5005-C1-48 **Alyson K. Fletcher*** (alyson@eecs.berkeley.edu), **Sundeep Rangan** and **Vivek K Goyal** (vgoyal@mit.edu), 77 Massachusetts Avenue, Room 36-690, Cambridge, MA 02139. *Compressed Sensing as a Source Coding Technique.*

Suppose $x \in \mathbb{R}^N$ is K-sparse with respect to V, meaning that $x = Vu$ where $u \in \mathbb{R}^N$ has only $K < N$ nonzero entries. Acquisition of x is modeled as measuring $y = \Phi x$ where $\Phi \in \mathbb{R}^{M \times N}$. If $M < N$, the acquisition can be seen as compression of x. The results in compressed sensing (CS) show that, under suitable assumptions, x can be recovered practically from y with M not much larger than K.

This talk considers CS from the perspective of rate-distortion theory. Compression of a random vector x is quantified by the mean squared error in representing x and the mean number of bits used. We consider a CS-based source coder, where y is quantized with RK bits and a decoder must estimate x from the quantized values. We show that when R and sparsity fraction K/N are held constant as $N \to \infty$, it is impossible for any decoder to recover the sparsity pattern of u from the quantized y. Thus, a CS decoder must operate in a regime where the sparsity pattern cannot be exactly recovered. Simulations show CS to perform significantly worse than a simple quantization scheme that exploits the sparsity at the encoder. Finally, improvements inspired by information theory are described. (Received June 12, 2007)