Fluctuations and Odd-Even Effects in the Thermodynamics of Small Superconducting Systems

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Fluctuations and odd-even effects in small superconducting systems are investigated by means of the static path plus RPA approximation. A new general derivation of this method is provided, which allows a straightforward implementation in statistical ensembles with fixed number parity (NP). An excellent agreement between exact and NP projected SPA+RPA results is obtained for a standard BCS interaction, where comparison with NP projected BCS and BCS+RPA treatments is made. An effective BCS+RPA approach is also derived.

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Fisher Information and the Inference of Wave Functions for Systems of Unknown Hamiltonian

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Systems for which the Hamiltonian is unknown abound. In this Letter, inspired by the work of Silver, we show how, with the help of Frieden and Soffer's principle of extremal information (EPI), one can compute approximate solutions of Schrdinger's equation for such systems, on the basis of a few pieces of data. The concomitant procedure should be regarded as an exploratory step towards practical quantum implicancies of the EPI, beyond its proved worth at the fundamental level.

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Fisher's Information, Kullback's Measure and H-Theorems

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In order to (i) provide a unified treatment for the diverse H-theorems verified by Fisher's information I and (ii) clarify the nature of the Fisher–Frieden–Soffer arrow of time, we study the behaviour of I under the action of Markov operators. The ensuing considerations allow us (1) to shed some light upon the relation between Fisher's information, on the one hand, and the process of coarse graining, on the other one; (2) to establish an H-theorem for the general Liouville equation, and (3) in the case of the diffusion and other linear evolution equations, to gain some additional insight into the workings of I 's temporal evolution.

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Fluctuations and Odd-Even Effects in Small Superfluid Systems

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Fluctuations and odd-even effects in small superfluid systems at finite temperature are investigated by means of the static path plus RPA approximation. A general derivation of this method is presented, which allows a straightforward implementation in statistical ensembles with fixed number parity (NP). A significant smoothing of the superconducting to normal transition is obtained in systems where the gap is comparable to the level spacing, as well as a decrease of pairing correlations in the odd case. Results are shown for a schematic model, where an excellent agreement with exact canonical results is OBTained with the present method, and then for a heavy nucleus. Comparison with NP projected BCS and BCS+RPA results is made. An effective BCS+RPA approach which remains smooth in transitional regions is also derived.

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