Title:

Simulation and inference for stochastic differential equations

Abstract:

Stochastic differential equations SDEs are used to model continuous time phenomena appearing in many disciplines including finance, biology, ecology, the social sciences, etc.
In this talk we consider one dimensional SDEs driven by standard Brownian motion. We start with a quick review on simulation schemes for SDEs. These schemes are needed in the study of random dynamical systems like in population dynamics, numerical option pricing in finance, etc.
While inference for SDEs with continuous time observation is a long studied field, only recently the interest of the scientific community focused on discrete time observations. The boost of this growing interest has been ignited by the increasing availability of high frequency data, e.g. from finance.
Unfortunately, the likelihood function for these data is almost never available in explicit form and, moreover, different sampling schemes are possible. We review different approaches to both likelihood and non-likelihood inference for discretely observed SDEs. In particular we will discuss pseudo-likelihood and approximate-likelihood methods, estimating functions, generalized method of moments, non parametric estimation and model selection.