Branching Brownian particles with spatial selection and the KPP equation

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Abstract

The F-KPP equation was introduced in 1937 as a model for the evolution of a genetic trait. This equation admits an infinite number of travelling wave solutions but only one of them has a physical meaning, the one with minimal velocity. We consider a system of N interacting Branching Brownian particles and show that the empirical cumulative distribution associated to this process converges to the solution of the F-KPP equation. Additionally, for each N, we prove existence of a velocity for the cloud of particles. These velocities turns out to converge to the minimal one for the F-KPP, namely, a "microscopic selection principle" holds.