

Abstract Submitted
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Local entropy of a nonequilibrium fermion system¹ CHARLES STAFFORD, ABHAY SHASTRY, University of Arizona — The local entropy of a nonequilibrium quantum system of independent fermions is investigated, and analyzed in the context of the laws of thermodynamics. The concept of “parentropy” is introduced, which is a state function related to the local nonequilibrium entropy by a variational principle: the parentropy is the entropy of a distribution maximizing the local entropy subject to the same constraints as the actual nonequilibrium distribution. It is shown that the local temperature and chemical potential measured by a floating thermoelectric probe can be expressed in terms of derivatives of the parentropy. The first law of thermodynamics can also be expressed in differential form in terms of the parentropy. However, the actual nonequilibrium entropy is related to the parentropy only via an inequality. It is not a state function, and its differential can not be expressed in terms of the first law of thermodynamics.

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