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Athermal dynamics of strongly coupled stochastic three-state oscillators LEV TSIMRING, UCSD, BASTIEN FERNANDEZ, University of Marseille — We study the collective behavior of a globally coupled ensemble of N cyclic stochastic three-state systems with rates of transition from state $i-1$ to state i proportional to the number of systems already in state i. While the mean field theory predicts only decaying oscillations in this system, direct numerical simulations indicate that the mean field exhibits stochastic oscillations even in the large N limit. We characterize the regularity of oscillations by the coherence parameter which has a well-defined maximum at the coupling constant of order 1. In contrast, the order parameter characterizing the level of synchrony among oscillators, increases monotonously with the coupling strength. We derive the exact solution of the full master equation for the stationary probability distribution and find the analytical expression for the order parameter.

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