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Quantum interference in a Cooper pair splitter device SZABOLCS CSONKA, G. FULOP, Department of Physics, Budapest University of Technology and Economics, F. DOMINGUEZ, A. LEVY YEYATI, Departamento de Fisica Teorica de la Materia Condensada, Universidad Autonoma de Madrid, S. D'HOLLOSY, A. BAUMGARTNER, P. MAKK, C. SCHONENBERGER, Department of Physics, University of Basel, V. A. GUZENKO, Laboratory for Micro- and Nanotechnology, Paul Scherrer Institute, M. H. MADSEN, J. NYGARD, Nano-Science Center, Niels Bohr Institute, University of Copenhagen — Cooper pair splitting (CPS) is a process in which the electrons of naturally occurring spin singlet pairs in a superconductor are spatially separated using two quantum dots. In the present work we investigate the evolution of the conductance correlations in an InAs nanowire based CPS device in the presence of an external magnetic field. In our experiments the gate dependence of the signal that depends on both quantum dots continuously evolves from a slightly asymmetric Lorentzian to a strongly asymmetric Fano-type resonance with increasing B field. Our experiments can be understood in a simple 3 site model, which shows that the nonlocal CPS leads to symmetric line shapes, while the local transport processes can exhibit an asymmetric shape due to quantum interference. These findings demonstrate that the electrons from a Cooper pair splitter can propagate coherently after their emission from the superconductor and how a magnetic field can be used to optimize the performance of a CPS device. In addition CPS devices were developed where the nanowire segments between the two dots were removed, nonlocal measurement on such CPS devices will also be presented.

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