



IBS Center for Molecular Spectroscopy and Dynamics

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# Seminar

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- **SPEAKER**

Prof. Ulugbek S. Kamilov (Computer Science and Engineering, Washington University, USA)

- **TITLE**

Reconciling Model-Based and Learning-Based Computational Imaging

- **ABSTRACT**

There is a growing need in biological, medical, and materials imaging research to recover information lost during data acquisition. There are currently two distinct viewpoints on addressing such information loss: model-based and data-adaptive. Model-based methods leverage analytical signal properties (such as wavelet sparsity) and often come with theoretical guarantees and insights. Learning-based methods leverage flexible representations (such as convolutional neural nets) for best empirical performance through training on big datasets. The goal of this talk is to introduce a framework that reconciles both viewpoints by providing the "deep learning" counterpart of the classical image recovery theory. This is achieved by specifying "denoising" as a mechanism to infuse learned priors into recovery problems, while maintaining a clear separation between the prior and physics-based acquisition models. Our methodology can fully leverage the flexibility offered by deep learning by designing learned denoisers to be used within our new family of fast iterative algorithms. Yet, our results indicate that the such algorithms can achieve state-of-the-art performance in different computational imaging tasks, while also being amenable to rigorous theoretical analysis. We will focus on the application of the methodology to the problem of optical diffraction tomography.

- **DATE AND VENUE**

October 31, 2019 (Thursday, 5:00 - 6:00)  
Seminar Room A (116), KU R&D Center

- **INVITED BY**

Associate Director Wonshik Choi

- **LANGUAGE**

English