Potential approximation of the one-dimensional Bose gas with contact interactions

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In this talk a Bose gas with δ-interactions in one space dimension is considered. We prove that the Hamiltonian of this system, which is defined by a closed semi-bounded quadratic form, naturally arises as a resolvent limit $\varepsilon \downarrow 0$ of Schrödinger operators H_ε, where the corresponding two-body potentials scale like a Dirac sequence in $\varepsilon > 0$. Moreover, we estimate the rate of norm convergence of the resolvents depending on the decay of the potential at infinity. Our results extend previous results (see [1]), concerning the three-body case, to the case of an arbitrary number of bosons $N \in \mathbb{N}$.

References

[1] G. Basti, C. Cacciapuoti, D. Finco, A. Teta. The three-body problem in dimension one: From short-range to contact interactions. *J. Math. Phys.* **59**, 072104 (2018).