

COMPUTATIONAL MATHEMATICS  
SEMINAR

*Deep Learning meets Modeling: Taking the Best out of Both  
Worlds*

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**Abstract:** Pure model-based approaches are today often insufficient for solving complex inverse problems in imaging. At the same time, we witness the tremendous success of data-based methodologies, in particular, deep neural networks for such problems. However, pure deep learning approaches often neglect known and valuable information from the modeling world.

In this talk, we will provide an introduction to this problem complex and then focus on the inverse problem of (limited-angle) computed tomography. We will develop a conceptual approach by combining the model-based method of sparse regularization by shearlets with the data-driven method of deep learning. Our solvers are guided by a microlocal analysis viewpoint to pay particular attention to the singularity structures of the data. Finally, we will show that our algorithm significantly outperforms previous methodologies, including methods entirely based on deep learning.

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