

Physics Seminar: Israel Klich
Wednesday, September 16•2:00 – 3:00pm
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Title: Optimizing ice cubes

Abstract: The Mpemba effect—the counterintuitive possibility that a hotter system can cool faster than a colder one—is part of a broader class of anomalous relaxation phenomena in which distance from equilibrium does not determine relaxation time. I will describe how such effects arise from the spectral structure of stochastic dynamics: different initial states excite the slow relaxation modes with different amplitudes, and an initially distant state may relax rapidly if its overlap with the dominant slow mode is small or vanishes. I will then introduce the idea of an “optimal ice cube”: a suitably prepared auxiliary system which, when briefly coupled to the system of interest, suppresses its slowest relaxation mode and thereby accelerates equilibration. This provides a simple framework for designing optimal thermalization protocols and illustrates how nonequilibrium resources can be used to control relaxation.