



BISP8

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

## **Time varying density estimation with diffusive Dirichlet mixtures**

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We introduce a new class of prior distributions on the space of continuously varying densities, induced by Dirichlet process mixtures which diffuse in time. These select time-indexed random functions without jumps, whose sections are continuous or discrete distributions depending on the choice of kernel. The construction exploits the widely used stick-breaking representation of the Dirichlet process and induces the time dependence by replacing the stick-breaking components with one-dimensional Wright-Fisher diffusions. These features combine appealing properties of the model with great flexibility and tractability for posterior computation. The construction easily extends to multi-parameter GEM marginal states, which include for example the two-parameter Poisson-Dirichlet process. An inferential strategy is illustrated on real financial data.

### **Keywords:**

Density estimation; Dirichlet mixture; stick-breaking representation; time-varying density; Wright-Fisher diffusion.

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**ABSTRACT  
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