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Title: Many-Body Synchronization in a Classical Hamiltonian System and the Effect of Quantum Fluctuations

Abstract: In this talk I present synchronization between periodically driven, interacting classical spins undergoing a Hamiltonian dynamics. In the thermodynamic limit there is a transition between a regime where all the spins oscillate synchronously for an infinite time with a period twice the driving period (synchronized regime) and a regime where the oscillations die after a finite transient (chaotic regime). This is a peculiar result, having been so far synchronization only in driven-dissipative systems observed. This phenomenon can be interpreted as a period-doubling time crystal and I show how synchronization can appear both for an overall regular and overall chaotic dynamics. Finally I show that this form of Hamiltonian synchronization is unstable even to the slightest quantum fluctuations.