

The **Institute of Radiation Medicine** and the **Dept. of Radiation Oncology TUM** are looking for a

## Master student in physics

**Project title:** Design and implementation of a novel cancer treatment system in radiation oncology for preclinical research

**Background:** Microbeam radiation therapy (MRT) is a novel, still preclinical approach for cancer treatment that uses micrometer sized x-ray treatment fields. One of the major obstacles for a clinical application of MRT is the availability of appropriate radiation sources. Currently only large synchrotrons provide the necessary dose rates and radiation quality required for clinical treatments. In our team, we developed a system that generates microbeams for preclinical studies with a conventional x-ray tube.

In order to be useful for preclinical radiotherapy trials the current applicator requires

- A motorized mechanical stage
- An x-ray imaging system of the target (2D/3D)
- Software control

Purpose of the master project will be the design and set-up of such a system.

### Methods and tasks:

- Design of a technical solution in collaboration with an interdisciplinary team of physicists, biologists and physicians
- Solution has to fit in the existing x-ray cabinet
- Design of motors and stages to position the target with submillimeter accuracy relative to the beam
  - Positioning has to be performed with 4 degrees of freedom in motion (3 translation + 1 rotation)
- Registration between imaging and beam coordinate system – translation of planning coordinates to stage coordinates
- Fabrication/ordering of the parts, set-up of the system in the x-ray cabinet
- Quality assurance – verify functionality of the set-up

### Time schedule:

Month of Thesis	1	2	3	4	5	6
Literature	X	X				
Design a technical solution	X	X	X			
Fabrication of components			X	X		
Programming of interface			X	X		
Assembly				X	X	
QA and verification				X	X	X
Write thesis						X

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