



The University of Chicago  
Departments of Computer Science,  
Mathematics, and Statistics

## Scientific and Statistical Computing Seminar

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### Super-resolution via Sparse Recovery: Progress and Challenges

**FRIDAY, April 27, 2012 at 3:30 PM**

133 Eckhart Hall, 5734 S. University Avenue.

### ABSTRACT

From the knowledge of a function in a frequency band, super-resolution consists in detecting or estimating sharp features which are less than the inverse of a bandwidth apart from one another. Sparse recovery is one way to extend this Shannon-Nyquist scaling, but “by how much” and “in which setting” it is not yet clearly understood. This work attempts to start the classification of singularity layout vs. noise level for proper identification by  $\ell^1$  minimization. When a condition of constructive interference is met,  $\ell^1$ -minimization performs optimally: it only breaks down in the unrecoverable regime where no other method would work either. As a corollary, we obtain a novel noise-dependent scaling which replaces the inverse bandwidth rule for super-resolution. Algorithmic alternatives to  $\ell^1$  minimization are presented to attempt to deal with the harder situation of “destructive interference”.

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