

CIEMAT Cosmology Group

BCN-MAD Cosmology Meeting

CIEMAT (Madrid)

January 27th, 2025

Eusebio Sánchez on behalf of CIEMAT Cosmology Group

Ciemat

Public research center (OPI) for Energy, Environment and Technology
We belong to the Basic Research Department

Depends of the Ministerio de Ciencia, Innovación y Universidades

75 years old

About 1400 employees.

Centers in Madrid, Almería, Soria, Barcelona and Trujillo

Annual Budget ~120 Meuros (35% from competitive projects)

Departamento de Investigación Básica

Particle Physics Unit

Emerged from the collaboration JEN-CERN in the 1960's

Pioneer in spanish experimental particle physics (MARK-J at DESY, UA1 at CERN...)

María de Maeztu between 2016 and 2019

Participation in major worldwide experiments

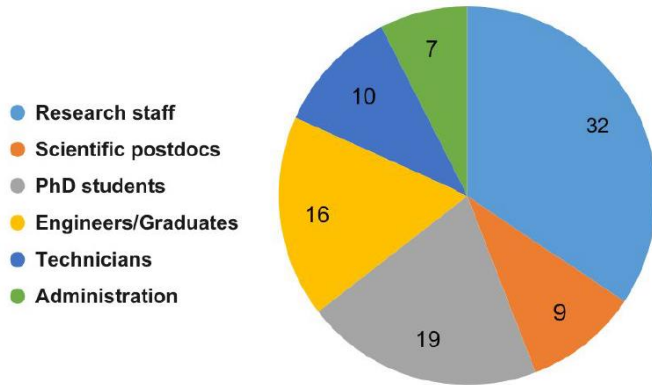
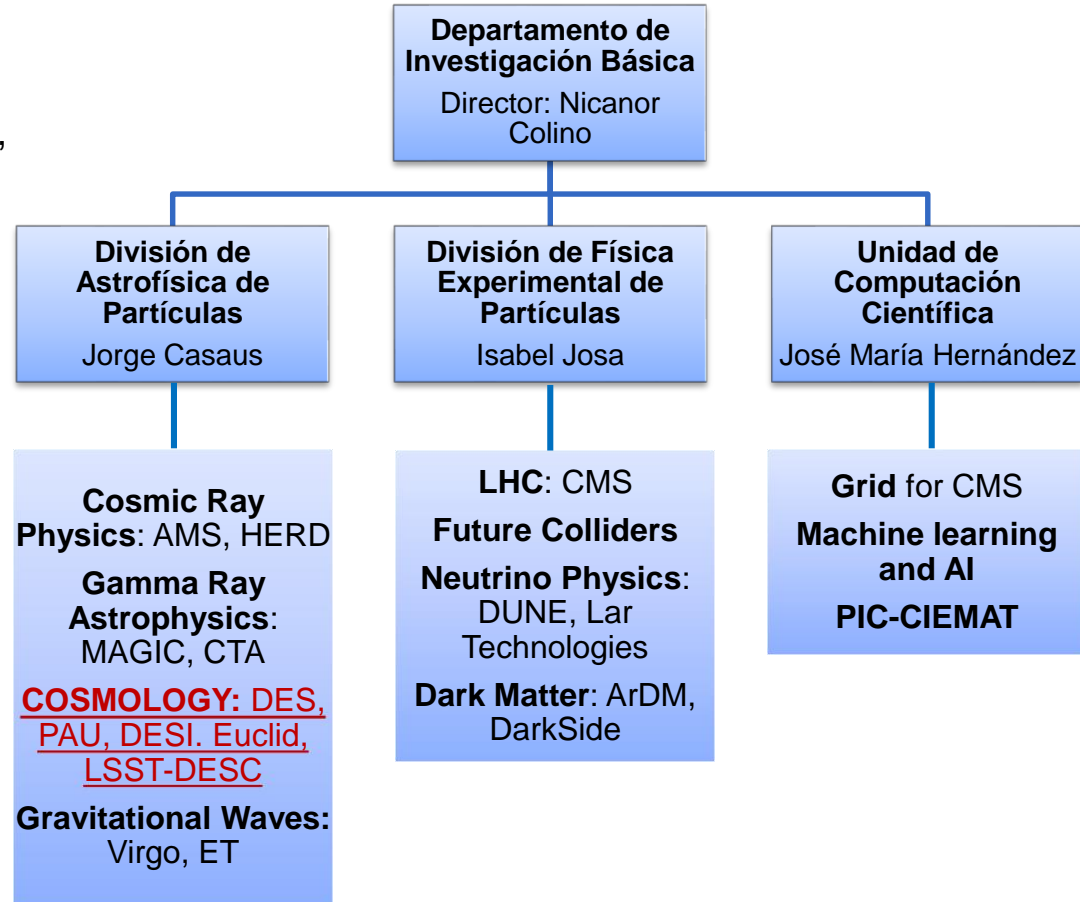
Mechanics and electronics workshops, big assembly hall, clean room, data center, fast network access

Departamento de Investigación Básica

Consists of :

- Experimental High Energy Physics Division,
- Astroparticle Physics Division
- Scientific Computing Unit

As of 2023, 93 members (including scientists, technical staff and administrative staff)



Cosmology Projects

Active:

- **DES (Dark Energy Survey)**
- **PAUS (Physics of the Accelerating Universe Survey)**
- **DESI (Dark Energy Spectroscopic Instrument) and DESI-II**
- **Euclid**

In construction (commissioning):

- **LSST-DESC (Legacy Survey of Space and Time - Dark Energy)**

Possible Future Projects (among others):

- **CMB-S4**
- **Spec-S5 ...**

Current Personnel

Scientific Personnel

Seniors: **E. Sánchez (PI)**, **I. Sevilla (co-PI)**,
L. Toribio (researcher), **J. Carretero** (PIC-CIEMAT, researcher),
S. Ávila (RyC), **S. Joudaki (RyC)**, **A. Porredon (ATCAM)**

Senior Computing Support: **F. J. Rodríguez (1/2 FTE)**

Postdocs: **None**

Students: **N. Deiosso (PhD for 2026)**

Support from other Departments (technology)

Senior Scientists: **J. de Vicente**

Foreseen Growth

Scientific Personnel

CIEMAT predoc: **Manuel Francisco Bernal** (in a few weeks?)

ATCAM predoc: **In progress** (spring 2025)

MAD2Space CAM predoc: **To be started** (summer 2025)

Funding

Spain National Plan

Project: **Fundamental Physics and Cosmology with Extragalactic Surveys**

Funding Agency: MICINN (PID2021-123012NB-C42)

Duration, from: **2022 to: 2025**

Funding: **237160 €**

PI: **Eusebio Sánchez** ; co-PI: **Ignacio Sevilla**

New Projects (in progress):

FPA COSMOFUN 2025-2028; PI: **Ignacio Sevilla**; co-PI: **Shahab Joudaki**

AyA COSMo 2025-2028; PI: **Santiago Ávila**; co-PI: **Anna Porredon**

MAD2Space CAM 2025-2029; PI: **Laura Toribio**; co-PI: **Juan de Vicente**

Long list of previous projects since 2006 (~55 Keuros/year from Plan Nacional)

Coordinated projects IFAE, CIEMAT, IFT-UAM, PIC

In addition some (ended) other sources,

Consolider 2007 → Origin of PAU Collaboration

EWC (Enabling Weak Lensing Cosmology), H2020 Project

Expertise

Hardware and technical work

Mechanics for large projects

Electronics (DES, PAU and many particle physics experiments)

Cosmology Data Management

DES Science Release Group

Rubin-LSST Science Release

Photometric Redshifts

DNF

Data Analysis

BAO and galaxy clustering in general

3x2pt (analysis and modelling)

Cosmological Parameters (MCMC chains, covariance matrices, ...)

Neutrino masses

Primordial non-Gaussianities

Simulations

Current Responsibilities in collaborations

DES (since 2006):

Member in the Management Committee
Chairman of the Membership Committee
Convener of the Science Release WG
Both conveners of the DES LSS WG
Member of the EDI Committee

PAU (since 2007):

Proponent and creator of the project and
the international collaboration
Member of the Management Committee

DESI (since 2014):

Member of the IB
Member of the Speakers Bureau
Member of Membership Committee

Euclid (since 2011):

Member of the EWC Consortium
ECDC Co-chair
co-lead of likelihood WG
Coordinator of DR1-KP-GC-8
photoz clustering in DR1
Leader of WP on simulated data
challenges

LSST-DESC (since 2016):

Computing and simulations
coordinator of the Collaboration
Convener of Science Release and
Validation WG

KiDS:

Coordinator of 6x2pt WG

Challenges and outlook

CIEMAT is well positioned to participate in world leading cosmology projects

Group needs to face some challenges for the near future:

Lack of personnel → Need for more postdocs and PhD students

Need to decide for medium and long term projects after LSST-DESC →
Including technical activities and responsibilities

From P5: CMB-S4, Spec-S5