





PhD in THE HADRON ACADEMY Risk and Complexity in High Tech Medical Innovation

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Scientific fields	ICAR/09; ICAR/03; IUS/02; FIS/07; ING-INF/06; FIS/01; MED/36; FIS/02; MED/06;
	BIO/13
Brief description	 BIO/13 The extraordinary increase of technologies available in the biomedical field induces as a consequence the need of controlling the adequacy of medical procedures and their prescription, the preparation of medical staff for the informed use of technologies and the management of risks associated to their use with patients. The increasing complexity of this topic requires the harmonization of different competences in order to optimize all phases of the therapeutic route of the patient. In addition, the technological development in medicine is a complex procedure also under the legal and ethical point of view, aspects essential for allowing innovation reaching the patient. In this scenario, the PhD program in Risk and Complexity in High Tech Medical Innovation aims at the education of medical doctors, medical physicists, biologists, engineers, physicists with a program whose goal is building a common language and integrating different skills and competences. The agreement between the Scuola Universitaria Superiore IUSS (IUSS), the University of Cagliari and Fondazione CNAO (CNAO) ensures the right synergy of scientific, methodological, technological, legal/ethical competences needed for considering the mentioned topics in the specific scientific/technological area of Hadrotherapy. The PhD course, characterized by a high degree of interdisciplinarity, proposes every year to the candidates, research topics and activities characterized by interdisciplinarity and complexity that can be dealt with by motivated students coming from different disciplines, i.e. biomedical disciplines (physicists, engineers, data scientists), humanities/social disciplines (lawyers, economists, philosophers). The research activities will be accompanied by a curriculum including both common and specialistic courses. Common courses will deal with general topics related to hadrotherapy (the main focus of the PhD) and to risks associated to the technological innovation in the biomedical
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Duration	3 vears
Number of	6 positions, of which:
positions available	
	 n. 1 position co-funded by Piano Nazionale di Ripresa e Resilienza (PNRR) DM 630/2024, on the following topic: <i>RADOTHERAPY: from radiobiology to patient care, through the integration of different disciplines.</i> Main topics: Exploring therapeutic approaches with different particles, guided by the biological characteristics of tumors in radioresistant forms. Treatment program guided by radiobiology, designed by medical physics, and implemented by heavy particle accelerators. New methods for characterizing mixed fields and activation, and development of innovative instrumentation for radioprotection. Development of a detector for simultaneous treatment and range verification with a dual ion beam.











	Company involved: CNAO
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	 n. 1 position funded by CNAO on the topic: BORON NEUTRON CAPTURE THERAPY (BNCT): the multidisciplinarity of care. When radiobiology, pharmacology, physics, and engineering contribute to the improvement of medical treatments. Main topics: Implementation of clinical workflow for BNCT (Radiotherapy, Medical physics, Bioengineering). New methods for characterizing mixed fields and activation, and development of innovative instrumentation for radioprotection. Study of radiation fields generated by BNCT and their detection during commissioning and clinical activity.
	 n. 2 positions funded by CNAO on the following topic: Particle Accelerators: advanced technologies and radioprotection.
	 n. 2 positions funded by IUSS on one of the following topics relevant to the doctoral course subjects:
	 Machine-learning classification models applied to biomedical imaging and data.
	Health risk and benefit assessment in the context of radio- and hadron therapy
	 Advanced wearable systems for patient monitoring during hadrotherapy
	 Advanced sensor systems for the characterization of cell cultures in the context
	of hadrotherapy
	 Philosophical and ethical implications of medical advanced technologies
Submission	01/07/2024 at 12:00 CEST
Submission deadline for the	01/07/2024 at 13:00 CEST
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onnie application	
Mandatory	a) a PDF copy of a valid identity document:
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Interview and	The selection will be performed through the assessment of the qualifications listed in
evaluation	the section "Qualification assessment" (maximum 50 points) and through an
	interview (maximum 50 points). The Selection Board will therefore award a final score
	from 1 to 100.
	score up to 50 points. The candidates obtaining a score of at least 36/50 in the assessment phase, will be accepted to the interview. Candidates are not required to be present during the assessment of qualifications.
	2. The interview may also be carried out online, as long as the candidate can be identified. The interview will entail a discussion about the scientific background and skills of the candidate and about the research that the candidate would like to conduct, as well as technical/scientific questions, with the aim of ascertaining the candidate's background, vocation and aptitude for research. Candidates obtaining a score below 36/50 in the interview will not be eligible to be admitted to the programme hence not part of the ranking list.
	During the interview, the selection board will verify that the calludate has the
	and evaluate the eligibility for the research tonics of the scholarships selected also
	hased on the research project/s submitted
	At this stage, subject to the candidate's authorization, the Selection Board will assess
	eligibility for scholarships other than their preferred choice(s). If the assessment is
	nositive eligibility for the alternative scholarship will be taken into consideration only
	in case of unassigned scholarships after the final ranking.
	3. IUSS Pavia will notify the scholarship holders of their admission to the programme
	using the e-mail address provided in the application.
Test schedule	The results about the evaluation process will be published on the IUSS website
	http://www.iusspavia.it
	The interviews will be carried out on 18/07/2024 at 10.00 CEST, at the IUSS building
	or online, via Zoom.
Information	e-mail: postlaurea@iusspavia.it