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Non-equilibrium theory of tunneling into localized states in superconductors IVAR MARTIN, Argonne National Laboratory, DIMA MOZYRSKY, Los Alamos National Laboratory — A single static magnetic impurity in a fully-gapped superconductor leads to formation of an intragap quasiparticle bound state. At temperatures much lower than the superconducting transition temperature, the energy relaxation and spin dephasing of the state are expected to be exponentially suppressed. The presence of such a state can be detected in electron tunneling experiments. Here we show, that even for an arbitrarily weak tunneling strength, the differential tunneling conductance is symmetric with respect to the sign of applied bias. This is in contrast to the standard expectation that the conductance is proportional to the local density of states, which may be particle-hole asymmetric. The standard result can be recovered is one assumes either a finite density of impurity states, or that impurities are coupled to another, non-superconducting equilibrium bath.

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