A DYNAMICAL HARTREE-FOCK-BOGOLIUBOV APPROXIMATION OF INTERACTING BOSONS

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1. Abstract

We consider a system of N interacting bosons where the particles experience a short range two-body interaction given by $N^{-1}v_N(x) = N^{3\beta-1}v(N^\beta x)$ where $0 < \beta < 1$ and v is a non-negative spherically symmetric function. Our main result is the extension of the local-in-time Fock space approximation of the exact dynamics of quasifree states proven in M. Grillakis and M. Machedon, Comm. PDEs., **42**, 24(2017) for $0 < \beta < \frac{2}{3}$ to a global-in-time approximation for $0 < \beta < 1$. Our extension allows for a more general set of initial data that includes *coherent states*. The key ingredients in establishing the Fock space approximation are the work of Grillakis and Machedon on the local well-posedness theory for the time-dependent Hartree-Fock-Bogoliubov(HFB) system in M. Grillakis and M. Machedon, Comm. PDEs., **44**, 1431(2019) and a global-in-time estimate for the HBF system in J. Chong, M. Grillakis, M. Machedon, and Z. Zhao, arXiv:2008.01753 (2020). This is a joint work with Z. Zhao (to appear shortly on arXiv). Moreover, the talk will be delivered in English.

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