
SERENA CENATIEMPO, Gran Sasso Science Institute, L'Aquila
Bogoliubov theory in the Gross-Pitaevskii regime

Since 1947 Bogoliubov theory has represented the guide model to thinking about Bose gases. Such a theory predicts a linear excitation spectrum and provides expressions for the thermodynamic functions which are believed to be correct in the dilute limit. Remarkably, there are only a few cases where the predictions of Bogoliubov theory can be actually proved. In particular, one of the main mathematical issues is to recover the intuition that the physical parameter that should appear in the expressions for the physical quantities is the scattering length of the interaction.

In this talk I will discuss how the predictions of Bogoliubov theory can be rigorously obtained for a system of N bosons trapped in a box with volume one and interacting through a weak, repulsive potential with scattering length $1/N$ (Gross-Pitaevskii regime). This is a joint work with C. Boccato, C. Brennecke and B. Schlein.