

Brownian ratchets for Toom: Active dynamics from driving and dissipation

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Active systems driven out of equilibrium can realize a broad range of physical phenomena that systems in equilibrium cannot. However, given an abstract set of active dynamics, such as cellular automata, it is often unclear how to design a physically natural driven system that realizes them. In this talk, I show how to simulate any cellular automaton dynamics in a many-body Brownian ratchet, a bilayer system with the two layers coupled to baths at different temperatures. As a particular example considering Toom's rule, I construct a nearest-neighbor Ising model coupled to two baths whose ferromagnetic phase is stable to symmetry-breaking perturbations.