

## **Helmholtz-Zentrum Dresden-Rossendorf e.V.**



Project description Proton therapy is an emerging radiation therapy technique to deliver highly-targeted doses with ionizing radiation beams to cancer patients with improved sparing of healthy surrounding tissues and reduced toxicity compared to conventional photon beam radiotherapy.

While traditionally patients are irradiated in supine position, with the radiation beam being rotated around the patient to target the tumour volume from multiple angles, recent technological developments have made it possible to do the opposite. Instead of using bulky equipment to rotate the radiation beam around the patient, robotics has made it possible to rotate the patient in upright position relative to a stationary beam generated by compact equipment. This not only saves costs and space, but also improves system reliability and increases patient comfort. Image guidance during treatment is crucial to assure highly accurate dose delivery. The recent development of a vertical computed tomography (CT) device enables the acquisition of anatomical images at the treatment isocentre prior to irradiation and during each treatment fraction. This allows for adaptive therapy, taking into account anatomical variations that occur during the course of treatment. Since the targeting accuracy of proton therapy is more sensitive to anatomical variations than photon therapy, tumour shrinkage and/or motion as well as organ deformation during dose application must be accounted for. However, the lack of real-time image guidance is currently the dominant limiting factor in achieving a higher targeting accuracy for moving tumours with proton therapy. Magnetic resonance imaging (MRI) has the capability to provide unrivalled soft-tissue contrast images in real-time. However, the development of in-beam MRI for proton therapy has only recently started and not yet reached technical maturity to be introduced into the clinic. Recently, a unique, whole-body in-beam MRI device has been installed at HZDR/OncoRay in Dresden (Germany). By means of the rotating, open-bore magnet, this device offers the possibility to scan and irradiate patients in both recumbent and upright posture. Upright patient positioning in this device is challenging from a technical, ergonomical and workflow point-of-view.

### **EU-Project UPLIFT - Project 10: Upright immobilization and positioning**

City: Dresden; Starting Date: 01/03/25; Duration: 36 months; Remuneration: TVöD-Bund; Reference number: 2024/170; Closing date: 15/01/25

#### **Working field**

##### **Objective**

The aim of this project is to optimize an upright patient positioning system (UPPS) to be used inside the inbeam MRI device with respect to both patient comfort and immobilization. An inclusive design of an MR-compatible UPPS for a future clinical upright MR-integrated proton therapy system should be developed.

##### **Tasks**

To assemble key anthropometric and mobility data for different patient subgroups. To consider relevant patient demographics for the highest patient inclusivity in the development of bespoke immobilization devices to be used for different patient postures

in the upright position. To consider occupational health of the staff to achieve an ergonomic workflow with the UPPS. To study and verify the positional accuracy of said immobilization devices in the in-beam MRI device at HZDR/OncoRay.

## Requirements

- Higher education in Mechanical Engineering or a related field
- Proficiency in spoken and written English
- Proven experience in ergonomics, mechanical concept creation, and CAD software is highly desirable
- Excellent problem-solving skills, academic writing skills, and communication skills
- Ability to work independently as well as in a team

## Application

If you find this position interesting and would like to work in an exceptional, international, strongly innovative environment, please send your full application documents, including the filled application form, motivation letter, short CV, list of most important publications with explanation of your own contribution, and information of your earliest possible starting date. If you are applying for more than one UPLIFT PhD position, you may indicate your top 1-3 preferences in the application form by using the DC numbers associated with the projects. Please submit your application to **info@uplift-project.eu** until January 15, 2025.

We anticipate video conference interviews with candidates starting in the third week of February, for start dates from March 2025. Applications submitted without any of the required documents will not be considered.

Candidates can be of any nationality but must not have resided or carried out their main activity (work, studies, etc.) in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date. Applicants should be within the first four years of their research careers and must not have been awarded a doctoral degree. Submitted applications will be evaluated in accordance with the European Code of Conduct for Recruitment.

More information at <https://stellenticket.de/189814/>  
Offer visible until 27/12/24

