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Infinite-randomness critical point in the two-dimensional disordered contact process ADAM FARQUHAR, JASON MAST, THOMAS VOJTA, Missouri University of Science and Technology — We study the nonequilibrium phase transition in the two-dimensional contact process on a randomly diluted lattice by means of large-scale Monte-Carlo simulations for times up to 10^{10} and system sizes up to 8000×8000 sites. Our data provide strong evidence for the transition being controlled by an exotic infinite-randomness critical point with activated (exponential) dynamical scaling. We calculate the critical exponents of the transition and find them to be universal, i.e., independent of disorder strength. The Griffiths region between the clean and the dirty critical points exhibits power-law dynamical scaling with continuously varying exponents. We discuss the generality of our findings and relate them to a broader theory of rare region effects at phase transitions with quenched disorder. Our results are of importance beyond absorbing state transitions because according to a strong-disorder renormalization group analysis, our transition belongs to the universality class of the two-dimensional random transverse-field Ising model.

Thomas Vojta
Missouri University of Science and Technology

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