Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Compressed Sensing for Multispectral and Confocal Microscopy
KEVIN KELLY, Rice University, DHARMPAL TAKHAR, TING SUN, JASON LASKA, MARCO DUARTE, RICHARD BARANIUK — Compressive sensing is an emerging field based on the revelation that a small number of random linear projections of a signal or an image contain enough information for reconstruction of a high resolution one. This technique has been applied to magnetic resonance imaging and neutron scattering. We have previously developed an optical camera based on this concept which is capable of megapixel images while utilizing a single photodiode for acquisition and implemented through the use of a digital micromirror device to randomly modulate and acquire the necessary projections of the image. In addition, this scheme allows for the rapid acquisition of multispectral information. We are now extending this scheme to imaging beyond the visible spectrum into the infrared and terahertz where high resolution image sensors are much more costly. Lastly we will present a scheme for utilizing this method in confocal microscopy similar to the flying pinhole concept except that the individual pinhole is replaced by a complex random projection and reconstructed via linear programming.

Kevin Kelly
Rice University

Date submitted: 22 Nov 2006 Electronic form version 1.4