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Sensitivity of a 3D fully-gapped topological superconductor to non-magnetic impurities YUKIHIRO OTA, YUKI NAGAI, MASAHIKO MACHIDA, Japan Atomic Energy Agency — Topological superconductors (TSC) are notable materials, owing to the mathematical curiosity and the application potential. The bulk TSC can emerge by copper intercalation into topological insulator Bi_2Se_3. In this paper, we theoretically study the non-magnetic impurity effects in the mean-field model of $Cu_xBi_2Se_3$, focusing on the odd-parity fully-gapped superconducting state. Calculating the density of states with a self-consistent T-matrix approach, we test the presence of mid-gap states, leading to pair-breaking effects. Remarkably, the sensitivity to non-magnetic impurities strongly depend on a normal-state dispersion character, i.e., either non-relativistic or relativistic dispersion relations. We show unification picture for understanding this intriguing result, deriving a low-energy effective superconducting theory.

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