

Abstract Submitted  
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**Momentum space Cooper pairing in a spin-momentum locked Dirac gap on the surface of a topological insulator**<sup>1</sup> SU-YANG XU, Joseph Henry Laboratory, Department of Physics, Princeton University, Princeton, New Jersey 08544, USA — Superconductivity in Dirac systems is one of the central theoretical themes in modern physics. In particular, a helical superconductor is a theoretically predicted exotic topological phase of matter, which can be experimentally realized if superconductivity can be induced in an odd number of spin-helical Dirac electronic states. By spectroscopically momentum-resolving the superconducting proximity effect at the boundary of a topological insulator ultra-thin film, we experimentally present direct experimental evidence for a helical topological superconductor via the observation of superconductivity in an odd number of spin-momentum locked topological surface states. Observation of helical superconductivity opens the door to a number of novel topological phenomena such as supersymmetry and Abelian Majorana modes in a condensed matter context.

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