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Quantum thermalization and the expansion of atomic clouds
LOUK RADEMAKER, Univ of California - Santa Barbara — In the traditional 19th century approach to thermodynamics, one studies whether a system will reach thermal equilibrium when brought into contact with an infinitely big heat bath. In this talk, I will discuss this problem in the context of quantum many-body systems. Surprisingly, even noninteracting fermionic and bosonic systems will thermalize, as one can explicitly infer from computing the time-dependent modular Hamiltonian. The approach to thermalization is of a ballistic nature for fermions, $\Delta E \sim t^{-d}$ where d is the dimension. Bosons, on the other hand, smoothly change from ballistic at high bath temperatures to diffusive $\Delta E \sim t^{-d/2}$ behavior at low temperatures. Finally, I will discuss how to compute the thermalization in generic interacting non-integrable systems, thereby presenting some numerical results for the interacting Bose-Hubbard model in one dimension.

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