

Abstract Submitted
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Temperature Exchange in a System of Two Harmonic Oscillators ANTONIA CHIMONIDOU, GEORGE SUDARSHAN, University of Texas at Austin — We study the process by which quantum correlations are created when an interaction Hamiltonian is repeatedly applied to a system of two harmonic oscillators for some characteristic time interval, under what we call the “interact-refresh-repeat” scheme. We show that, for the case where the oscillator frequencies are equal, the initial Maxwell-Boltzmann distributions of the uncoupled parts evolve to a new Maxwell-Boltzmann distribution through a series of transient Maxwell-Boltzmann distributions, or quasi-stationary, non-equilibrium states. Further, we discuss why the equilibrium reached when the two oscillator frequencies are unequal, is not a thermal one. More specifically, we show that the ratio of the harmonic oscillator temperatures at the new equilibrium state is completely determined by the ratio of the inverse harmonic oscillator frequencies. We conclude that the selection rules imposed by the interaction Hamiltonian override the expected statistical mechanical effects. All the calculations are exact and the results are obtained through an iterative process, without using perturbation theory.

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