



## Master / Diploma thesis project

### „Development and implementation of a regularization framework for differential phase contrast tomography“

#### Topic

Advances in imaging hardware have enabled differential phase contrast tomography with conventional X-ray tube sources. Here, iterative series expansion methods are applied in a weighted maximum likelihood framework to reconstruct absorption and phase contrast data jointly. To fully utilize the additional information content provided by the hardware setup, which measures absorption, phase contrast and darkfield information all at once, regularization terms incorporating this information have to be introduced in the maximum likelihood framework. The aim of this thesis is the development and implementation of several regularizers integrated into the existing reconstruction pipeline, as well as an evaluation of the different strategies in terms of imaging performance.

#### Requirements

The student should be interested in the topic of tomographic reconstruction and novel X-ray imaging applications. Mathematical knowledge, especially in linear algebra and optimization, as well as fluency in C/C++ is required. Knowledge of Matlab and Python is advantageous.

#### Supervision / Contact

This project is jointly proposed between Prof. Franz Pfeiffer (E17, Department of Physics, TUM) and Prof. Nassir Navab (I16, Department of Informatics, TUM). Supervision will be provided by Dr. Guillaume Potdevin, Dieter Hahn and Tobias Lasser, working environment will be provided at IMETUM, Garching.

For more information please contact either

- Guillaume Potdevin ([guillaume.potdevin@ph.tum.de](mailto:guillaume.potdevin@ph.tum.de)) or
- Dieter Hahn ([dieter.hahn@ph.tum.de](mailto:dieter.hahn@ph.tum.de)) or
- Tobias Lasser ([lasser@in.tum.de](mailto:lasser@in.tum.de)).