

**April 2009**

**MADALGO seminar by Eric Price,  
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**Lower Bounds in Compressed Sensing**

Abstract:

Compressed sensing is a method for reconstructing a sparse signal from a low-rank linear sketch. This is useful because many real-world signals have sparse representations in some basis; for example, images are sparse in the wavelet basis and music is sparse in the Fourier basis.

In the past five years, a variety of sketch matrices and reconstruction techniques have emerged that can efficiently and stably recover an  $N$ -dimensional vector with  $K$  non-zero components from  $O(K \log N/K)$  linear measurements.

We prove that any stable recovery scheme requires  $\Omega(K \log N/K)$  linear measurements, matching the upper bound. This contrasts with the  $\Theta(K)$  measurements required for unstable recovery.

Joint work with:

Piotr Indyk (MIT),  
Khanh Do Ba (MIT).