

PhD Studentship: *Development and characterization of Silicon Carbide detectors for ultra-high dose rates (FLASH) radiotherapy*

Closing date for application: 15th October 2021

Start date: 1st December 2021

Duration: 3 years

Funding: annual salary: 15343 € (+ 50% on top of the base salary for time period spent abroad)
+ 1800 € per year for travel expenses and research activity (starting from the second year)

[University of Catania](#) is inviting applications from **suitably-qualified graduates** for a fully-funded PhD studentship in the area of **detectors development for Medical Physics**, in collaboration with The [Italian National Institute for Nuclear Physics \(INFN\)](#).

The project focuses on the development and characterization of novel solid-state detectors, based on **Silicon Carbide (SiC)**, for monitoring and dosimetry of particle beams with **ultra-high dose rates (UHDRs)** for **FLASH radiotherapy**.

Recent results from pre-clinical studies investigating the so-called FLASH effect suggest that the UHDRs of this modality reduces normal tissue damage whilst preserving tumour response, when compared with conventional radiotherapy (RT). FLASH-RT is characterized by average dose rates of dozens/hundreds of Gy/s instead of only a few Gy/min of conventional radiotherapy. This opens **unprecedented challenges** for radiation dosimetry and beam monitoring, paving the way for the development of **innovative approaches** and **novel technologies**.

Solid state detectors represent a valuable alternative as respect conventional approaches based on ionization chambers, which are characterized by large ion recombination effects at these extreme regimes. SiC detectors, in particular, put together advantages of silicon detectors, such as (i) higher operating temperatures, (ii) superior radiation hardness, (iii) insensitivity to optical light, and of diamonds, such as (i) lower costs, (ii) superior industrial maturity and (iii) availability of large single-crystal ingots, representing a promising detection technology for UHDRs, as characterized by reduced response saturation effects, according to first investigations.

The student will be based at the [Department of Physics and Astronomy “E. Majorana”](#) in Catania (Italy) and he/she will join a wider cohort of funded students across the Department. He will closely work also with Researches of the [INFN - Catania Division](#) and will receive training in detector modelling and radiation dosimetry, joining the University doctoral program, which offer a wide variety of dedicated high-level classes. He will be actively involved on the development and optimization of the SiC detectors, strictly collaborating with the technology producer, the [STLab](#) company in Catania (Italy), where the student will spend over one year, working in the cleanrooms for the hands-on fabrication of the SiC sensors.

The student will also spend a period of 6 months at the [National Physical Laboratory](#) in London (UK), which is the UK National Metrology Institute. There, he/she will have the opportunity to closely work with highly-qualified Researchers, further developing competencies in radiation dosimetry, also looking at metrological aspects. He/she will also actively participate to **experimental campaigns** in Italy and abroad for the detector characterization with UHDRs.

The student will have the opportunity to join a **stimulating research environment** and to work in close contact with an **industrial partner**, living in one of the liveliest cities in Sicily and spending six months in most exciting town in the UK.

For **further information** about the project or any informal enquiries, please contact **Dr. Francesco Romano** (francesco.romano@ct.infn.it) or **Dr. Massimo Camarda** (massimo.camarda@stlab.eu).