

Abstract Submitted
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Time-reversal anomaly and Josephson effect in time-reversal invariant topological superconductors¹ SUK BUM CHUNG, University of California Los Angeles, JOSHUA HOROWITZ, XIAO-LIANG QI, Stanford University — Topological superconductors are gapped superconductors with protected Majorana surface/edge states on the boundary. In this paper, we study the Josephson coupling between time-reversal invariant topological superconductors and *s*-wave superconductors. The Majorana edge/surface states of time-reversal invariant topological superconductors in all physical dimensions 1, 2, 3 have a generic topological property which we named as time-reversal anomaly. Due to the time-reversal anomaly, the Josephson coupling prefers a nonzero phase difference between topological and trivial superconductors. The nontrivial Josephson coupling leads to a current-flux relation with a half period in a SQUID geometry, and also a half period Fraunhofer effect in dimension higher than one. We also show that an in-plane magnetic field restores the ordinary Josephson coupling, as a sharp signature that the proposed effect is a consequence of the unique time-reversal property of the topological edge/surface states. Our proposal provides a general approach to experimentally verify whether a superconductor is topological or not.

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