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BDI Class Topological Superconductors and Generating Correlated Spin Currents in Quantum Anomalous Hall insulators JAMES HE, JIANSHENG WU, TING-PONG CHOY, XIONG-JUN LIU, Department of Physics, Hong Kong Univ of Sci & Tech, Y. TANAKA, Department of Applied Physics, Nagoya University, K.T. LAW, Department of Physics, Hong Kong Univ of Sci & Tech — In this work, we show that a one dimensional AIII class topological insulator, which supports fermionic end states, can be turned into a BDI class topological superconductor (TS) through proximity effect. The resulting BDI TS has two topological phases with one or two Majorana end states at each end of the wire respectively. Interestingly, in the phase with two Majorana end states, the BDI TS causes zero-bias conductance dips in tunneling spectroscopy experiments due to destructive interference of Andreev reflection amplitudes caused by the two Majorana end states. More importantly, this BDI TS can induces resonant crossed Andreev reflections in a normal lead/BDI TS/ normal lead junction, in which an electron from one lead is reflected as a hole in the other lead with probability of unity. Moreover, we show that the currents in the two normal leads are perfectly correlated and spin polarized with opposite spin-polarization. Therefore, BDI TS can be used to generate correlated spin currents. We demonstrate that a quantum Anomalous Hall insulator in proximity to a superconductor can be used to realize the proposed BDI TS.

James He
Department of Physics, Hong Kong Univ of Sci & Tech

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