

Quantitative derivation of the Gross-Pitaevskii equation

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Abstract

Starting from the many-body Schroedinger equation we show that the dynamics of Bose-Einstein condensates can be described, in the Gross-Pitaevskii limit, by the time-dependent Gross-Pitaevskii equation. Furthermore, we give a bound on the rate of convergence for this approximation. Our results hold for a class of modified coherent states in Fock space which model a condensate in a trap. To construct these initial states we use Bogoliubov transformations. We present the main steps to obtain these results. This work was done in collaboration with N. Benedikter and B. Schlein.