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Efficiency and Large Deviations in Time-Asymmetric Stochastic Heat Engines TODD GINGRICH, GRANT ROTSKOFF, University of California, Berkeley, SURIYANARAYANAN VAIKUNTANATHAN, University of Chicago, PHILLIP GEISSLER, University of California, Berkeley — In a stochastic heat engine driven by a cyclic non-equilibrium protocol, fluctuations in work and heat give rise to a fluctuating efficiency. Using computer simulations and tools from large deviation theory, we have examined these fluctuations in detail for a model two-state engine. We find in general that the form of efficiency probability distributions is similar to those described by Verley et al. [2014 Nat Comm, 5 4721], in particular featuring a local minimum in the long-time limit. In contrast to the time-symmetric engine protocols studied previously, however, this minimum need not occur at the value characteristic of a reversible Carnot engine. Furthermore, while the local minimum may reside at the global minimum of a large deviation rate function, it does not generally correspond to the least likely efficiency measured over finite time.

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