

## Data-driven model corrections and learned iterative reconstruction

**Speaker:** Andreas Hauptmann, University of Oulu

**Abstract:** Iterative model-based reconstruction approaches for high-dimensional problems in inverse problems with non-trivial forward operators can be highly time consuming. Thus, it is desirable to employ model reduction techniques to speed-up reconstructions in variational approaches as well as to enable training of learned model-based iterative reconstruction techniques. Nevertheless, reduced or approximate models can lead to a degradation of reconstruction quality and need to be accounted for.

In this talk we discuss the possibility of learning data-driven model corrections for inverse problems. We make a distinction between implicit and explicit corrections. In the former, correction and regularisation are trained simultaneously with the data-driven iterative updating network. This way a substantial speed-up, compared to classical variational approaches, can be achieved with improved reconstruction quality. Nevertheless, such implicit corrections offer limited insights into how approximate models are corrected for and hence we additionally discuss the latter case of learning and explicit correction that can be subsequently used in a variational framework. We will discuss the conceptual difficulty of learning such an explicit forward model correction and present conditions under which solutions to the variational problem with a learned correction converge to solutions obtained with the accurate model.