

## Medical Physics PhD position

### **Title: “Macro- and micro-dosimetric characterisation of proton and Carbon ions for cell experiments – going beyond current standards ”**

@ Division Medical Radiation Physics, Department of Radiation Oncology  
Medical University of Vienna / AKH Wien

The Department of Radiation Oncology, Medical University offers a 30h PhD position in close cooperation with the Technical University of Vienna and the MedAustron Centre for Ion Therapy Treatment and Research with an enrolment in the PhD programme “Medical Physics” at the Medical University of Vienna starting from autumn 2019.

#### Motivation:

In today’s radiotherapy practice and radiobiology research, respectively, it is the macroscopic unit of absorbed dose that is considered, which does not per se represent biological effects. It is well known that besides biological parameters (e.g. tissue type, endpoint, absorbed dose) the biological effect varies with dose, dose per fraction, microstructure of dose deposition. Despite this general knowledge micro-dosimetry has so far not been widely applied in medical physics and radiobiological research in the context of ion beam therapy.

#### Job description:

The research project aims to establish micro-dosimetric procedures for the subsequent characterisation of proton and Carbon ions available for non-clinical research at the MedAustron Centre for Ion Therapy Treatment and Research in Wiener Neustadt. The project is embedded in a basic research project funded by the Austrian Research Fund (FWF) entitled “Proton and carbon ion response studies for chondrosarcoma – going beyond current radiobiological standards with 3D models”, which is conducted in close collaboration with Prof. Lohberger, Head of the orthopaedic research unit Medical University of Graz.

The tasks in this PhD project ranges from the development of a new irradiation setup for cell irradiation with horizontal beams to be able to place detectors for macro- and micro-dosimetry as well as biological probe holders in identical positions, to absorbed dose determination with standard detectors (e.g. ionisation chambers, films) in X-ray reference irradiation, in protons and C-ion beams. Another major task is to validate the established micro-dosimetric procedures with Monte Carlo methods. Finally, the PhD student is expected to collaborate with the radiobiology team of Prof. Lohberger and applies the obtained physical and radiobiological results from 3D cell model experiments to test and validate radiobiological models (e.g. LEM, or MKM) as used in today’s state of the art treatment planning systems.

#### Qualifications:

- Master degree in Physics, biomedical engineering or related studies
- Research interest and ambitions for excellence in medical radiation physics

- Fluent in English (oral and written)
- Analytical skills and ability to work independently on a project basis
- Experience with Monte Carlo simulation
- Experience in experimental dosimetry in radiotherapy, ideally particle therapy
- Basic knowledge in Python and MatLab programming
- Good communication skills relevant for working in an international research and in a multidisciplinary research study group

#### Research team and infrastructure

The close cooperation between the MedAustron Centre for Ion Therapy and Research in Wiener Neustadt and the Medical University of Vienna offers the opportunity to work in the field of ion beam therapy on a high level research basis. On a team level intense collaboration with macro- and microdosimetry experts located at MedAustron is envisaged. Beam time, equipment and infrastructure are available for the researchers of the Medical University of Vienna. Especially for the announced PhD project a variety of state-of the art detectors, e.g. ionisation chambers, micro-dosimeters, films as well as a cluster for Monte Carlo simulations are available.

The Department of Radiation Oncology is a high-end equipped photon and brachytherapy department with 5 linear accelerators, CT, an open MR and access to PET/CT and MR/PET imaging devices in the general hospital of Vienna. More than 5 PhD students and 7 post-docs are performing research in the context of precision radiotherapy with protons or ions in the medical radiation physics group of Univ.-Prof. Dr. Dietmar Georg.

#### Conditions:

- 30 hours/week (payment according to salary scheme of the Austrian science fund FWF; brutto/month: 2162.40€ plus 13<sup>th</sup> and 14<sup>th</sup> salary )
- Employer: Medical University of Vienna
- Place of work: The working place will be at the MedAustron Centre for Ion Therapy and Research, which is well connected with public transportation to the city of Vienna and Wiener Neustadt.

Closing date for application: October 15<sup>th</sup> 30, 2019

Envisaged starting date: November 15<sup>th</sup>, 2019

Please submit application and CV by email to Prof. Dr. Dietmar Georg ([dietmar.georg@meduniwien.ac.at](mailto:dietmar.georg@meduniwien.ac.at))

The employer does not discriminate on the grounds of race, colour, religion, sex, sexual orientation, including transgender status and gender expression, national origin, citizenship status, age or disability.

Disabled candidates are preferentially considered in case of equal qualification. Applications from women are encouraged.