Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

NIS cooler platform: from 300 mK to 100 mK THOMAS AREF, JUHA MUHONEN, HUNG NGUYEN, JOONAS PELTONEN, MATTHIAS MESCHKE, JUKKA PEKOLA, Low Temperature Laboratory, Aalto University, Finland — Normal-insulator-superconducting (NIS) tunnel junctions allow cooling of the normal metal by electrons tunneling across the insulating barrier. With proper biasing, hot electrons leave the normal metal and cold electrons enter from the superconductor, lowering the electronic temperature. The heat dissipation is determined primarily by the quasiparticle relaxation in the superconducting leads. We explore the effects of magnetic field, electrode geometry, direct quasiparticle traps and other fabrication modifications on cooler effectiveness. The overall aim is to produce a general electronic cooler for efficient, solid state, cooling of small devices from 300 to 100 mK.

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Date submitted: 11 Nov 2011 Electronic form version 1.4