



The University of Chicago  
Department of Statistics

FIRST YEAR PHD PRESENTATION

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## Geometric Bounds for Eigenvalues of Markov Chains

WEDNESDAY, May 25, 2011, at 4:45 PM  
110 Eckhart Hall, 5734 S. University Avenue

### ABSTRACT

Kolmogorov's convergence theorem states that all irreducible, aperiodic Markov Chains on a finite state space converge to their stationary distribution regardless of initial distribution. Unfortunately, it does not give any information about the rate of convergence to stationarity. In applied settings, specifically when using MCMC methods, getting bounds on the rate of convergence is of much importance. Over the years, both analytic and geometric methods have been introduced. We will focus on the geometric bounds developed by Persi Diaconis and Daniel Stroock for bounding the second largest eigenvalue and spectral gap for reversible Markov Chains, showing how these can be used to bound the mixing time of reversible Markov Chains. Through several examples, we will compare performance with bounds determined through Cheeger-like inequalities. Time permitting, we will briefly discuss the extension of these bounds to non-reversible chains.

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Information about building access for persons with disabilities may be obtained in advance by calling Sandra Romero at 773.702-0541 or by email ([sandra@galton.uchicago.edu](mailto:sandra@galton.uchicago.edu)).