

## PHYSICS

A Ph.D. in Physics is an excellent choice for those interested in a career in academia, research, or industry, and for those who want to pursue their interests in physics. It provide deep knowledge and skills in the various areas of Physics. Graduates in Physics are highly sought after in academia, research institutions, industries and in all activities related to new and innovative technologies. Due to the analytical and problem-solving skills developed during their PhD program, physicists can fit very well for activities in several related domains like artificial intelligence, biology, computer science, complex system modelling, epidemiology, finance, government, mathematics, etc...

## QUANTUM TECHNOLOGIES (QT)

QT have radically innovative characteristics and have an intersectorial impact, in strong discontinuity with the technologies available today. The transformation that is envisaged is disruptive, QT having direct and far-reaching repercussions in many fields, from information technology to biology, from telecommunications to engineering, from chemistry to pharmaceuticals, from medicine to the environment. Some quantum solutions are already on the market. At national level the great interest is testified by special measures dedicated to QT in the National Research Plan (PNR) 2021-2027; more over the European Commission launched the 10-year Quantum Flagship program funded with 1 billion euros in 2018 for research and development projects..

The PhD program in QT offers very relevant job opportunities as experts in QT for cutting-edge research activities in high-Tech industries, research centers and Universities. Graduates in QT are entitled: i) to develop applications, systems and services based on quantum technologies aimed at quantum information and computation, quantum communication, quantum simulation, quantum sensors and metrology; ii) to develop quantum software; iii) to carry out advanced research in the field of quantum science and engineering, tackling fascinating problems in every area.



Polytechnic and Basic Sciences School www.scuolapsb.unina.it

Sito web dei corsi di Dottorato Physics http://www.fisica.unina.it/en GB/presentazione-dottorato

Quantum Tecnologies http://www.fisica.unina.it/en\_GB/presentazione-dottorato-qt

## Segreteria del Dottorato

Sig. Guido Celentano tel. 081-676870 guido.celentamo@unina.it

### Coordinator

Physics Prof. Vincenzo Canale vincenzo.canale@unina.it

Quantum Tecnologies Prof. Giovanni Piero Pepe giovannipiero.pepe@unina.it









Polytechnic and Basic Sciences School

## PhD Program in Physics Dipartimento di Fisica Ettore Pancini and

# PhD Program in Quantum Technologies

Università di Napoli Federico II Università di Camerino Consiglio Nazionale delle Ricerche



AIMS

## PHYSICS

The PhD program in Physics is settled at the Department of Physics "Ettore Pancini" of the University of Naples "Federico II", one of the largest research Universities in Italy, and the oldest public University in the World, dated since 1224. It is based in the Department of Physics of the University, but with wide collaborations with several research institutes like INFN (National Institute for Nuclear Physics), CNR-SPIN (National Council for Researches - SuPerconducting and other INnoivative materials and devices Institute) and INAF (National Institute for AstroPhysics), INGV (National Institute of Geophysics).

The research subjects at Department and collaborating institutes cover almost all topics of physics (theoretical, nuclear, sub-nuclear, matter physics, astrophysics, geophysics, medical physics, applied physics, etc.), and in some cases interdisciplinary subjects. For further details, we suggest surfing the web sites of the Department (www.fisica.unina.it ) and Institutes given above.

#### QUANTUM TECHNOLOGIES

The Ph.D. Program on "Quantum Technologies" aims at promoting a novel scientific awareness based on interdisciplinary skills useful to the development of quantum devices and technologies.

The PhD program and courses intend to cover different quantum platforms, building on complementary expertise ranging from physical sciences to chemistry, engineering and informatics. They will cover quantum computation, quantum networks and communication, quantum simulation, quantum sensors and metrology with some focus on quantum interfaces and couplers for integrated hybrid quantum devices. The underlying concept of the need of an interdisciplinary background is that the "whole", i.e. an integrated quantum device, can be better than the sum of its ingredients. Only a smart combination of different platforms can provide flexible and transformational solutions, useful for a variety of quantum applications. Partners are currently the University of Napoli Federico II, the National Council of Research (CNR) and the University of Camerino.

## **KEY WORDS**

#### PHYSICS

Astro-particle physics, Astrophysics, Biophysics, Geophysics, High energy physics, History of physics, Matter physics, Nanophysics, Nuclear physics, Optics, Statistical physics, Theoretical physics

Accelerators and detectors, Analog and digital electronics, Atoms and molecules, Complex systems, Fields and particles, Gravitational waves, Green energy, Laser, Medical imaging, Muon radiography, Nanoparticles and nanostructures, Radiation and radioprotection, Relativity and cosmology, Semiconductors, Sensors and biosensors, Space flight, Strings, Symmetries Data science, Big data, Computing, Data analysis, Network.

## QUANTUM TECHNOLOGIES

Quantum physics, Quantum optics , Quantum computing, Quantum communication, Quantum entanglement, Quantum tunneling, Quantum sensors, Quantum simulation, Quantum superposition, Qubits and transmons, Quantum effects in Nanoscience, Quantum interfaces, Quantum networks and communication, Quantum sensors and metrology, Criptography, Low noise Low temperatures, Josephson junction, Superconductivity.







## **OPPORTUNITIES**

The normal duration of the PhD program is of three years. In order to achieve the PhD, research results have to be published in peer reviewed international scientific journals. The results of the research performed during the PhD program must be written down in the doctoral thesis. All PhD students during the three years of the program must have at least one relevant experience with the international scientific community, such as research visits in international institutions, or attending international conferences or scientific school.



## ADMISSION

To access the PhD program in Physics or in Quantum Technologies a master's degree is required, and applicants must pass a selection process based on their academic qualifications and an oral interview.





## LOCATION

Dipartimento di Fisica "Ettore Pancini", Complesso Universitario di Monte Sant'Angelo, Via Cinthia, 21, Edificio 6. 80126 Napoli.

#### **Public transportations:**

R6, 180,S1 buses from P.le Tecchio subways CUMANA (MOSTRA) and FS (CAMPI FLEGREI).

