

Abstract Submitted
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Quantum work statistics of charged Dirac particles in time-dependent fields¹ SEBASTIAN DEFFNER, AVADH SAXENA, Los Alamos Natl Lab — The quantum Jarzynski equality is an important theorem of modern quantum thermodynamics. We show that the Jarzynski equality readily generalizes to relativistic quantum mechanics described by the Dirac equation. After establishing the conceptual framework we solve a pedagogical, yet experimentally relevant, system analytically. As a main result we obtain the exact quantum work distributions for charged particles traveling through a time-dependent vector potential evolving under Schrödinger as well as under Dirac dynamics, and for which the Jarzynski equality is verified. Special emphasis is put on the conceptual and technical subtleties arising from relativistic quantum mechanics.

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