1015-94-170 **Emmanuel J Candes** (emmanuel@acm.caltech.edu), MC 217-50, 1200 E California Blvd, Pasadena, CA 91125, and **Justin K Romberg*** (jrom@acm.caltech.edu), MC 217-50, 1200 E California Blvd, Pasadena, CA 91125. *Signal and image recovery from incomplete and inaccurate measurements.*

A common problem in applied science is to recover a signal or image from a set of indirect measurements. For example, in Magnetic Resonance Imaging (and many other imaging modes widely used in medicine, astronomy, and other fields) we wish to reconstruct an image from samples of its 2D Fourier spectrum. A natural question arises: How many measurements do we need to recover the object of interest? In this talk, we will discuss some recent research that addresses this fundamental question, and present a recovery framework that performs surprisingly well (both in theory and in practice).

A special instance of this theory yields a novel sampling theorem: Suppose that a finite N dimensional signal f has only B nonzero Fourier coefficients at unknown frequencies. Then we can recover f perfectly from a small number of samples (on the order of B log N) in the time domain.

The recovery procedure is nonlinear, and consists of solving a tractable convex program. Despite its nonlinearity, the recovery procedure is exceptionally stable against measurement error. The theory can also be extened to general representation and measurement systems.

We will close by showing how these ideas can be applied to problems in tomographic imaging and data compression. (Received February 03, 2006)