

On the behavior of the population density of branching random walks

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We consider the branching random walk in d dimensional integer lattice with time-space i.i.d. offspring distributions. Then, the normalization of total population is a non-negative martingale and it converges to a certain random variable almost surely. Moreover, the following phase transition occurs. If the environment is not too random, then the growth rate of the total population is the same as the one of its expectation (the regular growth phase). On the other hand, if the environment is random enough, then the one of the total population is slower than the one of its expectation (the slow growth phase). We will look at the behavior of the population density in each phase.