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How can one measure the entropy of a mesoscopic system ?

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Time: 16:00-17:00

Abstract:

Entropy is a fundamental thermodynamic quantity indicative of the accessible degrees of freedom in a system. While it has been suggested that the entropy of a mesoscopic system can yield nontrivial information on emergence of exotic states, its measurement in such small electron-number system is a daunting task. Here we propose a method to extract the entropy of a mesoscopic system from transport measurements. We prove analytically and demonstrate numerically the applicability of the method to a mesoscopic system of arbitrary spectrum and degeneracies. We then apply our procedure to measurements of thermoelectric response of a single quantum dot, and demonstrate how it can be used to deduce the entropy change across Coulomb-blockade valleys, resolving, along the way, a long standing puzzle of the experimentally observed finite thermoelectric response at the apparent particle-hole symmetric point.