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Time Reversal Invariant Topological Superconductor in Rashba System SHO NAKOSAI, Dept. of Appl. Phys., Univ. of Tokyo, YUKIO TANAKA, Dept. of Appl. Phys., Nagoya Univ., NAOTO NAGAOSA, Dept. of Appl. Phys., Univ. of Tokyo, CMRG & CERG, ASI, RIKEN — Recently, topological superconductors (TSCs) have been intensively studied as one of the topologically nontrivial phases. TSCs are characterized by topological numbers classified by their symmetries and dimensions. In the previous proposals on TSCs in Rashba systems, Zeeman splitting is necessary and therefore time reversal symmetry (TRS) is broken. We consider instead a bilayer Rashba system, e.g., a two-interface system, where hybridization causes a band gap. As for the single layer case, it has been shown experimentally that at the interface of $SrTiO_3/LaAlO_3$, two dimensional electron gas with Rashba spin-orbit interaction and superconductivity is formed. We find that the hybridization in bilayer system leads to topological phase without breaking TRS. This system belongs to the class characterized by Z_2 index. We obtain the conditions for odd-parity pair potentials by analyzing relations between strength of interactions and types of pair potentials. TSCs are attained in the case when the system has an odd-parity pair potential and the Fermi energy lies in the hybridization gap. We analytically calculate a topological number in a bulk system, and explicitly confirm the bulk-edge correspondence by performing numerical calculation in a finite system with edges.

Sho Nakosai
The University of Tokyo

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