Stochastic flows in the Brownian web and net

Dr. Jan Swart
(Institute of Information Theory and Automation of the ASCR,
Academy of Sciences of the Czech Republic)

November 25, 2009

In this talk, we will look at a class of Markov processes taking values in the space of measures on the real line, which have recently been introduced in the work of Le Jan, Raimond, Howitt and Warren. These Markov processes arise as the diffusive scaling limits of discrete processes with the following description. We start with a distribution of mass on the even integers. For each even integer i, we construct an independent $[0,1]$-valued random variable ω_i according to some fixed law μ, and we sent an ω_i-fraction of the mass at i to the point $i+1$ and the remaining mass to $i-1$. Repeating this procedure yields a Markov chain, taking values alternatively in the measures on the even and odd integers, that after diffusive scaling approximates the Markov processes we are interested in. We prove a number of new properties about these measure-valued Markov processes, such as the fact that they are atomic at deterministic times, yet there may be random times when they are purely nonatomic. An important tool in our proofs is the Brownian web, which is a collection of coalescing Brownian motions started from each point in space and time.