

**Stanford University**  
**Departments of Mathematics and Statistics**

PROBABILITY SEMINAR

4pm, Monday, October 7, 2019  
Sequoia Hall Room 200

Refreshments served at 3:30pm in the Lounge.

**Speaker:** Georg Menz, *UCLA*

**Title:** Ergodicity of the infinite swapping algorithm at low temperature

**Abstract:**

Sampling Gibbs measures at low temperature is a computationally challenging task. Numeric evidence suggest that the infinite-swapping algorithm (isa) is a promising method. The isa can be seen as an improvement of replica methods. We rigorously analyze the ergodic properties of the isa in the low temperature regime deducing Eyring–Kramers formulas for the spectral gap (or Poincaré constant) and the log-Sobolev constant. Our main result shows that the effective energy barrier can be reduced drastically using the isa compared to the classical over-damped Langevin dynamics. As a corollary we derive a deviation inequality showing that sampling is also improved by an exponential factor. Furthermore, we analyze simulated annealing for the isa and show that isa is again superior to the over-damped Langevin dynamics.

This is based on joint work with André Schlichting, Wenpin Tang, and Tianqi Wu.