

HARVARD UNIVERSITY
DEPARTMENT OF STATISTICS



Tel. 617-495-5496
Fax. 617-496-8057
statdept@stat.harvard.edu
<http://www.stat.harvard.edu/>

Science Center 7th Fl.
One Oxford Street
Cambridge, MA 02138

STATISTICS COLLOQUIUM

MONDAY, NOVEMBER 3, 2014

TALK: 4:15 PM — SCIENCE CENTER RM. 705

RECEPTION: 3:50 PM — SCIENCE CENTER, 7TH FLOOR

**“A General Construction for Parallelising
Metropolis-Hastings Algorithms”**

Ben Calderhead

**Faculty of Natural Sciences, Department of Mathematics
Imperial College London**

ABSTRACT

Markov chain Monte Carlo methods are essential tools for solving many modern day statistical and computational problems, however a major limitation is the inherently sequential nature of these algorithms. In this talk I'll present some very recent work on a natural generalisation of the Metropolis-Hastings algorithm that allows for parallelising a single chain using existing MCMC methods. We can do so by proposing multiple points in parallel, then constructing and sampling from a finite state Markov chain on the proposed points such that the overall procedure has the correct target density as its stationary distribution. The approach is generally applicable and straightforward to implement. I'll demonstrate how this construction may be used to greatly increase the computational speed and statistical efficiency of a variety of existing MCMC methods, including Metropolis-Adjusted Langevin Algorithms and Adaptive MCMC. Furthermore, I'll discuss how it allows for a principled way of utilising every integration step within Hamiltonian Monte Carlo methods; our approach increases robustness to the choice of algorithmic parameters and results in increased accuracy of Monte Carlo estimates with little extra computational cost.