



Spectral Theory and Dynamics of Quantum Systems

GRADUIERTENKOLLEG 1838

Two lectures by

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Quantum Fluctuations around the Gross-Pitaevskii dynamics

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10:00 - 11:30 h

University of Stuttgart, Campus Vaihingen

Pfaffenwaldring 57, Room 8.122

Abstract:

We consider the many body quantum evolution of bosonic systems in the Gross-Pitaevskii regime, a special case of a dilute limit which is relevant for the description of initially trapped Bose condensates. In this regime the dynamics is known to be approximated by the Gross-Pitaevskii equation. So far, the available results establish the convergence in trace norm of the reduced k -particle density matrices associated with the solution of the many body Schrödinger equation towards products of solutions of the Gross-Pitaevskii equation. In this talk we go one step further, and we consider fluctuations around the Gross-Pitaevskii dynamics. On the bosonic Fock space we construct a limiting unitary evolution with a quadratic generator, providing a norm approximation for the full many body dynamics for a certain class of initial data. The approach we use, based on a representation of the system on the bosonic Fock space, and on the study of the time evolution of initial coherent states, also provides precise bounds on the rate of the convergence towards the limiting Gross-Pitaevskii dynamics. (Joint work with Chiara Bocato and Benjamin Schlein)



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