



# Masters Degree in

# FUNDAMENTAL RESEARCH IN SUBATOMIC PHYSICS

**Explore the Universe, from the infinitely small to the infinitely large.**

The Master's in Research in Subatomic Physics (RPS) at Nantes Université offers a unique training programme in nuclear physics, particle physics, and astrophysics. Designed to prepare students for PhD research in top laboratories in France and abroad, it also equips them with highly transferable skills in data science, advanced computing, and high-tech innovation. Combining theory, experiments, and cutting-edge data analysis, the programme opens the way to careers in both fundamental research and the private sector, from academia to Big Data, nuclear energy, and beyond.

## Syllabus

### First Semester (27 ECTS)

- Statistical physics (4 ECTS)
- Signal Acquisition and Processing I (2 ECTS)
- Quantum physics (4 ECTS)
- Atomic physics (3 ECTS)
- Subatomic physics (4 ECTS)
- Detector physics (5 ECTS)
- Statistical methods (4 ECTS)
- Knowledge of Organizations (1 ECTS)
- Optionnal: English TOEIC® preparation

### Second Semester (33 ECTS)

- Informatics (1 ECTS)
- Experimental project (8 ECTS)
- Signal Acquisition and Processing II (1 ECTS)
- Experimental physics (3 ECTS)
- Standard Model and Beyond I (2 ECTS)
- Nuclei, Astronuclear and Compact Objects (4 ECTS)
- Cosmology and field theory (4 ECTS)
- Internship (10 ECTS)

### Third Semester (30 ECTS)

- PROJECT: Theory and Analysis (3 ECTS)
- Detection (2 ECTS)
- Astroparticles and Multimessengers (1 ECTS)
- Nuclei and Astronuclear (2 ECTS)
- Standard Model and Beyond I (5 ECTS)
- Standard Model and Beyond II (4 ECTS)
- Quantum Field Theory (3 ECTS)
- Soft Skills (3 ECTS)
- Fundamentals of Nuclear Physics (1 ECTS)
- Experimental project (3 ECTS)
- Modelisation (3 ECTS)

### Fourth Semester (30 ECTS)

- A 4 to 6 months internship

## Skills

- › Master advanced concepts in nuclear, particle and astroparticle physics
- › Perform high-level experimental research, from detector design to data analysis
- › Use modern simulation frameworks and statistical tools to model complex physical processes
- › Apply artificial intelligence and machine learning techniques to large-scale scientific data
- › Develop strong problem-solving, programming and project management skills
- › Communicate research results effectively in international academic and professional contexts

## Career Opportunities

### Sectors

- › Higher education and fundamental research
- › High-tech industries (detector development, instrumentation, aerospace, medical imaging, nuclear technologies)
- › Data science, artificial intelligence and Big Data applied to scientific and industrial challenges
- › High-performance computing, modeling, and simulation for physics and engineering

### Occupations

- › PhD researcher lecturer, or professor
- › Research engineer in large research organizations
- › Detector and instrumentation engineer (medical physics, space technologies, security)
- › Data scientist or machine learning engineer in high-tech companies
- › Project manager in innovative sectors



Faculté des sciences  
et des techniques



[univ-nantes.fr/sciences](https://univ-nantes.fr/sciences)

# Admission criteria



› To enter this Master's degree in 1st year (1st semester) applicants should hold a Bachelor's degree in **Astrophysics or Subatomic physics**.

› You can also enter the programme in second year (3rd semester). Applicants should hold a degree equivalent to the first year of a master (i.e. a 3-year Bachelor is not acceptable), for example a 1st year of MSc validated in a field related to the scientific field of the master.

## Requirements

- › Transcripts of records, GPA
- › 87 TOEFL / 785 TOEIC / 5.0 IELTS / B2
- › Ranking in the promotion (position of student/number of students)

## Application

- › Exchange students follow the application procedure for exchange students.
- › Students coming from a country using the CEF/Campus France procedure must enroll with Campus France.
- › Students coming from a country not using the CEF/Campus France procedure follow the non CEF-procedure.
- › European students must complete the application process on [mon-master.gouv.fr](http://mon-master.gouv.fr).

## Cost

The cost refers to education and training costs that includes additional services such as French language classes.

- + A provisional budget is available on [Nantes Université's website](http://Nantes Université's website).

## Academic calendar

Courses start in early September.

### Hosting research lab

Subatech, Subatomic Physics and Technologies

Laboratory's website



### Faculty key figures

**5 000**

Students

**19%**

International  
Students

**96%**

Professional  
integration\*

**11**

Research Units

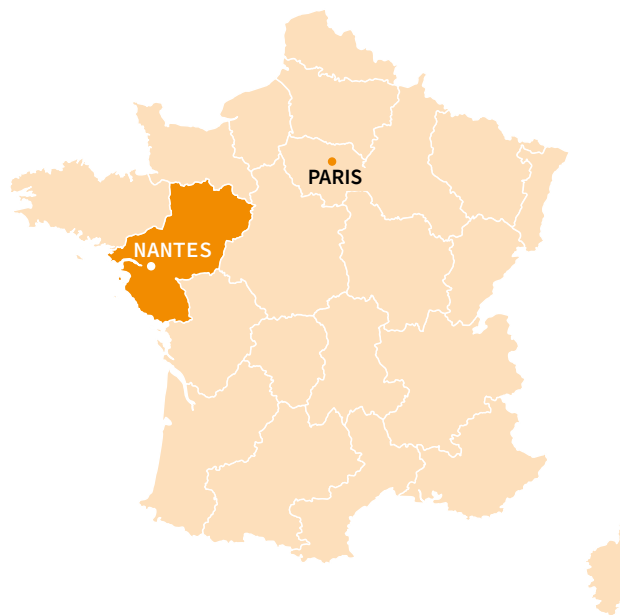


## Location

In Nantes, the university is organized into four major campuses along the Erdre River, crossing the city from north to south to the Ile de Nantes on the Loire River.

The programme courses are located on the Lombarderie Campus which is a wooded area well served by public transportation.

Nantes (600,000 inhab.) is located close to the Atlantic Ocean and is regularly rated as one of the most pleasant French cities to live in. Thanks to its beautiful parks, efficient public transport and other policies for sustainable development, Nantes has been awarded the status of European Green Capital.



After graduating in 2024, 9 students out of 10 started a funded PhD

### Contact

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