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【186】 Emergent $U(1)$ symmetry in non-particle-conserving 1D models

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The properties of stable Luttinger liquid phases in models with a non-conserved number of particles are investigated. We study Luttinger liquid phases in one-dimensional models of hard-core boson and spinless fermion chains where particles can be created and annihilated three by three on adjacent sites. We provide an intuitive and systematic method based on the flow equation approach, which accounts for additional terms in the correlations generated by the \mathbb{Z}_3 -symmetric interactions. We find that despite the emergence of $U(1)$ symmetry under renormalization, the observables are still affected by its breaking in the bare Hamiltonian. In particular, the standard bosonization mapping becomes insufficient to capture the full behavior of correlation functions.

Theoretical Work

Theory

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