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Branching Random Walk in Random Environment

Tommaso Cornelis Rosati *

Abstract

We study a particle system which models spatial branching according to a randomly distributed catalyst: a branching random walk in a random environment. We derive the asymptotics of the system for a high density of particles, in terms of a certain density growth parameter. For high values of such parameter we establish a functional law of large numbers. At a critical value of the parameter, we can establish a central limit theorem in terms of a rough analogous of the superbrownian motion.

We characterize the latter limit as the unique solution to a martingale problem, combining recent advances in the study of singular stochastic PDEs with techniques from the theory of superprocesses.

*e-mail: t.r.cornelis@gmail.com