APPLIED MATHEMATICS COLLOQUIUM

"1930s Analysis for 2010s Signal Processing: Recent Progress on the Super-Resolution Question"

Laurent Demanet
(MIT)

Abstract: The ability to access signal features below the diffraction limit of an imaging system is a real, delicate, and very nonlinear phenomenon called super-resolution. The main theoretical question in this area is largely untouched: it concerns the precise balance of noise, bandwidth, and signal structure that enables super-resolved recovery. When structure is understood as sparsity on a grid, we show that there is a precise scaling law that extends Shannon-Nyquist theory, and which governs the asymptotic performance of a class of simple "subspace-based" algorithms. This law is universal in the minimax sense that no statistical estimator can outperform it significantly. Compressed sensing, in contrast, is demonstrably suboptimal for the same task. Joint work with Nam Nguyen.

Monday December 15, 2014
4:30 PM
Room E17-122

MiT

Massachusetts Institute of Technology