1032-60-1 **Emmanuel J Candes*** (emmanuel@acm.caltech.edu), Applied and Computational Mathematics, MC 217-50, Caltech, Pasadena, CA 90049. *The role of probability in compressed sensing.*

A new sampling theory has emerged which goes somewhat against the conventional wisdom and common practice in signal or image acquisition. This theory claims that it is possible to recover signals and images faithfully from what appear to be highly incomplete sets of data, from far fewer data bits than traditional methods use. This theory relies on two fundamental premises: 1) sparsity (or compressibility) of the object we wish to recover and 2) incoherence between the domain in which the object is sparse and that in which it is acquired.

A convenient way to design incoherent measurements is by nonadaptive random sensing, hence the key role played by probability and random matrices. Specifically, we wish to find matrices for which sparse vectors are 'away' from the (large) null space of the matrix or more quantitatively, which act on sparse vectors as near isometries. The talk will show how to design random matrices obeying this property—by drawing the entries independently or by selecting the rows of a fixed orthogonal transformation uniformly at random—together with some key results in compressed sensing. We focus on the role played by high-dimensional convex geometry and Banach space theory such as the Rudelson's selection lemma and Talagrand's concentration inequality. (Received July 14, 2007)