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2nd International Conference on

MAGNETISM AND MAGNETIC MATERIALS

September 24-26, 2018 | Budapest, Hungary

Mater Sci Nanotechnol 2018, Volume 2

PROBING TRIPLET SUPERCONDUCTIVITY BY THE ANDREEV-EDELSTEIN EFFECT

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An unambiguous identification of spin-triplet superconductivity is one of the outstanding problems in condensed matter physics. The author will present a new approach to this problem based on using Andreev reflection in combination with the Edelstein effect. The latter refers to the spin magnetization produced by an electric supercurrent in a noncentrosymmetric superconductor. The author will discuss the combined Andreev-Edelstein effect which consists in the generation of equal-spin triplet Andreev reflection by a supercurrent. This effect is a smoking gun for the nonunitary triplet pairing which is characterized by cooper-pair spin magnetism. Both intrinsic and proximity-induced on centrosymmetric superconductors will be addressed. In the latter case, we will focus on the topological insulator surface states which, in general, offer an excellent playground for studying the Edelstein and related magnetoelectric effects.

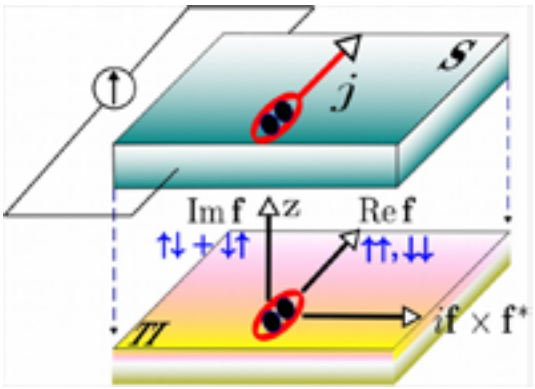

Fig. 1. Schematic of a topological insulator (TI) proximitized by a current-biased superconductor (S); j is the supercurrent density. The supercurrent generates nonunitary triplet pairing described by a complex pair amplitude f with orthogonal real and imaginary parts. The axial vector if × f* characterizes the spin magnetization of the nonunitary triplet condensate