The Contact Process on the Regular Tree with Random Vertex Weights

Dayue CHEN *Peking University, China*, E-mail: dayue@pku.edu.cn

Abstract: In this paper, we are concerned with contact process with random vertex weights on regular trees, and study the asymptotic behavior of the critical infection rate as the degree of the trees increasing to infinity. In this model, the infection propagates through the edge connecting vertices x and y at rate $\lambda\rho(x)\rho(y)$ for some $\lambda > 0$, where $\{\rho(x), x \in T^d\}$ are *i.i.d.* vertex weights. We show that when d is large enough there is a phase transition at $\lambda_c(d) \in (0, \infty)$ such that for $\lambda < \lambda_c(d)$ the contact process dies out, and for $\lambda > \lambda_c(d)$ the contact process survives with a positive probability. Moreover, we also show that there is another phase transition at $\lambda_e(d)$ such that for $\lambda < \lambda_e(d)$ the contact process dies out at an exponential rate. Finally, we show that these two critical values have the same asymptotic behavior as d increases. This is a joint work with Yu Pan and Xiaofeng Xue.