Theoretical Statistics and Mathematics Unit

Indian Statistical Institute

203 B.T. Road, Kolkata-700108

COLLOQUIUM

Date: February 20, 2026 **Time:** 04:30 P.M.

Venue: L-infinity, Stat-Math Unit (5th Floor, A.N. Kolmogorov Bhavan), ISI Kolkata

Prof. Gareth Roberts

University of Warwick, England

TITLE:

Ballistic Markov chain Monte Carlo and the scaling problem

ABSTRACT:

Markov chain Monte Carlo algorithms are traditionally constructed as reversible Markov chains. One disadvantage they frequently suffer from is so-called "random walk behaviour" whereby moves in a particular direction are cancelled out by subsequent moves in the reverse direction leading to overall slow mixing. Improvements result from chains with momentum which reduces random walk-behaviour producing "ballistic" rather than "diffusive" Markov chain trajectories. In this talk I will review the popular "lifting" mechanism for producing non-reversible Markov chain Monte Carlo such as non-reversible Metropolis-Hastings and piecewise-deterministic Markov processes. The presentation will investigate how these behave in a collection of stylised high-dimensional examples showing that the non-reversibility can often be lost in the high-dimensional limit when algorithm scale parameters are chosen to optimise mixing. On the other hand, lifted algorithms still retain a uniform efficiency advantage over their reversible counterparts. The results will be applied to the "simulated tempering" algorithm.

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