



CO.CO.MAT

CONTROL OF QUANTUM CORRELATIONS IN TAILORED MATTER
SFB/TR 21 – STUTTGART, ULM, TÜBINGEN

Kolloquium

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Far-from-equilibrium dynamics of ultracold quantum gases

In more and more experimental situations, ultracold atomic Bose and Fermi gases are driven far away from a thermal equilibrium state.

Magnetic and optical Feshbach resonances as well as sophisticated trapping techniques play an important role in this progress. Precise measurements of the ensuing dynamics have become possible. The far-from equilibrium configurations of particular interest are those where quantum fluctuations become important which are not taken into account in mean-field theory. For this reason non-equilibrium quantum field theoretical approaches, in particular methods which extend beyond the Hartree-Fock-Bogoliubov and second order approximations will gain much importance in the near future. I present a non-perturbative dynamical quantum field theory for Bose-Einstein condensates on the basis of a $1/N$ -expansion of the 2-Particle Irreducible Effective Action. This approach allows to describe the short- and long-time dynamics including thermalization, both in the classical and quantum regimes, within one calculational scheme. Results for the dynamics of a one-dimensional Bose gas are presented.

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