Seminar/Talk

The Correlation Energy of a Fermi Gas in the Mean-Field Regime

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Host: Robert Seiringer

In this talk we consider the correlation energy of a Fermi gas on a torus as the particle number N goes to infinity,with the interaction potential scaled by a factor proportional to N^{-1/3}.In the second-quantized picture, the Hamiltonian of such a system can be written in the form of a quadratic Hamiltonian with respect to certain "quasi-bosonic" operators. By applying the theory of bosonic Bogolubov transformations, this Hamiltonian can be approximately diagonalized to yield a "bosonic contribution" to the correlation energy. For highly singular potentials, such as the Coulomb potential, the correlation energy also consists of an "exchange contribution" due to the underlying fermionic nature of the system. We will see that this is nonetheless automatically captured by the same approach, provided one keeps careful track of the fermionic correction terms.Based on joint work with Christian Hainzl and Phan Thành Nam.

Thursday, June 1, 2023 04:15pm - 05:15pm
Heinzel Seminar Room (I21.EG.101), Office Building West, ISTA

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