



Seminar/Talk

The Gibbs state of the mean-field Bose gas

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Host: Robert Seiringer

We consider the homogeneous mean-field Bose gas at temperatures proportional to the critical temperature of its Bose-Einstein condensation phase transition. We prove a trace norm approximation for the grand canonical Gibbs state in terms of a reference state, which is given by a convex combination of products of coherent states and Gibbs states associated with certain temperature-dependent Bogoliubov Hamiltonians. The convex combination is expressed as an integral over a Gibbs distribution of a one-mode 4-theory describing the condensate. This result justifies an analogue of Lee and Yang's extension of Bogoliubov theory to positive temperatures, and it allows us to derive various limiting distributions for the number of particles in the condensate, as well as precise formulas for the one- and two-particle density matrices of the Gibbs state. Key ingredients of our proof, which are of independent interest, include two novel abstract correlation inequalities. The proof of one of them is based on an application of an infinite-dimensional version of Stahl's theorem. This is joint work with Phan Tnh Nam and Marcin Napikowski.

Tuesday, June 10, 2025 04:15pm - 05:45pm

Office Bldg West / Ground floor / Heinzl Seminar Room (I21.EG.101)



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