



The University of Chicago
Department of Statistics

Seminar Series

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**On the Statistical Inversion of a Stochastic Radon Transform
with Applications to Structural Biology**

MONDAY, February 12, 2007 at 4:00 PM
133 Eckhart Hall, 5734 S. University Avenue

Refreshments following the seminar in Eckhart 110.

ABSTRACT

Single particle electron microscopy is a powerful method that biophysicists employ to learn about the structure of biological macromolecules. In contrast to the more traditional crystallographic methods, this method images “unconstrained” particles, thus posing a variety of statistical problems. We formulate and study such a problem, one that is essentially of a random tomographic nature, where a structural model for a biological particle is to be constructed given random projections of its Coulomb potential density, observed through the electron microscope. Although unidentifiable (ill-posed), this problem can be seen to be amenable to a statistical solution, once parametric assumptions are imposed. It can also be seen to present challenges both from a data analysis point of view (e.g. uncertainty estimation and presentation) as well as computationally. The proposed methodology will be illustrated on simulated data, and practical issues will be discussed