



THE UNIVERSITY OF CHICAGO

COMPUTATIONAL AND APPLIED MATHEMATICS COLLOQUIUM

JOE KILEEL

Program in Applied and Computational Mathematics
Princeton University

Invariant and Tensor-based Approaches to Cryo-EM

THURSDAY, May 30, 2019, at 4:00 PM
Jones 226, 5747 South Ellis Avenue

ABSTRACT

Cryo-electron microscopy (cryo-EM) is an imaging technique to recover the 3D structure of molecules from noisy 2D images, recognized by the 2017 Nobel Prize in Chemistry. High noise, big data and nuisance parameters are challenges in cryo-EM which appear in data science at large.

Drawing on invariant theory, the method of moments, tensor decomposition and non-convex optimization, we introduce a scalable moment-based solver for single-particle reconstruction. We prove sample-efficiency of the solver, using novel tight information-theoretic bounds that apply more generally to estimation under group actions. Motivated by the tensor structure of moments, we develop a fast algorithm for low-rank symmetric tensor decomposition and another for subspace clustering, which significantly outperform the state-of-the-art.

Organizers:

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

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