Analysis, Geometry and Stochastics for Planet Earth

Date: Tuesday, June 2, 2015
Location: Room 402, EPSRC Centres for Doctoral Training Suite, Imperial College London
Supported by: London Mathematical Society Institute and EPSRC-CDT Mathematics of Planet Earth

Speaker: Prof Sebastian Reich (University of Potsdam)
Title: "Beyond classic data assimilation: model adaptation, belief propagation and model selection"
Abstract: I will summarise recent progress on ensemble-based data assimilation methods in the first part of my talk. The second part will be devoted to an extension of these methods to belief propagation, model adaptation and model selection.

Speaker: Prof Robert McCann (University of Toronto)
Title: "The Intrinsic Dynamics of Optimal Transport"
Abstract: The question of which costs admit unique optimizers in the Monge-Kantorovich problem of optimal transportation between arbitrary probability densities is investigated. For smooth costs and densities on compact manifolds, the only known examples for which the optimal solution is always unique require at least one of the two underlying spaces to be homeomorphic to a sphere. We introduce a (multivalued) dynamics which the transportation cost induces between the target and source space, for which the presence or absence of a sufficiently large set of periodic trajectories plays a role in determining whether or not optimal transport is necessarily unique. This insight allows us to construct smooth costs on a pair of compact manifolds with arbitrary topology, so that the optimal transportation between any pair of probility densities is unique. This represents joint work with Ludovic Rifford (Nice).

Speaker: Dr Michaela Ottobre (Edinburgh Heriot Watt University)
Title: "A Function Space HMC Algorithm with second order Langevin diffusion limit"
Abstract: We describe a new MCMC method optimized for the sampling of probability measures on Hilbert space which have a density with respect to a Gaussian; such measures arise in the Bayesian approach to inverse problems, and in conditioned diffusions. Our algorithm is based on two key design principles: (i) algorithms which are well-defined in infinite dimensions result in methods which do not suffer from the curse of dimensionality when they are applied to approximations of the in finite dimensional target measure on R^N; (ii) non-reversible algorithms can have better ergodic properties compared to their reversible counterparts. The method we introduce is based on the hybrid Monte Carlo algorithm, tailored to incorporate these two design principles. Joint work with N. Pillai, F. Pinski and A. Stuart.