Speaker: Emmanuel Candes, Stanford University

Title: Exact Phase Retrieval via Convex Optimization?

Abstract:
This talks introduces a novel framework for phase retrieval, a problem which arises in X-ray crystallography, diffraction imaging, astronomical imaging and many other applications. Our approach combines multiple structured illuminations together with ideas from convex programming to recover the phase from intensity measurements, typically from the modulus of the diffracted wave. We demonstrate empirically that any complex-valued object can be recovered from the knowledge of the magnitude of just a few diffracted patterns by solving a simple convex optimization problem inspired by the recent literature on matrix completion. More importantly, we also demonstrate that our noise-aware algorithms are stable in the sense that the reconstruction degrades gracefully as the signal-to-noise ratio decreases. Finally, we present some novel theory showing that our entire approach may be provably surprisingly effective.