Local and nonlocal conductance enhancement due to Cooper pair splitting

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Enhanced local conductance due to Andreev reflection is well known for high transparency Normal metal-Superconductor (NS) interface. For low transparency NS junctions, observation of two-electron tunneling contribution (enhanced Andreev reflection) to current was also reported previously. In our recent work,[1] for a three-terminal Cooper pair splitter geometry, i.e., with two closely placed NS junctions sharing the same S terminal, we were able do a 2D scan of both local and nonlocal differential resistance, since for our ideal tunneling junctions there is little current redistribution (flow from one normal-metal lead to the other via the superconducting lead). In contrast to previous 1D nonlocal resistance measurements, 2D scans clearly show regime with pronounced contribution of the nonlocal processes to both local and nonlocal conductance enhancement. The enhanced local conductance and negative nonlocal resistance are consistent with enhanced Cooper pair splitting, and dynamical Coulomb blockade could be the origin of this enhancement.

[1]J. Wei and V. Chandrasekhar, Nat. Phys. **6**, 494 (2010).