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Quantum Work Statistics in Chaotic Fermion Systems

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We study the full distribution of quantum work in driven chaotic fermion systems by using a random matrix approach. We find that work statistics is generically non-Gaussian. At longer times, quantum work distribution is well-described in terms of a simple ladder model and a symmetric exclusion process in energy space, and bosonization and mean field methods provide accurate analytical expressions for the work statistics. At finite temperatures, a cross-over between diffusive and superdiffusive work statistics is found. The probability of adiabatic evolution crosses over from an exponential to a stretched exponential behavior. Our findings can be verified by measurements on nanoscale circuits and via single qubit interferometry, and have important implications for adiabatic quantum optimization.

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