



**Department of Medical Physics  
Faculty of Physics**

Prof. Dr. Katia Parodi



**DFG funded project**  
**“Fluence modulated proton computed tomography: a new approach for low-dose image guidance in particle therapy”**

**1 PhD position available**

In a research project funded by the German Research Foundation (DFG) based at the Department of Medical Physics, Faculty of Physics of the Ludwig-Maximilians-Universität München (LMU), a PhD position in Physics investigating proton computed tomography (CT) imaging using pencil beam scanning for image guidance in particle therapy is available.

At the LMU we have proposed the concept of fluence modulated proton CT (FMpCT) in a recently published article (<https://doi.org/10.1088/1361-6560/aa7734>). The idea of modulating the proton fluence during the acquisition of a pencil beam scanning proton CT (pCT) acquisition opens the door to high accuracy proton stopping power images for treatment planning and patient positioning at lower imaging radiation dose.

The general goals of the project are twofold: (1) Develop experimental procedures allowing the realization of FMpCT at a clinical proton therapy facility and (2) comparison of FMpCT with state of the art x-ray cone beam CT (CBCT) imaging. In the course of the project, both pencil beam scanning pCT and FMpCT will be tested experimentally at a collaborating proton therapy center equipped with a pre-clinical pCT prototype. In parallel to the experimental work, a simulation infrastructure for both FMpCT and CBCT imaging will be set up, allowing comparison studies as well as optimizing the experimental procedures.

The research project will offer a broad spectrum of tasks including the further development of the LMU’s extensive simulation infrastructure. Moreover, several visits to the collaborating proton therapy center, located in the US, for experimental work will be required. The salary will be 50% TV-L E13 for a duration of typically 36 months.

**The ideal candidate has**

- Highly ranked MSc in Physics, preferably in Medical Physics or Biomedical Engineering
- Good understanding of electromagnetic and nuclear processes relevant to photon and ion transport and interaction in matter for medical applications
- Experience in (medical) applications of imaging, data processing, and radiation physics
- Experience in programming with C/C++ and MATLAB, and Linux
- Experience with Monte Carlo transport and interaction codes, preferably Geant4
- Fluent English knowledge (spoken and written)
- Technical proficiency, scientific creativity, team working skills
- Solid experimental skills

The working place will be at the Forschungszentrum Garching, which is well connected with public transportation to the city of Munich. The successful candidate will work in a highly motivated and well established team within a multidisciplinary and international network embedded in a stimulating scientific environment with a long tradition of collaboration and excellence in biomedical research, with outstanding research and clinical infrastructures. Disabled candidates are preferentially considered in case of equal qualification. Applications from women are encouraged. The candidate will be under the academic guidance of Professor Katia Parodi.

In order to apply for the position please send your electronic application (**letter of motivation, curriculum vitae, last school certificate and university degree, publication list, other qualification certificates such as TOEFL, and two references**), preferably in PDF format, **until 30.11.2017** to the project leaders:

*Dr. Guillaume Landry ([G.Landry@physik.uni-muenchen.de](mailto:G.Landry@physik.uni-muenchen.de))*

*and*

*Dr. George Dedes ([G.Dedes@physik.uni-muenchen.de](mailto:G.Dedes@physik.uni-muenchen.de))*

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