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Nonmagnetic impurity effects in a superconducting topological insulator YUKI NAGAI, YUKIHIRO OTA, MASAHIKO MACHIDA, CCSE, Japan Atomic Energy Agency — Unconventional features in superconductivity are revealed by responses to impurity scattering. We study nonmagnetic impurity effects in a superconducting topological insulator, focusing on an effective model of Cu-doped topological insulator Bi_2Se_3. Typically, this superconducting compound is considered to be dirty owing to the copper intercalated process. Using a self-consistent T-matrix approach for impurity scattering, we examine in-gap states in density of states. It is well known that the unconventional superconductors such as p-wave diminish via non-magnetic impurity scattering, different from the robustness of an s-wave state (Anderson's theorem). We show that the impurity effects are well characterized by a simple material variable, which measures relativistic effects in the Dirac Hamiltonian. We find that the topological superconductor has two aspects, p- and s-wave features, depending on the weight of relativistic effects. The topological superconductors can not be simply regarded as one of the *conventional* unconventional superconductors.

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