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Physics : Quantum Gases and Condensates

Rauer, Bernhard

# Non-Equilibrium Dynamics Beyond Dephasing

Recurrences and Loss Induced Cooling in One-dimensional Bose Gases

- Nominated as an outstanding Ph.D. thesis by the Atominstitut - TU Vienna, Vienna, Austria
- Intuitive introduction to the physics of one-dimensional quasi-condensates
- In-depth investigation of several non-equilibrium phenomena occurring in the same system

Cold atomic gases trapped and manipulated on atom chips allow the realization of seminal one-dimensional (1d) quantum many-body problems in an isolated and well controlled environment. In this context, this thesis presents an extensive experimental study of non-equilibrium dynamics in 1d Bose gases, with a focus on processes that go beyond simple dephasing dynamics. It reports on the observation of recurrences of coherence in the post-quench dynamics of a pair of 1d Bose gases and presents a detailed study of their decay. The latter represents the first observation of phonon-phonon scattering in these systems. Furthermore, the thesis investigates a novel cooling mechanism occurring in Bose gases subjected to a uniform loss of particles. Together, the results presented show a wide range of non-equilibrium phenomena occurring in 1d Bose gases and establish them as an ideal testbed for many-body physics beyond equilibrium.

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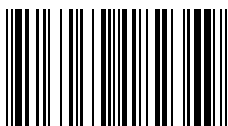
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