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Conditioning super-Brownian motion on its exit measure X_D

Let X be a super-brownian motion defined on a domain E in the euclidean space and (X_D) be its exit measures indexed by sub-domains of E. We pick a sub-domain D and condition the super-brownian motion inside this domain on its exit measure X_D. We give an explicit construction of the resulting conditional law in terms of a particle system, which we call the "backbone", along which a mass is created uniformly. In the backbone, each particle is assigned a measure ν at its birth. The spatial motion of the particle is an h-transform of Brownian motion, where h is a potential that depends on both ν and the particle's birth location. ν represents the particle's contribution to the exit measure. At the particle's death two new particles are born and ν is passed to the newborns by fragmentation into two bits.

Joint work with Tom Salisbury.