

Nanoscale Quantum Calorimetry with Electronic Temperature Fluctuations

Peter Samuelsson

Lund University

Motivated by the recent development of fast and ultra-sensitive thermometry in nanoscale systems, we investigate quantum calorimetric detection of individual heat pulses in the sub-meV energy range. We propose a hybrid superconducting injector-calorimeter setup, with the energy of injected pulses carried by tunneling electrons. Treating all heat transfer events microscopically, we analyse the statistics of the calorimeter temperature fluctuations and derive conditions for an accurate measurement of the heat pulse energies. Our results pave the way for novel, fundamental quantum thermodynamics experiments, including calorimetric detection of single microwave photons.