Universality in the Heating Dynamics of 1D Ultracold Bosons

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Recent studies of heating and thermalization of interacting one-dimensional (1D) bosons in cold atom setups have triggered the general interest in non-equilibrium dynamics of bosons in lower dimensions. In the framework of a Keldysh path integral approach to describe non-equilibrium dynamics of a Luttinger Liquid, we investigate a 1D Bose gas subject to permanent heating.
We determine the universal scaling behavior of the phonon life-times, which differs from thermal equilibrium. This modifies the scaling of relevant experimental signatures, such as the dynamical structure factor or the density of states compared to a thermal state.
In order to trace the dynamics of thermalization processes and estimate the relevant time-scales of the heating dynamics, we compute the non-equilibrium phonon distribution function. This allows us for a separation of the universal non-equilibrium long-wavelength behavior from the short distance dynamics. The latter is dominated by thermal fluctuations with time-dependent, increasing temperature.