Direct Measurement of the Current-Phase Relation in Superconductor/Topological Insulator/Superconductor Tunnel Junctions

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The interaction between superconductors (S) and topological insulators (TI) in close proximity is of interest because the long-sought Majorana state, a zero energy state that is its own anti-particle, may occur near such an interface in certain geometries. S/TI/S Josephson junctions have been proposed to have an unusual relationship between the quantum mechanical phase and the supercurrent. We have directly measured a nearly sinusoidal (conventional) current-phase relationship in S/TI/S rings using scanning SQUID susceptometry. These results establish a method for measuring current-phase relations in new materials systems.

REFERENCE:
“Direct measurement of current-phase relations in superconductor/topological insulator/superconductor junctions”