Stochastic partial differential equations and measure-valued branching processes

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Measure-valued branching processes (superprocesses) arise as limits of branching particle systems undergoing random migration and critical (or asymptotically critical) branching. In low dimensions these processes could be described as solutions to stochastic partial differential equations (SPDEs). We will deal with both superprocesses and SPDEs in this course. We will need a certain amount of machinery: characterization of processes via martingale problems, weak convergence of stochastic processes with values in metric space, martingale measures. We develop this as we need it.

As time permits we will cover some or all of the following topics.

1. Introduction: SPDEs, superprocesses and approximating particle pictures, log-Laplace equation.


4. Weak convergence of processes.


9. Weak uniqueness for some SPDEs via duality argument.

10. SPDEs driven by Levy noise.


12. Interacting particle system converging to superprocesses and SPDEs (contact, voter models).

References We shall not be following any particular book. The following are useful references for different aspects of the course.


