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Topological Edge States in High-Temperature Superconductor FeSe/SrTiO3(001) Film[1]

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Superconducting and topological states are two most intriguing quantum phenomena in solid materials. The entanglement of these two states, the topological superconducting state, will give rise to even more exotic quantum phenomena. While many materials are found to be either a superconductor or a topological insulator, it is very rare that both states exist in one material. In this talk, I will present recent studies based on first-principles theory as well as scanning tunneling spectroscopy and angle-resolved photoemission spectroscopy experiments, demonstrating that the recently discovered "two-dimensional (2D) superconductor" of single-layer FeSe also exhibits 1D topological edge states within an energy gap of ˜40 meV at M point below the Fermi level. It is the first 2D material that supports both superconducting and topological states, offering an exciting opportunity to study 2D topological superconductors through proximity effect.

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