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Time-reversal symmetry breaking in nonsymmorphic type-I superconductor $YbSb_2$

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The interplay of superconductivity with nontrivial topological phases exhibit the fascinating topological superconductivity, which has attracted widespan attention from observing quasiparticle like Majorana fermions to its application in fault-tolerant quantum computation[1,2]. It is proposed that the topological superconductivity can be realized in compounds having topological surface states and superconductivity[3]. Only a few superconducting materials with nontrivial topological states have been discovered, and their superconducting ground state/pairing mechanism can not be adequately understood. Therefore, searching and studying the superconducting ground state of materials having nontrivial topological states is vital.
Here, we present the evidence of time-reversal symmetry breaking (TRSB) in the nonsymmorphic type-I superconductor $YbSb_2$, having a distorted Sb square net crystal structure similar to the other topological system ZrSiS[4,5]. The microscopic muon spin relaxation and rotation investigation confirm the fully gapped type-I superconductivity with broken time-reversal symmetry in its superconducting ground state. This indicates that the nonsymmorphic RSb_2 superconductors are an interesting class of materials that exhibit unconventional superconductivity with fascinating properties and warrant great potential for future studies.

References:
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