Spectral Theory and Dynamics of Quantum Systems
GRADUIERTENKOLLEG 1838

Guest Lecture

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Bose Particles in a Box: Convergent Expansion of the Ground State in the Mean Field Limiting Regime

June 21, 2017
15:00 h, Room 8.526
University of Stuttgart, Pfaffenwaldring 57

Abstract:
I shall report on a novel multi-scale technique to study many-body quantum systems where the total number of particles is kept fixed. The method is based on the Feshbach-Schur map and the scales are represented by occupation numbers of particle states. Consider an interacting Bose gas at zero temperature, constrained to a finite box and in the mean field limiting regime, where the N gas particles interact through a pair potential of positive type and with an ultraviolet cut-off. The (nonzero) Fourier components of the potential are assumed to be sufficiently large with respect to the corresponding kinetic energies of the modes. For this system, we provide a convergent expansion of the ground state of the Hamiltonian in terms of the bare operators. In the limit N to infty the expansion is up to any desired accuracy.

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