



BISP8

**Eighth Workshop on
BAYESIAN INFERENCE IN STOCHASTIC PROCESSES**

Simulation-based Bayesian Inference for Animal Movement in Continuous Time

Paul Blackwell¹, Mu Niu¹

¹ University of Sheffield, UK

Diffusion processes are natural models of the movements of individuals, for example wildlife tracked using GPS collars. This talk concerns a rich class of stochastic models in which, at any instant, an animal can be in one of a number of different states, representing different behaviours, e.g. encamped and exploratory, as in Morales et al (2004), or different movement patterns within the same kind of behaviour, e.g. attraction to different feeding patches. For tractability, movement within a state is modelled rather simply, but to capture the heterogeneity of real movement data, switching between states can be allowed to depend on time and on spatial covariates in a very flexible way.

Using a technique related to uniformization, simulation can be carried out for these models without any approximation or time-discretization error, despite the complex feedback between location and behaviour. This enables fully Bayesian statistical inference, again without discretization error, using simulation-based methods such as Markov chain Monte Carlo. These ideas will be illustrated using data on wild boar movement, courtesy of the Food and Environment Research Agency.

Keywords:

Diffusion process; simulation; Markov chain Monte Carlo.

**ABSTRACT
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