



Master / Diploma thesis project

„Development and implementation of 3D parallelized series expansion methods for differential phase contrast tomography“

Topic

Advances in imaging hardware have enabled differential phase contrast tomography with conventional X-ray tube sources. So far, iterative series expansion methods have been applied in a weighted maximum likelihood framework to reconstruct absorption and phase contrast data jointly in 2D slices. However, the available hardware easily generates fully 3D cone-beam data sets with full projections. The expansion of this reconstruction approach to full 3D poses challenges both in terms of memory and computational power. This thesis project comprises the development and implementation of parallelized (multi-core) or massively parallelized (GPU) variants of the fully 3D reconstruction pipeline, including generation of the system equation and the implementation of several standard iterative solvers.

Requirements

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

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