Title:	Nonballistic transport characteristics of superconducting point contacts.
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Abstract:	In the “ballistic” regime, the transport across a normal metal (N)/superconductor (S) point contact is dominated by a quantum process called Andreev reflection. Andreev reflection causes an enhancement of the conductance below the superconducting energy gap, and the ratio of the zero-bias and the high-bias conductance cannot be greater than 2 when the superconductor is conventional in nature. In this regime, the features associated with Andreev reflection also provide energy and momentum-resolved spectroscopic information about the superconducting phase. Here, we theoretically consider various types of nonballistic N/S point contacts within a network resistor model and show that even when the superconductor under investigation is simple and conventional in nature, depending on the shape, size, and anatomy of the point contacts, a wide variety of spectral features may appear in the conductance spectra. We also show that in experiments involving simple, conventional superconductors, such as Nb, all such features do indeed appear. Such features may misleadingly mimic theoretically expected signatures of certain exotic physical phenomena including unconventional superconductivity and topological effects. We also present how the role of such nonballistic effects can be ruled out in experiments.
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