

Department of Applied Mathematics and Statistics  
The Johns Hopkins University  
and  
Department of Biostatistics  
Johns Hopkins Bloomberg School of Public Health

**JOINT SEMINAR**

Victor Panaretos  
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January 25, 2007  
**School of Public Health Bldg.  
Room W3008**  
Refreshments: 3:30 p.m.  
Seminar: 4:00 p.m.

**RANDOM TOMOGRAPHY IN STRUCTURAL BIOLOGY**

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.