

Generalized Unitary Bogoliubov Transformation that Breaks Fermion Number Parity

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The standard Bogoliubov transformation is generalized to enable fermion number parity breaking. The new transformation can diagonalize linear-plus-quadratic fermion Hamiltonians that include a number parity operator to commute with fermion operators. Number parity breaking can be used to model number fluctuations in low-energy fermion modes caused by strong interactions. This effect is compared and contrasted with parity-conserving number fluctuations in the Bardeen-Cooper-Schrieffer theory of superconductivity.

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