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Proximity Effect in Normal-Metal Quasiparticle Traps AMIN HOSSEINKHANI, GIANLUIGI CATELANI, Peter Grunberg Institut (PGI-2) and JARA Institute for Quantum Information, Forschungszentrum Julich, 52425 Julich, Germany — In many superconducting devices, including qubits, quasiparticle excitations are detrimental. A normal metal (N) in contact with a superconductor (S) can trap these excitations. However, the contact between N and S modifies the properties of both materials, a phenomenon known as proximity effect which has drawn attention since the '60s. Despite this long history, we find new analytical results for the density of states, which shows a square root threshold behavior at the minigap energy. In superconducting qubits, the trap must be placed far enough from a Josephson junction in order not to harm the qubit coherence. To estimate the minimum trap-junction separation, we study how the density of states in the superconductor depends on the distance from the trap. For high interface resistance between N and S, a separation of several (5-7) coherence lengths is sufficient.

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