

PhD Grant Position in Flash Radiotherapy

We are pleased to announce that our team has been awarded funding from the **Fonds Wetenschappelijk Onderzoek-Vlaanderen (FWO-Vlaanderen)** to support the implementation of FLASH radiotherapy, an innovative cancer treatment utilizing ultra-high dose rate (UHDR) radiation.

This significant grant will facilitate a four-year PhD program aimed at advancing the technology and scientific understanding of this revolutionary approach.

To accomplish the objectives of this project, we are seeking a highly qualified and motivated individual to join our multidisciplinary team of Medical Radiation Physics at the Radiotherapy Department UZ Brussel.

Background

FLASH radiotherapy (RT) is a groundbreaking technique that administers radiation at ultra-high dose rates (UHDR, >40 Gy/s). Preclinical studies have demonstrated its potential to maintain tumor control while sparing healthy tissues and reducing toxicities. At present, FLASH-RT is largely confined to preclinical research, with clinical trials relying on preclinical and intraoperative devices, which limit its broader clinical application.

Our radiotherapy department is recognized for implementing custom-designed machines to deliver personalized treatments. **This project aims to develop FLASH-RT using a dedicated machine to provide UHDR external-beam radiotherapy. Ultimately, the goal is to make this technology accessible to a much wider patient population.** FLASH-RT represents a seamless integration of technological, physical, biological, and clinical innovation, uniting these disciplines in a pioneering approach.

To realize this, extensive research will focus on understanding the mechanisms underlying FLASH-RT, optimizing its delivery, and establishing its integration into routine clinical practice. Initially, the project will center on research and development (R&D) and translational research. Key priorities include refining UHDR dosimetry, enhancing treatment planning and delivery. The overarching objective is to enable the safe and effective implementation of this revolutionary technique in clinical settings, ensuring the highest quality care for patients.



Position

The project encompasses two key areas of focus to advance the development and implementation of FLASH radiotherapy.

The first area centers on dosimetry and radiation field characterization. In collaboration with industrial partners, we will test and validate novel detectors, analyzing their responses under ultra-high dose rate (UHDR) conditions. Once their performance is established, we will conduct comprehensive beam characterization to measure parameters such as spatial and temporal dose distributions, dose rate profiles, energy distributions, and beam profiles. These measurements are essential for capturing the rapid changes that occur during UHDR delivery. To ensure accuracy and reliability, the experimental data will be complemented by Monte Carlo (MC) simulations for further validation.

Building on this foundation, the second area focuses on treatment planning and delivery. The beam and radiation field characterized in the first phase will serve as the basis for integrating dosimetric characteristics and a patient positioning system into an existing treatment planning system, developed in collaboration with industry partners. The goal is to assess the capabilities and robustness of the FLASH treatment planning system by comparing FLASH, conventional, and proton therapy plans across a range of targets, beam energies, and configurations. Furthermore, quality assurance tests and beam monitoring procedures will be implemented to ensure the safe and precise delivery of FLASH radiotherapy.

Together, these efforts will lay the groundwork for integrating this innovative technology into clinical practice, advancing cancer treatment to new levels of precision and effectiveness.

Diploma requirements

You hold a Master of Physics, Master of Physics and Astronomy, Master of Biomedical Engineering (preferably with a profile in Radiation Physics), Master of Nuclear Engineering, Master in de medical radiation physics, or Master in industrial sciences: nuclear technology, or equivalent through experience.

The offer

We offer a **four-year funded PhD position**. The student will be enrolled at the **Vrije Universiteit Brussel (VUB)** and will primarily conduct their research at the **Radiotherapy Department of UZ Brussel in Jette**.

