



THE UNIVERSITY OF  
**CHICAGO**

Department of Statistics

STATISTICS COLLOQUIUM

---

Emil Sidky

Department of Radiology  
University of Chicago

**Sparsity-Exploiting Image Reconstruction in X-ray Computed  
Tomography**

MONDAY, November 16, 2015, at 4:00 PM

Eckhart 133, 5734 S. University Avenue

*Refreshments following the seminar in Eckhart 110.*

ABSTRACT

Image reconstruction algorithms in X-ray Computed Tomography (CT) synthesize a volume image from multiple X-ray projections. In the domain of medical imaging, CT has become an indispensable tool providing detailed images of internal anatomy with sub-millimeter resolution, non-invasively. Such devices achieve such high quality images by acquiring hundreds to thousands of X-ray projections surrounding the patient.

Recently much research effort in CT has been directed toward reducing the projection sampling in order to limit exposure to ionizing radiation or shorten scan time. Part of this effort focuses on the image reconstruction algorithm, and in the past decade optimization-based iterative image reconstruction (IIR) algorithms have been heavily investigated. The timing of this algorithm research has coincided with the emergence of the field of Compressive Sensing, where sampling conditions for accurate image reconstruction are based on some form of sparsity in the scanned object. The idea of exploiting object sparsity has had an important influence on IIR algorithms, and the real-data CT examples shown in this talk will cover image reconstruction from sparse-view and limited angular range projection data as well as noisy data due to low-intensity X-ray exposure.

---

For further information and about building access for persons with disabilities, please contact Kirsten Wellman at 773.702.8333 or send email ([kwellman@galton.uchicago.edu](mailto:kwellman@galton.uchicago.edu)). If you wish to subscribe to our email list, please visit the following website: <https://lists.uchicago.edu/web/arc/statseminars>.