

STATISTICS COLLOQUIUM

TUESDAY, JANUARY 19, 2010

TALK: 4:00 PM — SCIENCE CENTER ROOM 705

RECEPTION: 5:15 PM — SCIENCE CENTER, 7TH FLOOR

“MCMC Algorithms in High Dimensions: A New Perspective”

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ABSTRACT

MCMC (Markov Chain Monte Carlo) algorithms are an extremely powerful set of tools for sampling from complex probability distributions. Understanding and quantifying their behavior in high dimensions thus constitute an essential part of modern statistical inference. In this regard, most of their search efforts so far were focused on obtaining estimates for the mixing times of the corresponding Markov chain.

In this talk we offer a new perspective for studying the efficiency of commonly used algorithms. We will discuss optimal scaling of MCMC algorithms in high dimensions where the key idea is to study the properties of the proposal distribution as a function of the dimension. This point of view gives us new insights on the behavior of the algorithm, such as precise estimates of the number of steps required to explore the target distribution, in stationarity as a function of the dimension of the state space.

In the first part of the talk, we will describe the main ideas and discuss recent results on high dimensional target measures arising in the context of statistical inference for mathematical models representing physical phenomena. In the second part of the talk, we will discuss the Hybrid Monte Carlo Algorithm (HMC) and answer a few open questions about its efficiency in high dimensions. We will also briefly discuss applications to parallel tempering, Gibbs samplers and conclude with concrete problems for future work.