Mathematics and CS Seminar

Upper bound for the grand canonical free energy of the Bose gas in the Gross-Pitaevskii limit for general interaction potentials

Andreas Deuchert
University of Zürich

Host: Robert Seiringer

We consider a homogeneous Bose gas in the Gross--Pitaevskii limit at temperatures that are comparable to the critical temperature for Bose--Einstein condensation. Recently, an upper bound for the grand canonical free energy was proved in arXiv:2305.19173 [math-ph] capturing two novel contributions. First, the free energy of the interacting condensate is given in terms of an effective theory describing the probability distribution of the number of condensed particles. Second, the free energy of the thermally excited particles equals that of a temperature-dependent Bogoliubov Hamiltonian. We extend this result to a more general class of interaction potentials, including interactions with a hard core. Our proof follows a different approach than the one in arXiv:2305.19173 [math-ph]: we model microscopic correlations between the particles by a Jastrow factor, and exploit a cancellation in the computation of the energy that emerges due to the different length scales in the system. (This is joint work with Marco Caporaletti.)

Tuesday, February 13, 2024 04:15pm - 05:15pm
Heinzel Seminar Room (I21.EG.101), Office Building West, ISTA

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.
Please find a schedule of the ISTA Shuttle on our webpage:
https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.