Contribution ID : **19** Type : **invited oral**

Quantum Fluctuation Phenomena in Quasi-1D Superconductors

sabato 22 giugno 2019 12:00 (30)

Superconducting properties of metallic nanowires can be entirely different from those of bulk superconductors because of the dominating role played by thermal and quantum fluctuations of the order parameter [1]. Fundamental attributes of superconductivity such as zero resistivity, persistent currents in closed loops, energy gap in excitation spectra can be drastically violated by fluctuations. Quasi-one-dimensional superconducting channels host sound-like plasma modes propagating along the sample which are associated with fluctuations of the phase of the superconducting order parameter [2]. Interaction between these electromagnetic excitations and charge carriers affects the electron density of states (DOS) [3]. Here we report the experimental study of I-V characteristics of tunnel S1-I-S2 junctions, where superconducting S2 electrode is a thin nanowire in the regime of quantum fluctuations. The observed broadening of the I-V dependencies at the gap edge is interpreted as the renormalization of DOS. The results are in reasonable agreement with the model [3], taking into consideration plasma modes in quasi-one-dimensional superconductors.

[1] Arutyunov K. Yu., Golubev D. S. , Zaikin A. D. 2008 Physics Reports 464 1.

[2] Mooij J.E. and G. Schön, 1985 Phys. Rev. Lett. 55 114.

[3] Radkevich A. A., Semenov A. G., Zaikin A. D. 2017 Phys. Rev. B 96 085435.

Primary author(s) : ARUTYUNOV, Konstantin (National Research University Higher School of Economics, Moscow Institute of Electronics and Mathematics, 101000, Moscow, Russia; P.L. Kapitza Institute for Physical Problems RAS, 119334, Moscow, Russia.); LEHTINEN, J.S. (VTT Technical Research Centre of Finland Ltd., Centre for Metrology MIKES, P.O. Box 1000, FI-02044 VTT, Finland); RADKEVICH, A.A. (Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, 141701,Russia; I.E. Tamm Department of Theoretical Physics, P.N. Lebedev Physical Institute, 119991 Moscow, Russia); SEMENOV, A.G. (National Research University Higher School of Economics, Moscow Institute of Electronics and Mathematics, 101000, Moscow, Russia; Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, 141701,Russia; I.E. Tamm Department of Theoretical Physics, P.N. Lebedev Physical Institute, 119991 Moscow, Russia); ZAIKIN, A.D. (National Research University Higher School of Economics, Moscow Institute of Electronics and Mathematics, 101000, Moscow, Russia; I.E. Tamm Department of Theoretical Physics, P.N. Lebedev Physical Institute, 119991 Moscow, Russia; Institute of Nanotechnology, Karlsruhe Institute of Technology, 76021, Karlsruhe, Germany)

Presenter(s) : ARUTYUNOV, Konstantin (National Research University Higher School of Economics, Moscow Institute of Electronics and Mathematics, 101000, Moscow, Russia; P.L. Kapitza Institute for Physical Problems RAS, 119334, Moscow, Russia.)

Session Classification : session 9