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Surface Andreev Bound States of Topological Superconducting Phase in Doped Semiconductors: Application to $\text{Cu}_x\text{Bi}_2\text{Se}_3$ ¹ TIMOTHY HSIEH, MIT, LIANG FU, Harvard — The recently discovered superconductor $\text{Cu}_x\text{Bi}_2\text{Se}_3$ is a candidate for three-dimensional time-reversal-invariant topological superconductors, which is predicted to have robust surface Andreev bound states hosting massless Majorana fermions. In this work, we present an analytical and numerical study of the surface Andreev bound state wavefunction and dispersion. We find the topologically protected Majorana fermions at $k = 0$, as well as a new type of surface Andreev bound states at finite k . We relate our results to a recent point-contact spectroscopy experiment.

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