FRM II
Forschungs-Neutronenquelle
Heinz Maier-Leibnitz

Technische Universität München

The MEDAPP group at the research reactor FRM II located in Garching is looking for a

Working Student (m/f/d)

to support the development and manufacturing of a heterogeneous phantom for mixed neutron-gamma dosimetry at the Medical Application instrument MEDAPP.

The medical application instrument MEDAPP (https://mlz-garching.de/medapp-nectar) is one of the world's few remaining facilities for the application of fast neutrons in external radiotherapy. It is located at the research neutron source Heinz Maier-Leibnitz run by the Technical University of Munich (TUM) and is located in Garching. Fast neutron therapy (FNT) with fission neutrons was performed in Garching for over three decades and is currently in the process of beeing reestablished into clinical practice.

While standard dosimetry measurements for quality assurance of the mixed neutron-gamma treatment field can be performed in water or polyethylene phantoms, heterogeneous phantoms are needed for example for the verification of dose calculation algorithms. Unfortunately, no heterogeneous phantom optimized for neutron dosimetry is available commercially. An ideal heterogeneous – or even better anthropomorphic – phantom for mixed neutron-gamma dosimetry would model the interaction of both neutron and gamma radiation in the human body. In the energy range present at MEDAPP, neutrons mainly interact with hydrogen via elastic scattering and gammas interact with shell electrons of the material.

Especially the selection of materials that not only adequately model these interactions within soft tissue, bone and lung tissue but can also be handled in the manufacturing process is challenging. The goal of the project is to develop and manufacture a heterogeneous anthropomorphic phantom for neutron dosimetry at MEDAPP.

To support us in the development process we are looking for a working student to join our group starting in *July 2023*.

Work packages will include

- the identification of materials that are suitable to model human tissue and are safe to use in a neutron beam.
- the design of neutron transport simulations in close collaboration with people in our group to evaluate different materials.
- the evaluation of different manufacturing options like for example 3D printing.

An ideal candidate would

… follow a master program in chemistry, engineering or physics with a focus on medical physics or nuclear/particle physics.
… have a strong background in 3D printing or a high motivation to gain knowledge in that field.
… be used to work independently.

What we can offer

- supportive working environment in a small group with high interest in the topic.
- flexible working hours throughout the week with respect to your university classes.

Please do not hesitate to get in touch! Address your questions and application directly to:
Lucas Sommer via mail lucas.sommer@frm2.tum.de or phone 089 289 54811.