1125-92-183   **Laura Waller***, waller@berkeley.edu. *Computational microscopy for phase retrieval.*
Computational imaging is the joint design of imaging system hardware and software, optimizing across the entire pipeline from acquisition to reconstruction. This talk will describe computational imaging methods for fast capture and reconstruction of Gigapixel-scale phase reconstructions. We use coded illumination and large-scale nonlinear non-convex optimization procedures to solve large-scale inverse algorithms that reconstruct phase with resolution beyond the diffraction limit of the microscope. Beyond theory, we discuss the implications of developing practical algorithms for real-world imaging systems, where forward models are inexact and experimental mis-alignment and errors can cause severe artifacts. In this light, we review the relative robustness of various proposed algorithms. Finally, we describe extensions that implement algorithmic self-calibration - joint estimation of both the object of interest and parametric aberration and mis-alignment corrections. (Received August 09, 2016)