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Thermometry and power sensing with SNS proximity structures RUSSELL LAKE, JOONAS GOVENIUS, VILLE PIETILÄ, KUAN YEN TAN, MIKKO MÖTTÖNEN, COMP Centre of Excellence, Department of Applied Physics, Aalto University, Finland — We present our experimental progress on thermometry employing the superconductor proximity effect in a normal-metal (N) mesoscopic wire between two superconducting (S) electrodes. We have fabricated Al/Au/Al SNS structures with junction lengths in the diffusive transport regime and performed electrical measurements between 300 K and 8 mK. Temperature dependence of the differential resistance shows sensitivity at the millikelvin level at a bath temperature of 8 mK. Specifically, the shape of the proximity effect induced dip in the differential resistance at zero current-bias serves as a direct probe of the N wire temperature. We show that the energy scale of proximity superconductivity in the N wire can be controlled by changing the wire length or by applying a perpendicular magnetic field to tune the temperature detection range. Results are discussed in terms of the temperature and resolving power noise for a thermometer and a power meter, respectively.

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