



THE UNIVERSITY OF CHICAGO

Departments of Computer Science, Mathematics, Statistics and the Computation Institute
SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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**Large Deviation Theory Applied to Climate Physics: A New Frontier of
Statistical Physics and Applied Mathematics**

THURSDAY, October 13, 2016 at 4:30 PM
Jones 226, 5747 South Ellis Ave.
Host: Mary Silber

ABSTRACT

I will review some of the recent developments in the theoretical and mathematical aspects of the non-equilibrium statistical mechanics of climate dynamics. At the intersection between statistical mechanics, turbulence, and geophysical fluid dynamics, this field is a wonderful new playground for applied mathematics involving large deviation theory, stochastic partial differential equations, and diffusion Monte-Carlo algorithms. We will discuss two classes of applications. First extreme heat waves as an example of a rare events with a huge impacts. We will show that the rare event algorithm allow to observe several hundred times more rare heat waves than with a direct numerical simulation, for a fixed computational cost. This opens new perspective in the science of climate extremes. Second rare trajectories that suddenly drive the complex dynamical system from one attractor to a completely different one, related to abrupt climate changes.

Organizers:

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