

Composite-boson formalism for one-dimensional models

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Particles made of an even number of fermions are often regarded as bosonic because of their integer spin and the overall plus sign upon exchange of two such identical composite particles. However, Pauli exclusion still holds for the constituents and its effects may become relevant in some situations, a behaviour that has been clarified with the development of “coboson theory” [1]. An important element in this theory is an approximation for the ground state of a system of N fermion pairs which is analogous to a BCS ansatz. Unfortunately, this approximation is not applicable in one-dimensional systems [2]. After an overview of the formalism, I will show how it can provide an elegant and convenient description of one-dimensional models despite the failure of the simplest ansatz [3].

[1] M. Combescot, O. Betbeder-Matibet, F. Dubin, Phys. Rep. **463**, 215 (2008).

[2] P. Céspedes, E. Rufeil-Fiori, P. A. Bouvrie, A. P. Majtey, C. Cormick, Phys. Rev. A. **100**, 012309 (2019).

[3] E. Cuestas, C. Cormick, Phys. Rev. A **105**, 013302 (2022).