

# **Multi-resolution Inference of Stochastic Models from Partially Observed Data**

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## **Abstract**

Stochastic models, diffusion models in particular, are widely used in science, engineering and economics. Inferring the parameter values from data is often complicated by the fact that the underlying stochastic processes are only partially observed. Examples include inference of discretely observed diffusion processes, stochastic volatility models, and double stochastic Poisson (Cox) processes. Likelihood based inference faces the difficulty that the likelihood is usually not available even numerically. Conventional approach discretizes the stochastic model to approximate the likelihood. In order to have desirable accuracy, one has to use highly fine discretization. However, fine discretization usually imposes unbearable computation burden. In this talk we will introduce the framework of Bayesian multi-resolution inference to address this difficulty. By working on different resolution (discretization) levels simultaneously and by letting the resolutions talk to each other, we not only substantially improve the computational efficiency, but also significantly increase the estimation accuracy. We will illustrate the strength of the multi-resolution approach by examples.