

# *Ph. D. GRANT OFFER*

The **Radiation Detectors Group** at the **Microelectronics National Center (IMB-CNM)** located in Barcelona, Spain, is looking for a candidate to join our group to realize a **Ph. D. in Physics** to work on *Adaptive Computation Techniques in Proton therapy*.

## **Scientific context**

Proton therapy is a radiotherapy modality that achieves very high dose conformity around the target, allowing a better protection of the organs at risk (decreasing radiation side effect). Nevertheless, to evaluate the consequences of proton therapy treatments accurately, new instruments to quantify the LET or RBE distributions are needed. This is the challenging where our project is focus on: we aim at incorporating novel microdosimetry arrays for quantifying the 2D LET maps in clinical facilities.

The main research activity is the development of **innovative GPU-based calculation algorithms and advanced machine learning-based analytics** to develop an **on-the-flight LET-painting tool**. It will be complemented **with experimental microdosimeters** that have already demonstrated their feasibility in clinical fluence rates [1,2]. The overall goal is to pave the way to their clinical implementation in proton therapy. The candidate will also be trained in experimental tasks related to radiation detector characterization and microdosimetry tests in proton therapy centers

## **Job description and missions:**

The student will develop different tasks:

- Bibliographic review.
- Monte Carlo simulations complemented with experimental microdosimetry data for training.
- Experimental tests.
- Data analysis and comparison with state-of-the-art.
- Presentation of results in meetings and congresses.

## **Research center context**

The student will work in the IMB-CNM that is situated on the campus of the Autonomous University (UAB). IMB-CNM is the main microelectronics public center in Spain and has one of the largest Clean-Room facilities for researching in Southern Europe. It has full capability to process its own CMOS technologies as well as photon/particle detectors. More information on CNM activities at: <http://www.imb-cnm.csic.es/>.

The student will work also in close collaboration with the Nuclear Physics department of the University Complutense in Madrid, which is highly specialized in Medical Physics research.

All the work will be done in the framework of one *CSIC-Proyectos Intramurales Especiales* associated to a Ramón y Cajal grant.

**Student Profile:** we are looking for a motivated student with:

- Master** in Physics, Medical Physics, Computer science, Nuclear Physics, or related field completed at the latest
- Mandatory very good programming skills.**
- Good English speaking/writing level.
- Previous experience in Monte Carlo simulations is an asset.
- Experience in Medical physics, proton/hadron therapy, and radiation detectors is valued.

**Contact and additional information:**

Applications are accepted contacting directly by email: **Dr. Consuelo Guardiola** (consuelo.guardiola@imb-cnm.csic.es) and **Dr. Paula Ibañez** (pbibanez@ucm.es), and must include a curriculum vitae and a confidential letter of reference<sup>1</sup>.

Selected candidates will be contacted before 15 September 2022.

**Position available:** Expected start date: November 2022.

**Term of appointment:** 3 years.

[1] Guardiola C. et al., *Phys Med Biol.* 2021;66(11):10.1088/1361-6560/abf811

[2] Bachiller-Perea D.. *et al. Sci Rep* **12**, 12240 (2022).



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<sup>1</sup> All letters will be treated as confidential.