1100-41-87 Ben Adcock* (adcock@purdue.edu), Anders C Hansen, Clarice Poon and Bogdan Roman. Getting even more from less: A new framework for compressed sensing.

Compressed sensing concerns the recovery of signals and images from seemingly incomplete data sets. Introduced nearly a decade ago, it has since become an intensive area of research in applied mathematics, engineering and computer science. However, in many practical problems in which compressed sensing is currently applied, e.g. Magnetic Resonance Imaging, the observed reconstruction quality is not explained by existing theoretical results. In this talk I will present a new theory for compressed sensing that bridges this gap, and as a by-product, shows that compressed sensing is possible under substantially relaxed conditions. In doing so, I will also explain why sparsity alone is not an adequate model for natural images and signals, and that in practice, the structure of the sparsity must also be taken into account. Finally, I will show how leveraging this inherent structure allows one to get even more from less in many compressed sensing applications: that is, obtain better reconstructions in a computationally efficient manner than purely sparsity-based algorithms. (Received January 30, 2014)