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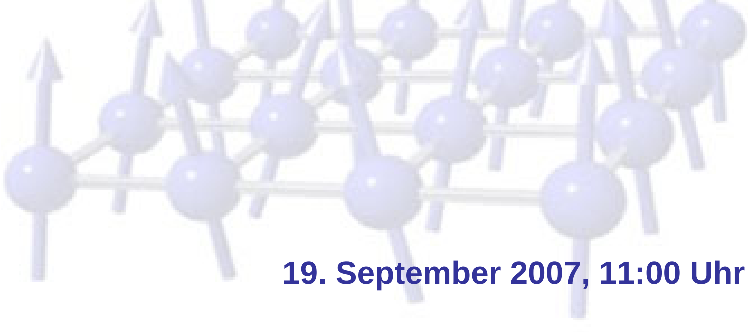
Thermalization and its mechanism for generic isolated quantum systems

Time dynamics of isolated many-body quantum systems has long been an elusive subject, perhaps most urgently needed in the foundations of quantum statistical mechanics. Only very recently experimentalists have begun performing detailed studies of this matter. In generic systems, one expects the nonequilibrium dynamics to lead to thermalization: a relaxation to states where the values of macroscopic quantities are stationary, universal with respect to widely differing initial conditions, and predictable through the time-tested recipe of statistical mechanics.
The relaxation mechanism is not obvious, however; for example, dynamical chaos cannot play the key role as it does in classical systems since quantum evolution is linear. In this talk we demonstrate that a generic quantum many-body system does relax to a state well-described by standard statistical mechanical prescription. Moreover, we show that time evolution itself plays a merely auxiliary role and that thermalization happens instead at the level of individual eigenstates, as first proposed by Srednicki [Phys. Rev. E 50, 888 (1994)].



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