ERASMUS MUNDUS JOINT MASTER DEGREE IN NUCLEAR PHYSICS

Co-funded by the Erasmus+ Programme of the European Union

www.emm-nucphys.eu nucphysinfo@us.es

SPECIALIZATION PATHS

- Experimental / large accelerators
- Theoretical
- Applied / small accelerators

NUMBER OF ECTS CREDITS

- 120 (60 ECTS / year)

PUBLIC FEES

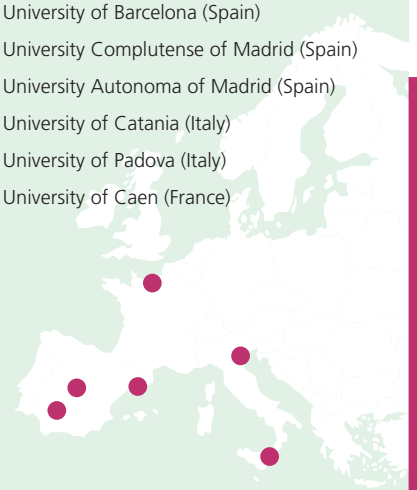
- 4500 euro / year Program Country Students

LANGUAGE OF INSTRUCTION

- English

HOST INSTITUTIONS

- University of Seville (Spain)
- University of Barcelona (Spain)
- University Complutense of Madrid (Spain)
- University Autonoma of Madrid (Spain)
- University of Catania (Italy)
- University of Padova (Italy)
- University of Caen (France)



DESCRIPTION AND OBJECTIVES

NucPhys is a 2-year Erasmus Mundus Master in Nuclear Physics (120 ECTS) and it is offered by a consortium of 7 partner universities in Spain, France and Italy, **with the participation of more than 30 research institutions/companies as associated partners worldwide**. Nuclear Physics is a broad matter of relevance from both the fundamental knowledge of Nature and the multiple applications to different fields of strategic economical relevance. Consequently, in this Master, fundamental theory and experiments as well as applications will be presented.

The main objective of the Master programme is to provide top-ranked students with an excellent background in Nuclear Physics so as to educate experts and foster their future career in this field. At the same time, NucPhys students carry out their master studies in least 3 countries, in a stimulating and scientifically excellent international environment, including Research internships (12 ECTS) carried out in companies or research institutions.

ADMISSION PROFILE

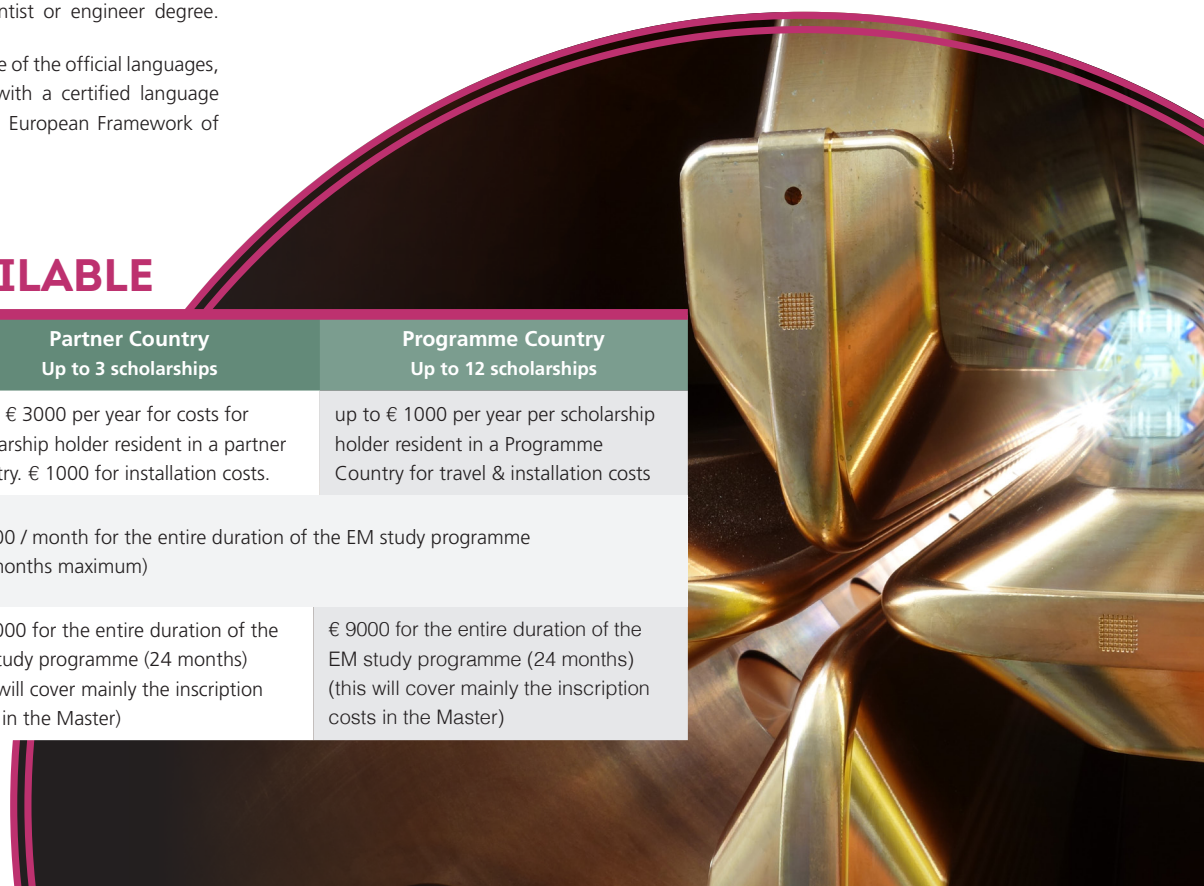
- NucPhys is aimed at all graduated in Physics, Chemistry, Engineering, Applied Mathematics or any other kind of scientist or engineer degree.
- Candidates from countries where English is not one of the official languages, must demonstrate their knowledge of English with a certified language level equivalent to B2 using the CEFR (Common European Framework of Reference for Languages).

NUCPHYS WILL BE PARTICULARLY USEFUL FOR

- Research in the field of Fundamental Subatomic Physics
- Medical physics and hadrontherapy
- Radiology
- Environmental radioactivity
- Nuclear techniques for multi-elemental analysis
- Nuclear dating techniques
- Nuclear power plants and waste management

15 ERASMUS+ SCHOLARSHIPS AVAILABLE

The Master scholarships from the ERASMUS + program include	**Partner Country** Up to 3 scholarships	**Programme Country** Up to 12 scholarships
Contribution to travel, installation and any other type of costs	up to € 3000 per year for costs for scholarship holder resident in a partner country. € 1000 for installation costs.	up to € 1000 per year per scholarship holder resident in a Programme Country for travel & installation costs
Contribution to subsistence costs (for both Programme and Partner Country scholarship holders)	€ 1000 / month for the entire duration of the EM study programme (24 months maximum)	
Contribution to participation costs	€ 18000 for the entire duration of the EM study programme (24 months) (this will cover mainly the inscription costs in the Master)	€ 9000 for the entire duration of the EM study programme (24 months) (this will cover mainly the inscription costs in the Master)



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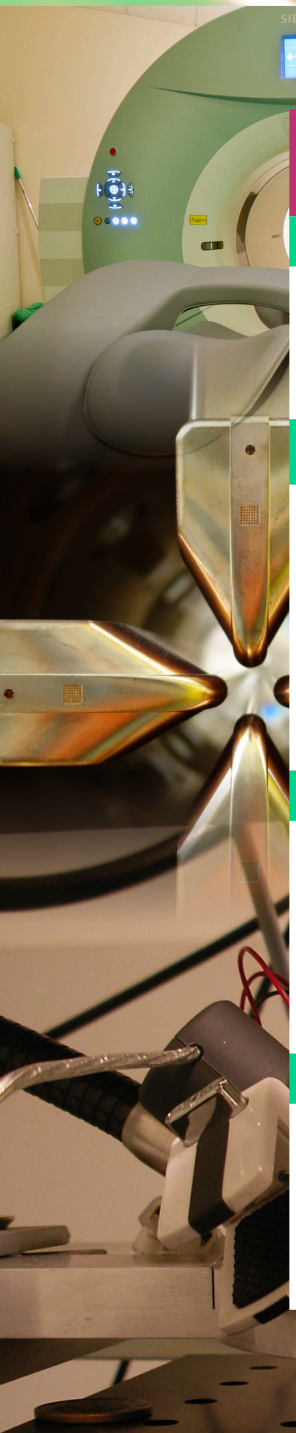

PATH 1 EXPERIMENTS AND INSTRUMENTATION IN LARGE ACCELERATORS	PATH 2 THEORETICAL NUCLEAR PHYSICS	PATH 3 APPLICATIONS AND SMALL ACCELERATORS
SPECIFIC OBJECTIVES OF THE PATH		
The aim of this path is the advanced education of young students in experimental Nuclear Physics using large accelerators. Most of the largest accelerators in the world are associated partners of this Master and students could have the opportunity of visiting some of these facilities.	The specific objectives of the theoretical path can be identified with providing the students with a solid preparation in several features of nuclear structure, nuclear dynamics, nuclear astrophysics and in various other aspects of theory of fundamental interactions.	The aim of this path is the advanced education of young students to different applications (medicine, environment, archeaometry, accelerators, etc.) in the field of Nuclear Physics.
BRIEF PROGRAM DESCRIPTION AND COURSE GENERAL CONTENT		
All paths include during S1 general master-level courses in Quantum Mechanics, Atomic and Plasma Physics, Basic Experimental Nuclear Physics, Computing and numerical calculations. Then, in S2 in Padova, students will have the opportunity to interact with major experts in the various fields at international level. Besides this, this path aims at the training on the use of particle detectors, and of other experimental instrumentation for the study of Physics of Fundamental Interactions. Students will also learn recent technics for data taking and analysis. Different activities are programmed, including a visit to the Laboratori Nazionali di Legnaro.	All paths include during S1 general master-level courses in Quantum Mechanics, Atomic and Plasma Physics, Basic Experimental Nuclear Physics, Computing and numerical calculations. For S2, in different Spanish cities, studentsn will take courses on Nuclear Structure and Reactions, Weak Interactions, Hadron Physics, etc. Students will visit differents Spanish Universities and Facilities . They will visit CIEMAT (Madrid), ALBA (Barcelona), Supercomputing center (Madrid), CNA (Sevilla).	All paths include during S1 general master-level courses in Quantum Mechanics, Atomic and Plasma Physics, Basic Experimental Nuclear Physics, Computing and numerical calculations. Furthermore, in S2 in Catania,advanced courses in nuclear physics applications will be held also with the participation of external experts. Both in the regular courses and in extra activities, students will be approached to experimental techniques, detectors, accelerators and analysis procedures. Different activities are programmed, including a visit to the Laboratory Nazionali di Sud, including the two accelerators, the experimental halls and the Radioactivity Laboratory.
TECHNICAL SPECIFICATIONS OF THE PATH		
All master lectures will be in English. During the first year, students will be in S1 at University of Seville (Spain), then for S2 they will move to University of Padova (Italy). During the second year, students will receive lectures in **University of Caen** (including the internship) in the first half of the academic year (S3). Finally, for S4, students will move to the selected place for developing the Master Thesis in experimental nuclear physics.	All master lectures will be in English. During the first year, students will be in S1 at University of Seville (Spain), then for S2 they will stay in Spain but will move for short periods of teaching to Madrid and Barcelona (Spain). During the second year, students will receive lectures in **University of Caen** (including the internship) In the first half of the academic year (S3). Finally, students will move for S4 to the selected place in Italy (either Padova or Catania) for developing the Master Thesis in theoreticall nuclear physics.	All master lectures will be in English. During the first year, students will be in S1 at University of Seville (Spain), then for S2 they will move to University of Catania (Italy). During the second year, students will receive lectures in **University of Caen** (including the internship). In the first half of the academic year (S3) and will move for S4 to the selected place for developing the Master Thesis in applied nuclear physics.
CAREER OPPORTUNITIES		
Thanks to high-level education on general aspects in subatomic physics and to specific experimental and technical acquired competences, students can be projected towards different career opportunities both in the academic sector (fundamental research in physics) and in the R&D department of industries in all the technology sectors dealing with ion beams, data acquisition and instrumentation. A continuation in PhD is also foreseen.	The theoretical path has as natural development an academic career and/or an activity in research in fundamental nuclear and particle physics and astrophysics. Furthermore, the skills acquired and the high level of scientific preparation will be able to provide these students with job opportunities in all the different fields needing modelling, data storage and analysis, software package development and related areas. A continuation in PhD is foreseen.	The high-level education on general aspects in subatomic physics and the specific experimental and technical competences acquired in this path concerning the different nuclear physics applications of social interest will allow students to access executive positions in companies or laboratories dealing with radiation protection, waste management, proton and hadrontherapy, radioisotopes for medicine, archeaometry, accelerators, etc. A continuation in PhD is also possible.

MORE THAN 80% OF OUR MASTER GRADUATES GOT A GRANT FOR PHD ALL AROUND THE WORLD JUST BEFORE FINISHING THEIR MASTER STUDIES