Measuring entropies of exotic quasi-particles?

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In recent years many candidate setups have been proposed to support exotic quasi-particles, such as Majorana fermions (MFs), which may be relevant for quantum computing, but whether these particles have been observed experimentally is currently the topic of vivid debate. Entropy measurements can unambiguously separate these quasi-particles from other, simpler excitations. The entropy of a MFs is, for example, log2 /2 (in units of the Boltzman constant), a fractional value that cannot be attributed to a localized excitation. However, standard entropy measurements applicable to bulk systems cannot be utilized in measuring the additional entropy of a mesoscopic device, which may be due to less than a single electron in the device. In this talk I will describe recent theoretical and experimental progress in performing such measurements, either using thermopower and/or using the Maxwell relations. Particular examples will be single and double quantum dots in the Coulomb blockade regime. Lastly I will show how the formalism has been generalized to deduce the entropy from conductance measurements, and, applying it to a setup where two and three-channel Kondo physics have been previously observed, yields the fractional entropy of a single MF and a single Fibonacci anyon.