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Andreev reflection on the p-wave altermagnet-superconductor junctions

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Abstract

We investigate the Andreev reflection properties of a two-dimensional p-wave Altermagnet-superconductor junction. The Altermagnet materials have special spin texture in the absence of spin-orbit interaction and create a new class in the category of magnetic materials alongside ferromagnet, anti-ferromagnet, etc. Here, we show that Andreev reflection is sensitive to the propagation direction of incoming fermions and breaks the mirror symmetry with respect to perpendicular direction when the strength-vector of Altermagnet has a component parallel to the junction's interface. Due to mirror symmetry breaking a transverse spin current flows parallel to the junction. The creation of spin current in the absence of long-range magnetization of ferromagnets and spin-orbit interaction is crucial in spintronics.

Keywords: Andreev reflection, p-wave altermagnet, breaking mirror symmetry, angle-dependent quantum transport

For full article, refer to the Persian section