Thermal Conductance by the Inverse Proximity Effect in a Superconductor

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We study heat transport in hybrid lateral normal metal – superconductor – normal metal (NSN) structures, consisting of a short S wire between two N reservoirs.[1] For local electronic thermometry and temperature control, we utilize normal metal – insulator – superconductor tunnel junctions connected to the N reservoirs of the NSN structure. We find the quasiparticle thermal conductance of S wires of length comparable to the superconducting coherence length to be strongly enhanced beyond the BCS value due to inverse proximity effect, resulting from contributions of elastic cotunneling and crossed Andreev reflection of quasiparticles. Our measurements agree with a model based on the quasiclassical theory of inhomogeneous superconductivity in the diffusive limit.

[1] J. T. Peltonen *et al.*, Phys. Rev. Lett. **105**, 097004 (2010).