Topological superconductivity and Majorana bound state in Fe-based superconductor

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In this talk I will report our recent discoveries of topological superconductivity and Majorana bound state in Fe-based superconductors, mostly in Fe(Te, Se) single crystals. We have discovered a superconducting topological surface state of Fe(Te, Se) with Tc ~ 14.5K by using high-resolution ARPES [1] . By using high-resolution STM on this material, we clearly observe a pristine Majorana bound state inside a vortex core, well separated from non-topological bound states away from zero energy due to the high ratio between the superconducting gap and the Fermi energy in this material [2]. This observation offers a new, robust plat-form for realizing and manipulating Majorana bound states, which can be used for quantum computing, at a relatively high temperature. I will also present some of our new results on this material. In addition, we have also found that most of Fe-based superconductors [3], including monolayer Fe(Te, Se)/STO [4], have similar topological electronic structures.

References

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