

External Scientific Advisory Committee meeting

CIEMAT (Madrid), March 11-12, 2026

CIEMAT- Particle Physics Unit Overview

N. Colino

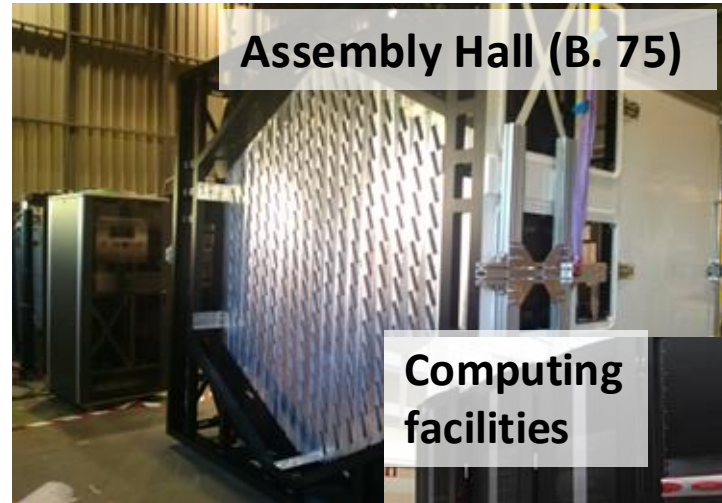
Welcome

- Thanks for coming to new face to face meeting of our Scientific Advisory Committee
- Welcome back to CIEMAT
 - Public research center (OPI) for Energy, Environment and Technology with a Basic Research department
 - Depends of Science, Innovation and Universities Ministry
 - 75 years old
 - About 1,400 employees. Several centers geographically distributed (Madrid, Almeria, Soria, Barcelona, Trujillo)
 - Total budget ~ 120 M€ (35% external funds from competitive projects)
 - Mechanic and electronic workshops, big assembly hall, clean room, data center, fast network access

CIEMAT and Particle Physics Unit facilities



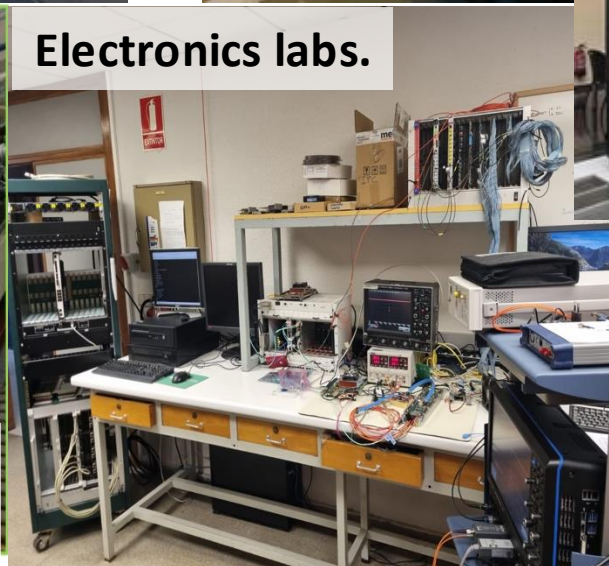
Clean room(B. 20)



Assembly Hall (B. 75)



Mechanical
workshops



Electronics labs.



Computing
facilities



Contents

- CIEMAT Particle Physics Unit background
- Structure of the Unit
- Overview of the research lines
- Funding sources
- Working groups
- Summary

CIEMAT Particle Physics Background

Emerged from JEN's collaboration with CERN in the 1960s.

Pioneer in Spanish experimental particle physics, participating in experiments like MARK-J at DESY, UA1 at CERN, L3 at LEP .

Recognized for its contributions to international projects in particle and astroparticle physics: Maria de Maeztu excellence accreditation in 2016-2019.

Pioneered the introduction of high throughput and distributed computing in Spanish particle physics field.

Participation in major worldwide experiments like CMS@LHC, leading to recognition and increased resources.

Multidisciplinary Research and Output: Engages in diverse scientific fields, publishing numerous high-impact articles and contributing to technological development.

CIEMAT Particle Physics Objectives

Our main goal is to contribute in solving basic pending questions in Fundamental Physics:

- Is there physics beyond the Standard Model of particle physics?
- Are neutrinos a window to new physics?
- What is the nature of dark matter?
- What is dark energy?

The experimental approach required to solve these questions implies the participation in **big international collaborations** and the use of significant **technological resources** in hardware and computer development



Structure of the CIEMAT Particle Physics Unit

CIEMAT-FP consists of the Experimental High Energy Physics and the Astroparticle Physics divisions, and Scientific Computing Unit.

Most of the research program is developed in eight research lines.

Five transversal Working Groups focus on training, outreach, equal opportunities, technology transfer, and support for early career personnel.

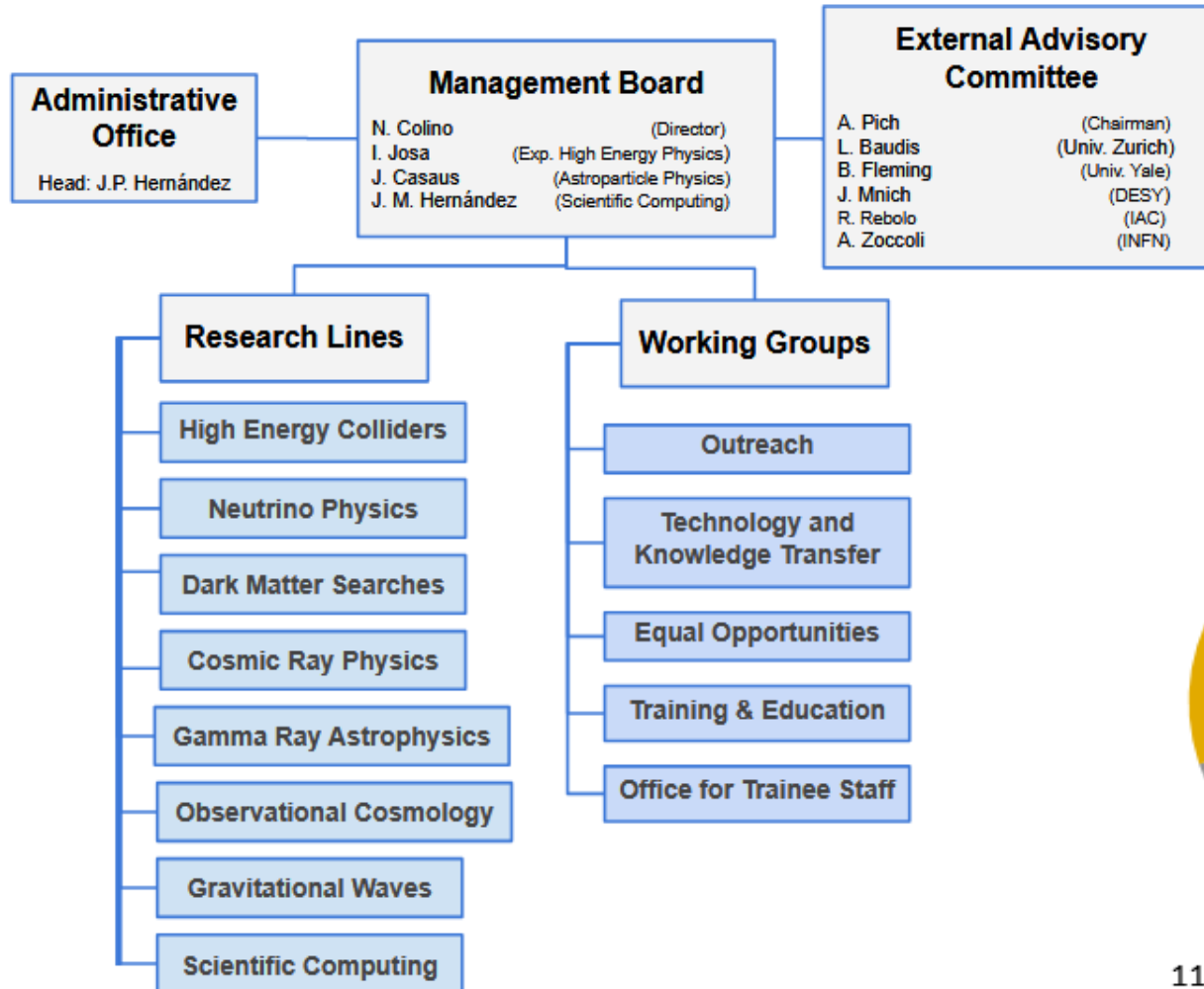
On mid 2025, comprises 111 members, 47% PhD, ~25% female.
Big increase since last report (+18, 7 of them PhD Students)

New step forward this year: 1 RyC, 1 “Atracción de Talento CAM”, 10 temporary
(3 Technicians, 2 Engineers, 5 PostDoc's)

Scientific career promotions: 4 CT, 6 IC, 3 PI (+ 5CT, 9 IC, 5 PI end of this year)

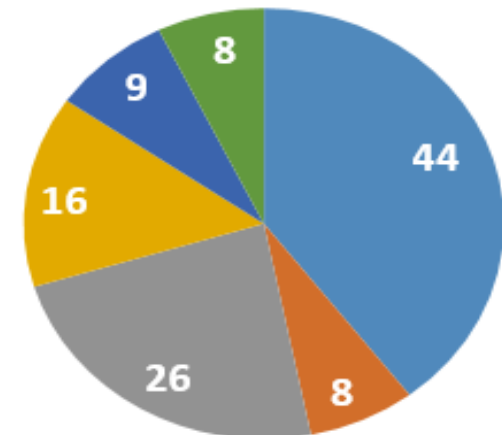
Structure of the CIEMAT Particle Physics Unit

CIEMAT Particle Physics Unit



Personal by type, mid 2025

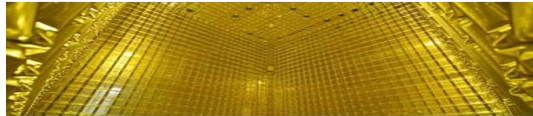
- Research staff
- Scientific postdocs
- PhD students
- Engineers/Graduates
- Technicians
- Administration



111 Total personnel, 67 Permanent,

Overview of the Research Lines

COLLIDER PHYSICS



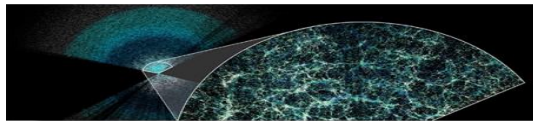
NEUTRINO PHYSICS

DIRECT **DARK MATTER** DETECTION



COSMIC RAYS DETECTION

HIGH ENERGY **GAMMA RAYS**



OBSERVATIONAL **COSMOLOGY**

GRAVITATIONAL **WAVES**



ADVANCED **COMPUTING** TECHNOLOGIES

Overview of the Research Lines

Our research program has 8 main lines:

- **High Energy Colliders:** Probing the constituents of the matter
CMS@LHC: Test the SM to the higher precision and look for new Physics
- **Neutrino Physics:** Unveiling the properties of neutrinos
Dchooz, DUNE, SBND, CLOUD: Determination of neutrino oscillation parameters
- **Direct Dark Matter Detection**
ArDM, DEAP, DarkSide: look for hints of dark matter scattering.
- **Cosmic Rays Detection:** Dark matter and antimatter
AMS@ISS, HERD@CSS: Understanding the origin cosmic rays and using them to study the physics beyond the standard model
- **Physics with very high energy gamma rays**
MAGIC, CTA: unveiling the most energetic processes of the universe and the dark domain
- **Observational Cosmology**
DES, PAU, DESI, LSST-DESC, Euclid: Most competitive constraints to cosmological parameter of the universe through large scale galaxy surveys.
- **Advanced Computing Technology**
WLCG: R+D+I in computing technologies and infrastructure: big science => big data => big computing
- **Gravitational Waves:** Probing gravity @ most extreme phenomena

+ Participation on Detector R&D for future experiments (DRD's)

Highlights of the Unit activities: mid 2023 - mid 2025

See upcoming talks

Some indicators of scientific production

(mid2023—mid 2025)



Funding sources

The primary Funding Source is through the Spanish National Budget: provides foundational funding, covering staff salaries and some predoctoral contracts, as well as PIC operations.

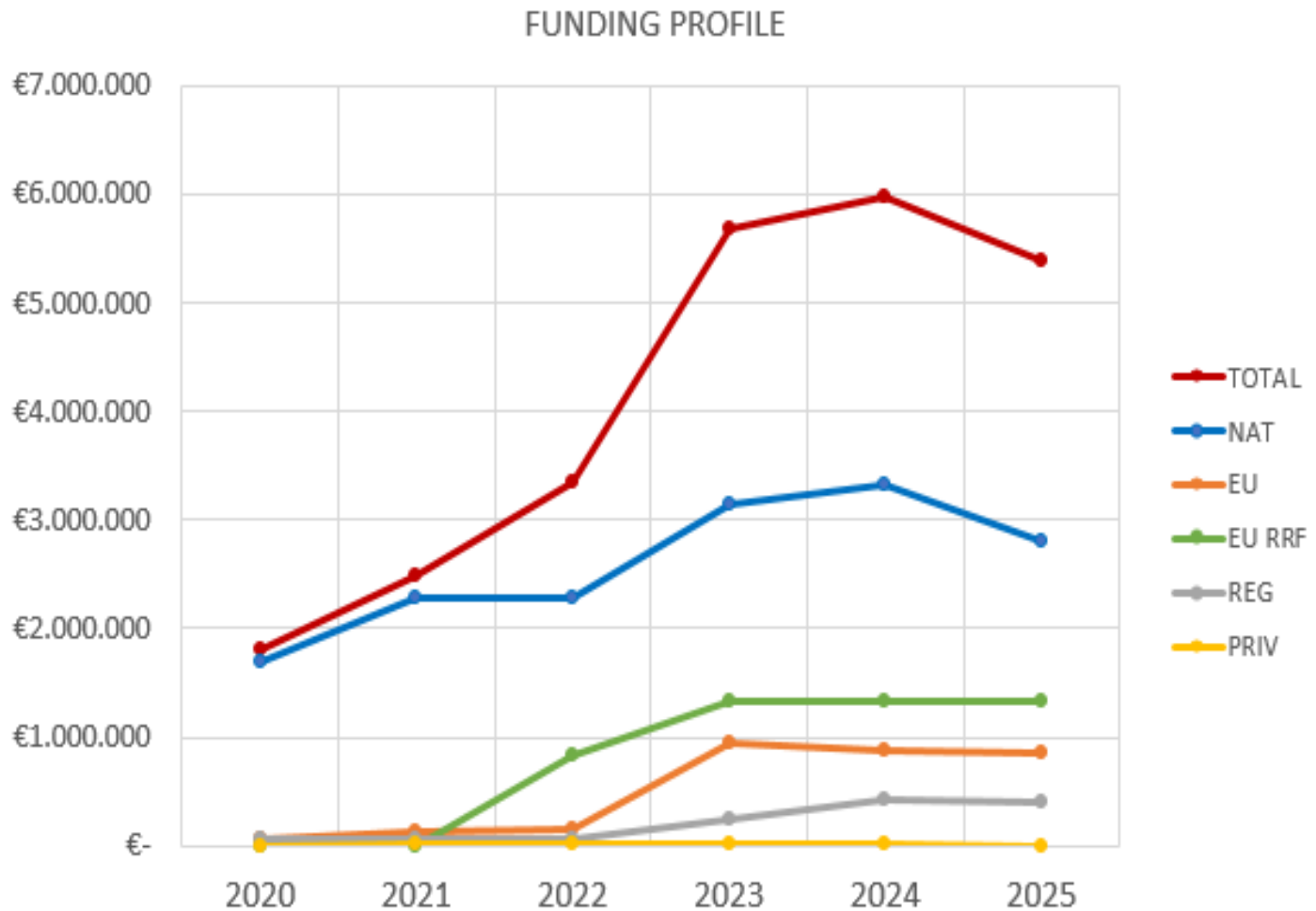
About 5.5M€ annually of external funding is from competitive sources, with AEI as a key contributor.

During the reporting period, the CIEMAT-FP Unit has achieved its highest funding levels to date, but big problems because not national budget

It also includes regional funding, national allocations for specific projects, and small contributions from private organizations.

No new MdM Excellence Award

Funding sources



Working groups

In addition to the scientific research lines

Five working groups to address specific goals:

- Training & education
- Outreach
- Equal opportunities
- Knowledge and technology transfer (Cristina's talk)
- Early Career Personnel office

Scientific Outreach WG

Strategic role

- **Key driver of CIEMAT-FP outreach**
- Since 2023 aligned with the **new Scientific Outreach Unit (UDC)**
- ~15 researcher involved + department-side support

Educational impact

- ~9,000 students (2023/24) ~ 12,000 (2024/25)
- 130 girls in Women & Girls in Science activities
- 70 high-school talks in two academic years
- 40 students/year in international Masterclasses
- 50 students/year in 4ºESO+Ciencia

Leadership & representation

- **Spanish representative to IPPOG**
- Coordinator of the **Spanish Science Communication Network**
- National contact for **CERN Spanish Teacher Programmes**

Public engagement & media

- **Science Week, Midnight, Naukas, science fairs, Pint of Science...**
- **CIEMAT en tu barrio, CIEPub Quiz...**
- **National media collaborations (RNE, SER, RTVE, press, podcast)**
- **Launch of CIEMAT-FP social media channels**

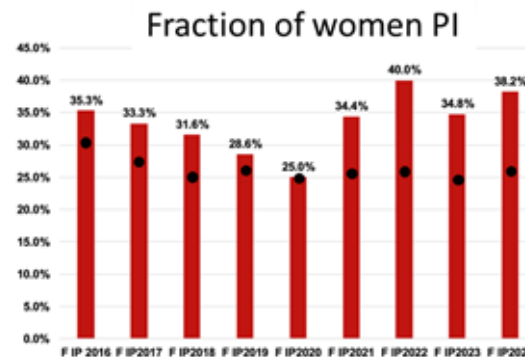
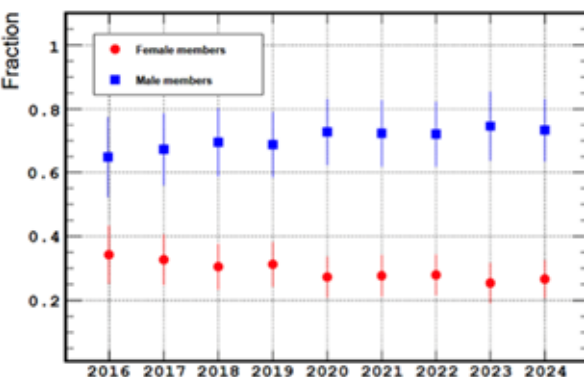
Equal Opportunities WG

Objectives:

- ❑ To raise awareness of the importance of diversity and the reduction of the gender gap
- ❑ To establish the necessary actions to remedy the low representation of women in our Unit
- ❑ Facilitate equal opportunities and inclusion.

Actions:

- Collecting sex-disaggregated data for diagnosis and monitoring of the gender gap
- Development of Gender equality sensitive indicators
- Gender awareness-raising seminars
- Visibility of women researches from school to Universities



Seminar
Espacios libres de violencia:
evidencias científicas de la
mejora personal y profesional
L. Puigvert (UB)

Training and Education WG

- Focused on **attracting** and **retaining talent** at pre- and postdoc level, with a gender and equal opportunities insight.
- Coordinated with other Working Groups (Equal Opportunities, Outreach, Trainee Personnel Office).
- Educational activities also towards other (CIEMAT, international) colleagues (courses).

Activities

- Coordination with Spanish Universities: Scientific faculties and Technological colleges.
Teaching activities at Master level in U.Complutense de Madrid (UCM) and U. Autónoma de Madrid (UAM).
- **Our Offer:** internships, Master Thesis, Particle Physics Summer School, seminars in university cycles, High School Teachers courses: related to all our activities in experimental particle, astroparticle and cosmology physics.
- Our PhD students: Profit from participation in excellent experiments in prestigious laboratories and facilities, with outstanding colleagues from most valuable universities and research centres: at scientific and technological level.

Own distinctive programs:

- Experimental Particle Physics and Cosmology subject @ Theoretical Physics Master in UCM (later source of PhD students)
- Undergraduate Particle Physics Summer School: **Py6cool**
- Seminars Cycle: internal and external speakers



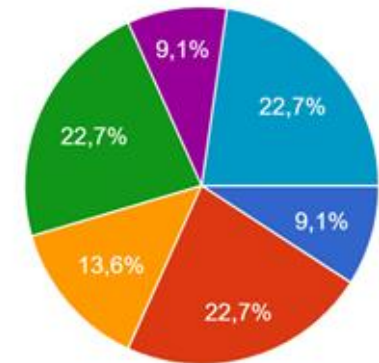
Office for trainee personnel (PEF)

Body responsible for the reception, support and monitoring of scientific-technical staff joining the Unit within the framework of a training programme.

- Ensures the proper integration of the PEF in the CIEMAT-PF Unit.
- Creates appropriate working environment for activities development of CIEMAT-FP Unit.
- Fosters the professional capacities of the PEF

Activities:

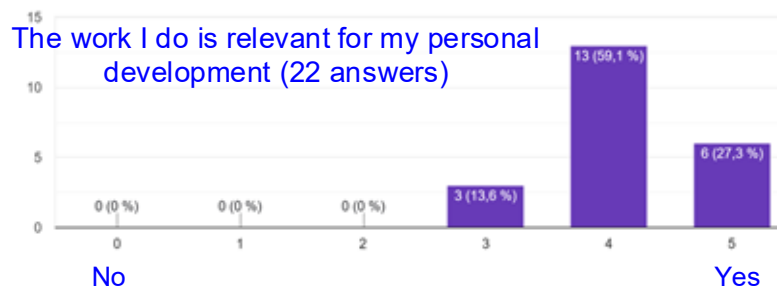
- Creation of several documents with recommendations for PEF's work and Supervisors tasks.
- Welcome document with practical info when incorporating to Unit.
- (Bi-)annual Satisfaction Surveys within PEF.
- Handling of anonymous mailbox to contact PEF Office.
- Management of questions, suggestions, incidents coming from PEF.



Year of contract



From 2025 Survey



Summary

CIEMAT-FP continues its commitment to excellence through rigorous research, interdisciplinary collaboration, and innovative technological advances.

We continue our active engagement in Particle and AstroParticle Physics experiments despite systemic bureaucratic obstacles.

Even without the Maria de Maeztu accreditation, funding and personal have increased and diversified with more international contributors.

We have reinforced the recruitment of young researchers

End
