UMM
UNIVERSITÄTSMEDIZIN
MANNHEIM

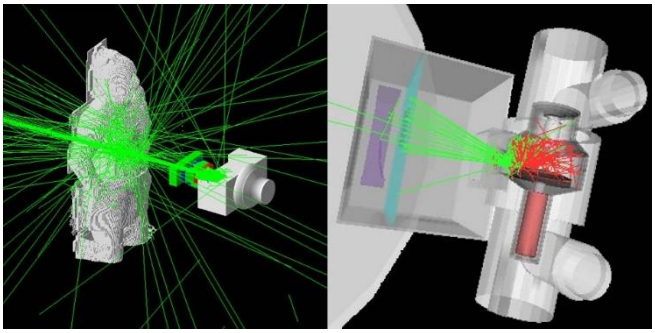
Medizinische Fakultät Mannheim
der Universität Heidelberg

Universitätsklinikum Mannheim

# Master Thesis in CT Simulation and Evaluation

**Institution:** Computer Assisted Clinical Medicine, Heidelberg University, Germany
**Start date:** flexible, February 2018 at the earliest
**Duration:** 6-12 months

**Profile:**
Applicants will hold a B.Sc. and will be M.Sc. candidates in physics, computer science, mathematics, biomedical engineering or a related field; basic knowledge of a programming language such as MATLAB, Python or C++ is required, an affinity towards simulations is expected; basic knowledge of CT physics is a plus.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**Project Description:**
The simulation of imaging procedures is a key element in the development of new imaging techniques and shows potential for application in the training and evaluation routine for machine learning algorithms. Especially in Computed Tomography, where public human image data is scarce due to radiation exposure and privacy concerns, simulations of anthropomorphic phantoms are essential. This project aims to set up a framework for robust CT simulations using Monte Carlo methods (e.g. GATE, based on Geant4) and the subsequent comparison to established machine learning approaches. The work on this project can be carried out in German or English.

**Working Environment:**
Our group is composed of more than thirty scientists from physics, electrical engineering, medicine and computer science and is working in close co-operation with the local medical departments. We are developing new imaging techniques and translate them with our clinical partners into daily practice. In particular, we are doing basic research on the development of novel MR-techniques for measuring perfusion, diffusion, BOLD + oxygenation, and sodium in the human brain or other organs like lung, liver or heart. Tasks include the implementation of novel MRI techniques at whole body MRI systems (Siemens) at different field strengths (3x 1.5 Tesla; 2x 3.0 Tesla) with transfer to a small bore animal system 9.4 T (Bruker) for mice and rats. Beside this we are developing innovative molecular imaging technologies by fusion of several imaging modalities (CT, MRI, PET) to enable image-guided, high-precision interventions using high-end CT and robotic systems (ZEEGO, Siemens). Ongoing collaborations with other researchers involve the Central Institute of Mental Health (ZI, Mannheim), the German Cancer Research Centre (DKFZ, Heidelberg), and across Europe with multiple opportunities to visit leading international laboratories and to attend taught schools.

**Interested?**
If you enjoy working in an interdisciplinary, young, creative and open team, we are looking forward to your application! For more information on the project or for application please contact:


**Project leader:**

Tom Russ, M.Sc.
Project group: 'Image Guided Interventions'
Computer Assisted Clinical Medicine,
Medical Faculty Mannheim, Heidelberg University,
Theodor-Kutzer-Ufer 1-3, 68167 Mannheim, Germany
Tel.: +49 621 383 6552
E-Mail: Tom.Russ@MedMa.Uni-Heidelberg.de

**Director:**

Prof. Dr. rer. nat. Lothar Schad
Chair in Computer Assisted Clinical Medicine,
Medical Faculty Mannheim, Heidelberg University,
Theodor-Kutzer-Ufer 1-3, 68167 Mannheim, Germany
Tel.: +49 621 383 5121
E-Mail: Lothar.Schad@MedMa.Uni-Heidelberg.de
Web: http://www.ma.uni-heidelberg.de/inst/cbtm/ckm/


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