



THE UNIVERSITY OF  
CHICAGO

COMPUTATIONAL AND APPLIED MATHEMATICS COLLOQUIUM

---

EMIL SIDKY

Department of Radiology  
The University of Chicago

## Image Reconstruction in X-ray Tomography by Large-scale Optimization

THURSDAY, November 1, 2018, at 4:00 PM  
Jones 226, 5747 South Ellis Avenue

### ABSTRACT

In the past decade there has been much effort in medical imaging to implement optimization-based image reconstruction algorithms in X-ray computed tomography (CT) for the purpose of addressing non ideal sampling conditions, reducing X-ray dose, or exploiting improved physics modeling. The goal of image reconstruction in X-ray CT is to form a 3D volume image from multiple 2D X-ray projections, and a major hurdle for optimization-based methods is the sheer size of the data sets involved. The CT volume image size can be on the order of one billion voxels, and the projection data set can also be of similar size.

In this talk, I will introduce the inverse problem of CT image reconstruction, describing current challenges for CT imaging. I will then discuss some of the specific ongoing projects in our lab at the UChicago Dept. of Radiology. I will focus mainly on X-ray tomographic configurations that involve challenging sampling conditions, where we have been working to translate the sparsity-exploiting ideas from Compressive Sensing to application on clinical X-ray tomographic devices.

---

#### Organizers:

Daniel Sanz-Alonso, Department of Statistics, [sanzalonso@uchicago.edu](mailto:sanzalonso@uchicago.edu)  
CAM Colloquium URL: <https://cam.uchicago.edu/seminars/colloq/index.shtml>.

For further information and inquiries about building access for persons with disabilities, please contact Zellencia Harris, [zellenciah@uchicago.edu](mailto:zellenciah@uchicago.edu). If you wish to subscribe to our email list, please visit the following website: [https://lists.uchicago.edu/web/subscribe/cam\\_colloquium/](https://lists.uchicago.edu/web/subscribe/cam_colloquium/).