

Coulomb Blockade Thermometer: a primary device for sub-kelvin measurements

Coulomb blockade thermometry (CBT) is a well-established method for a precise and primary determination of cryogenic temperatures from below 5 mK to a few tens of kelvins. In practical devices, the operation of CBT is based on single electron charging effects in arrays of about 1000 normal metal tunnel junctions and relates temperature directly to a conveniently measurable voltage signal. I will discuss how optical lithography allows the fabrication CBTs on the wafer scale with good accuracy and reproducibility whereas cutting-edge electron beam lithography is applied for sensors having structures with a size on the order of 20 nm to extend the useful range of CBT to about 60 K. Finally, I will focus on the role of CBT for the proposed kelvin redefinition in terms of the Boltzmann constant.

Summary

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Session Classification: Cryogenic instrumentation (chairperson: Agnieszka Piotrowska)