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Is SmB₆ the topological insulator or not ?

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We theoretically examined whether samarium hexaboride (SmB₆) is topological insulator, or not. Despite the fact that the SmB₆ has long been known as a topological Kondo insulator, with strong correlations and band hybridization, it is still of a great interest because of low-temperature transport anomalies which have recently been interpreted as evidence that SmB₆ is a topological insulator. SmB₆ behaves electronically at high temperatures like an insulator, and at low temperature its resistance mysteriously saturates. We studies de Haas van-Alphen quantum oscillation results to resolve the Fermi surface topology in this material. Although dHvA measurement may be consistent with two-dimensional conducting electronic states, we find an elongated 3D ellipsoidal Fermi surface . Furthermore, resistance measurement also can give some evidence of SmB₆ topological surface states, by study different geometries to determine whether the conduction is dominated by the surface or the bulk. Another measurement is Scanning Tunneling Microscopy (STM) which use to discover the properties of the surface states with atomic spatial resolution. Finally, Angle-resolved photo-emission spectroscopy (ARPES), is another useful surface state probe directly the electronic structure of the (SmB₆).

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