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Enhanced rare-region effects in the contact process with long-range correlated disorder AHMED K. IBRAHIM, HATEM BARGHATHI, THOMAS VOJTA, Missouri Univ of Sci & Tech — We investigate the nonequilibrium phase transition in the disordered contact process in the presence of long-range spatial disorder correlations. These correlations greatly increase the probability for finding rare regions that are locally in the active phase while the bulk system is still in the inactive phase. Specifically, if the correlations decay as a power of the distance, the rare-region probability is a stretched exponential of the rare-region size rather than a simple exponential as is the case for uncorrelated disorder. As a result, the Griffiths singularities are enhanced and take a non-power-law form. The critical point itself is of infinite-randomness type but with critical exponent values that differ from the uncorrelated case. We report large-scale Monte Carlo simulations that verify and illustrate our theory. We also discuss generalizations to higher dimensions and applications to other systems such as the random transverse-field Ising model, itinerant magnets, and the superconductor-metal transition.

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