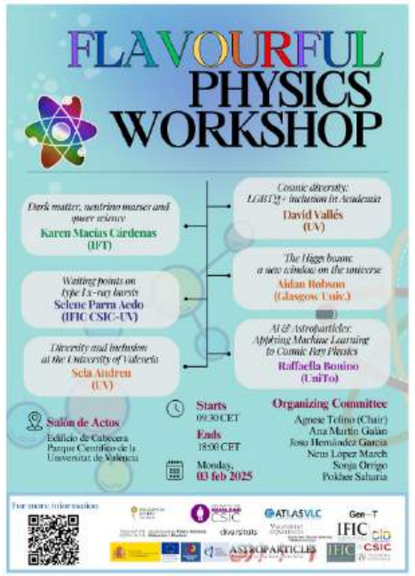


CODE OF CONDUCT (CDC)

The Institute of Corpuscular Physics states the need for everyone working within the Institute to adhere to the following basic principles:

- **No discrimination** based on sex, sexual orientation, gender identity, age, professional or socio-economic status, disability or medical condition, physical appearance, nationality, racial or ethnic origin, religion, or family situation.
- **Respectful and equal treatment.** At our Institute, we promote an inclusive and respectful environment in all our activities, both within and outside the Institute, including conferences, experiments, recruitment processes, and any other event. We will avoid comments about people's physical appearance, inappropriate physical contact, unequal greetings, intimidating or demeaning behavior, and any form of physical or verbal harassment (including insults and defamation).
- **Promotion of work-life balance and shared responsibility.** Let's work together to support IFIC personnel in fully developing their professional careers without interference in their personal lives and raise awareness about gender equality. Let's help address imbalances in professional careers, especially those stemming from personal and family responsibilities. Let's promote balanced gender leadership.
- **Cultural identity.** We respect the cultural diversity of our Institute, which is reflected in the use of different languages and in the distinctive elements of each culture, such as clothing, food, and ways of interacting with others.
- **Empathetic and responsible leadership.** Special care is needed in hierarchical interactions among Institute workers. It is essential for IFIC personnel to foster respectful behavior and set a positive example, avoiding any abuse of power and taking responsibility for the people under their supervision. This applies to all types of personnel, regardless of the nature of their work, with particular attention to those who may find themselves in situations of greater vulnerability or who are significantly influenced by their superiors in their careers, such as doctoral students and postdocs in the research environment, as well as technical or management personnel.
- **Use of language and images.** We must be especially mindful not to use sexualized or discriminatory language, as well as to properly use images, illustrations, and photographs in documents, websites, social media, etc., to ensure diverse and non-discriminatory representation in our community.





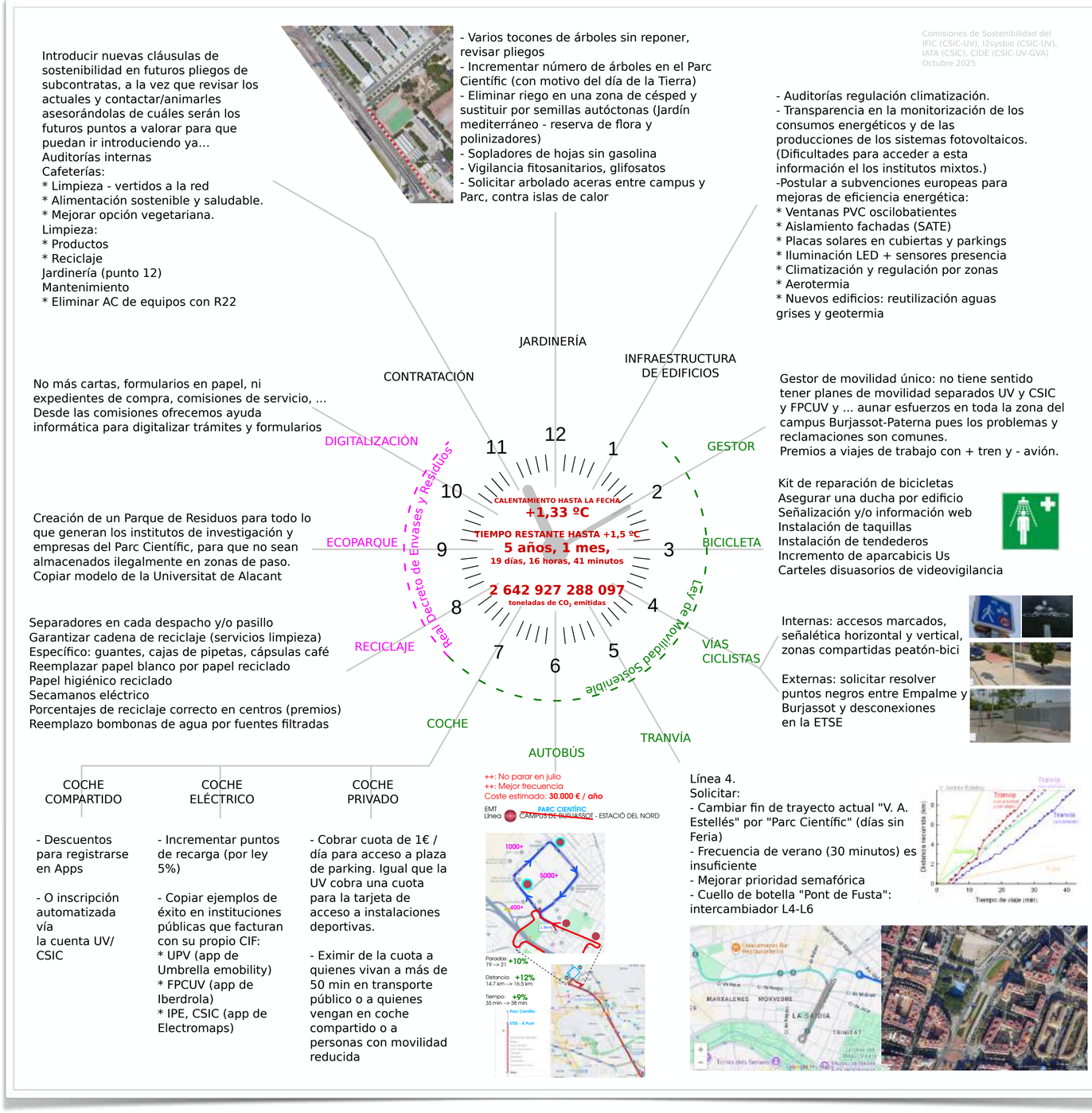
Committee for Sustainability

Formed by 4 IFIC members

12-suggestions document with main suggestions for IFIC and Parc Científic

- Working together with USIU, FPCUV, IATA, I2SYSBIO, CIDE, ICBIBE, ICMOL, IRTIC, Vicerrectorado Sostenibilidad UV
- Application for European calls for energetic efficiency
- Promoting clean transport like biking and improvements in public transport

Proposals sent to ONAC for the "Pacto de Estado Frente a la Emergencia Climática"




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