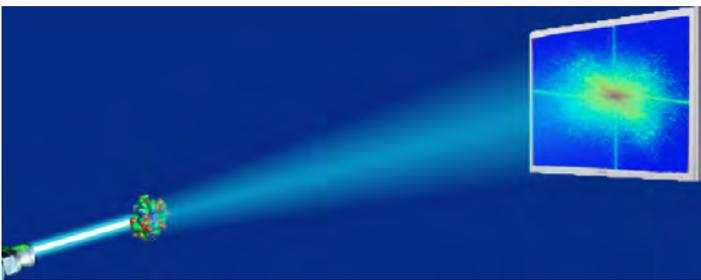# Emmanuel Candes

Barnum-Simons Chair in Mathematics and Statistics, Stanford University

Modern Optimization Meets Physics: Recent Progress on Phase Retrieval

In many imaging problems such as X-ray crystallography, detectors can only record the intensity or magnitude of a diffracted wave as opposed to measuring its phase. Phase retrieval concerns the recovery of an image from such phaseless information. This problem is of great importance because it arises in many applications ranging from astronomical imaging to speech analysis. This talk discusses novel acquisition strategies and novel convex and non-convex algorithms which are provably exact allowing perfect phase recovery from a minimal number of noiseless intensity-only measurements. 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. This may be of special contemporary interest because phase retrieval is at the center of spectacular current research efforts collectively known under the name of coherent diffraction imaging aimed, among other things, at determining the 3D structure of large protein complexes.

Emmanuel Candès is the Barnum-Simons Chair in Mathematics and Statistics and a Professor of Electrical Engineering (by courtesy) at Stanford University. He received his PhD in statistics from Stanford in 1998. His research interests include computational harmonic analysis, statistics, information theory, signal processing and mathematical optimization. He has received several awards including the Alan T. Waterman Award from NSF, which is the highest honor bestowed by the National Science Foundation, and which recognizes the achievements of early-career scientists. He has given over 60 plenary lectures at major international conferences. He was elected to the National Academy of Sciences and to the American Academy of Arts and Sciences in 2014.

Thursday October 9, 5:30pm
Davis Auditorium, CEPSR (Shapiro Center)
Refreshments served at 5:00pm in 200 SW Mudd

Organizing Committee:
Don Goldfarb (IEOR)
Eitan Grinspin (Computer Science / APAM)
Ioannis Karatzas (Mathematics)
Michael I. Weinstein (APAM / Mathematics)