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Path Integral Approach to Work Statistics in Quantum Thermodynamics TAYLOR KIMBALL, JEAN-FRANCOIS VAN HUELE, Brigham Young University — Quantum Thermodynamics (QT) studies how laws of thermodynamics can be applied to microscopic systems where quantum phenomena appear and fluctuations dominate. Work is among the most important concepts in classical thermodynamics, and is defined as the force applied over a distance along a trajectory. This definition must be adapted in QT because microscopic particles don't follow trajectories. The most common method for calculating work statistics in QT is based on a two-point measurement, where the work statistics can be found from the difference in energy between two measurements. Here, I use a path integral approach to compute the work statistics. I discuss the forward and backward propagators needed to evolve the initial density matrix and find the work statistics. I briefly illustrate the case of a particle in a rigid box with one wall moving uniformly in time and compare my results with those in the literature (Funo and Quan, Phys. Rev. Lett. 121, 040602). Finally, I discuss how the path integral approach applies in the classical limit.

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