Conductance Spectroscopy of Spin-triplet Superconductors

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Superconductivity is classified roughly into the spin-singlet and spin-triplet symmetries. The clear distinction between spin-singlet and spin-triplet superconductors is currently a challenging issue in condensed matter physics. Several experimental methods can be used for this purpose such as the nuclear magnetic resonance, the muon spin rotation, the critical magnetic field beyond the Pauli limit, and the Josephson π-junctions. The difficulty of experiment and the complicated procedure of the data analysis, however, may make the conclusion unclear. At present, only a series of different experiments can lead to the conclusion about the spin-triplet superconductivity as in the case of Sr_2RuO_4. We propose a novel experiment to identify the symmetry of superconductivity on the basis of theoretical results for differential conductance of a normal metal connected to a superconductor as shown in the figure [1]. The proximity effect from the superconductor modifies the conductance of the remote current depending remarkably on the pairing symmetry: spin-singlet or spin-triplet. The clear-cut difference in the conductance is explained by symmetry of Cooper pairs in a normal metal with respect to frequency. In the spin-triplet case, the anomalous transport is realized due to an odd-frequency symmetry of Cooper pairs [2].

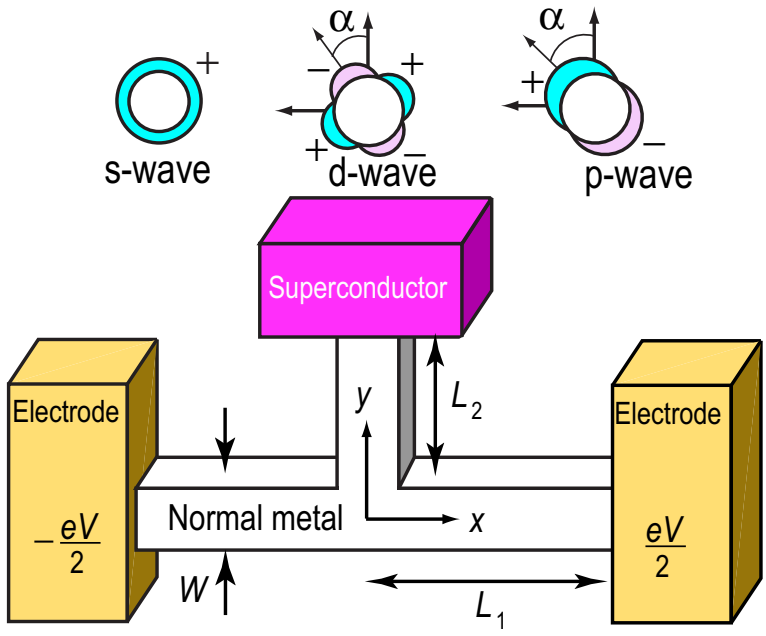

Fig. 1: Schematic view of the T-Shaped junction.

[1] Y. Asano, Y. Tanaka, A. A. Golubov, and S. Kashiwaya, arXiv:0705.0829.

[2] Y. Asano, Y. Tanaka, and S. Kashiwaya, Phys. Rev. Lett. **96**, 097007 (2006).