



## Master's degree in Particle Physics and the Cosmos

The master in Particle Physics and the Cosmos is a joint official degree of the Universidad de Cantabria (UC) and the Universidad Internacional Menéndez Pelayo (UIMP), with the collaboration of the Spanish National Research Council (CSIC), aiming to form future researchers in the fields of the high-energy physics, astrophysics and cosmology.

### Objective

The main objective is to offer an advanced formation on fundamental concepts and methodologies to students interested in developing a research career in the fields of particle physics, astrophysics and cosmology.

Depending on the selected branch, the student will obtain a deep knowledge of the microscopic world of the high-energy physics, or in the cosmological properties of the Universe and the main astrophysical processes taking place in it.

During the master, students will be in touch with researchers participating in some of the most important and paramount international collaborations of the current scientific panorama.

At the end of the Master, students will have a wide and deep knowledge on two of the most thrilling fields in Physics, and will be capable to join a research group and to start doctorate studies.

In addition, he/she will have acquired skills, both, from the methodological and practical points of view, which will be very important in case a career outside the academia is preferred.

### Student's profile

Graduate in Physics or related sciences, interested in receiving an advanced formation in two of the most active research fields in nowadays Physics, and obtaining a solid theoretical and data analysis background to start a Ph.D.

### Information

#### Area of knowledge:

Science

#### Venue:

Universidad de Cantabria  
(Santander, Spain)

#### Duration:

1 academic year

60 ECTS (18 ECTS dedicated to the Final Degree Project)

It is possible to complete up to 120 ECTS for those students coming from a Bachelor of 180 ECTS, in order to join any European Doctoral School.

#### Language:

English and Spanish

#### Contact:

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Students will obtain a very valuable view on how the current research work is performed within large international collaborations, having a first opportunity to start their research through developing a large and complete Final Degree Project.

# Contents and Scholarship opportunities

## Courses Programme

Students should follow 60 ECTS, divided in 4 modules:

**Common Module: 24 ECTS (compulsory)**

- Statistics and data analysis (6 ECTS)
- Scientific Programming (3 ECTS)
- Standard model of particle physics (6 ECTS)
- Physics of the cosmos (6 ECTS)
- Frontier research in astrophysics and particle physics (3 ECTS)

**Final Degree Research Project: 18 ECTS (compulsory)**

**Specialization Module: 12 ECTS (optative)**

- Specialization in Particle Physics**
  - Detection methods and in Particle Physics (6 ECTS)
  - Analysis tools in Particle Physics (6 ECTS)
- Specialization in Physics of the Cosmos**
  - Extragalactic astrophysics (6 ECTS)
  - Cosmology (6 ECTS)

**Advanced Research Module: 6 ECTS (optative)**

- Advanced Astrophysics
- Advanced Particle physics and Cosmology
- Research Project
- Advanced Computation

## Research Programme

The research programme is sustained by the Final Degree Research Project, which consists on an advanced research work supervised by one of the researchers of the Master. This work is on the field of the selected specialization. Also, it is possible to perform an additional (and shorter) research work, preferably on the non-selected specialization.

The Master is taught by teachers and researchers of the Science Faculty of the Universidad de Cantabria, of the Instituto de Física de Cantabria and of other researchers from the Spanish National Research Council and other international Centres and Universities.

A vast majority of these professors perform their research activity on different topics related to Particle Physics, Astrophysics and Cosmology, being part of some of the most important experiments and collaborations on these fields, as the discovery of the Higgs boson, or the measurement of the most precise map of the anisotropies of the cosmic microwave background, among other recent achievements.

## Scholarships

It is possible to apply for several scholarships or grants associated to the Master. Please refer to the Master web page for the availability of scholarships for the coming academic year:  
<https://masterphyparcos.ifca.es>

