

Correlation Energy of a Fermi Gas by the Bosonization Method

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Abstract. Quantum correlations play an important role in interacting systems; however, their mathematical description is a highly non-trivial task. I explain how correlations in a fermionic gas can be described by bosonizing collective pair excitations. This leads us to an effective quadratic bosonic Hamiltonian. We establish a theory of approximate bosonized Bogoliubov transformations by which we derive a Gell-Mann–Brueckner-type formula as an upper bound for the fermionic ground state energy.

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