

[P3] Interplay between cooperative effects and network topology in social contagions

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The generalized epidemic process (GEP)[†] is a simple model which captures the cooperative effects of social contagions. It is known that the model exhibits both continuous and discontinuous phase transitions on regular lattices[‡] and Poisson random networks[‡]. Here we first present a self-contained analysis of the phase diagram and the universality class of the GEP on Poisson random networks*. Then we discuss how the behaviors changes in the presence of communities or hubs. While communities simply shift the transition points**, hubs have nontrivial effects on the transition properties. Remarkably, provided that the hubs are sufficiently dominant and the order parameter is appropriately defined, even discontinuous transitions at a vanishing epidemic threshold may be observed. Our findings are corroborated by numerical verifications of the extended finite-size scaling theory.

[†] H.-K. Janssen, M. Mueller, and O. Stenull, Phys. Rev. E **70**, 026114 (2004).

[‡] P. S. Dodds and D. J. Watts, Phys. Rev. Lett. **92**, 218701 (2004); G. Bizhani, M. Paczuski, and P. Grassberger, Phys. Rev. E **70**, 011128 (2012).

* K. Chung, Y. Baek, M. Ha, and H. Jeong, Phys. Rev. E **93**, 052304 (2016).

** K. Chung, Y. Baek, D. Kim, M. Ha, and H. Jeong, Phys. Rev. E **89**, 052811 (2014).