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Contact process on generalized Fibonacci chains: infinite-modulation criticality and double-log periodic oscillations[1] HATEM BARGHATHI, Missouri University of Science and Technology, DAVID NOZADZE, The Ohio State University, THOMAS VOJTA, Missouri University of Science and Technology — We study the nonequilibrium phase transition of the contact process with aperiodic transition rates using a real-space renormalization group as well as Monte-Carlo simulations. The transition rates are modulated according to the generalized Fibonacci sequences defined by the inflation rules A $\to$ AB^k and B $\to$ A. For $k = 1$ and 2, the aperiodic fluctuations are irrelevant, and the nonequilibrium transition is in the clean directed percolation universality class. For $k \geq 3$, the aperiodic fluctuations are relevant. We develop a complete theory of the resulting unconventional "infinite-modulation" critical point which is characterized by activated dynamical scaling. Moreover, observables such as the survival probability and the size of the active cloud display pronounced double-log periodic oscillations in time which reflect the discrete scale invariance of the aperiodic chains. We illustrate our theory by extensive numerical results, and we discuss relations to phase transitions in other quasiperiodic systems.

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