LARGE LINEAR MAGNETORESISTANCE AND HIGH CARRIER MOBILITY IN $RhSb_3$ AS A DIRAC SEMIMETAL CANDIDATE

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Recently, there are several materials that were predicted to be located in the crossover region from trivial to topological insulators. Topological phase arises in three-dimensional (3D) materials, which are close to a critical point between an ordinary and a topological insulator. One kind of these interesting materials is the three-dimension Dirac semimetal with linear band and Dirac cone close to the Fermi level in the bulk states which is protected by symmetry. This kind of material can be considered as three-dimensional analogues of graphene, where the movement of the electrons in 3D was governed by the Dirac equation. It can also host the "protected surface states" that are characteristic of TI. The Dirac nodes have been discovered in two Dirac semimetals, Na_3Bi and Cd_3As_2. By breaking the inversion or time reversal symmetry, a DSM can be tuned to a WSM phase where the nondegenerated linear touchings of the bulk bands comes in pair and the low energy physics is approximated by the Weyl equation.

$RhSb_3$ is theoretically predicted to be a topological semimetal. We performed the first-principle calculation for band structure of $RhSb_3$. Band structure of $RhSb_3$ shows inverted linear valence/conduction bands which touch each other at points slight away from center of zone. RhSb3 single crystal shows extremely large magnetoresistance and our quantum oscillation in high field reveals very small hole pockets with a nontrivial Berry phase shift and a very small effective mass. These results suggest $RhSb_3$ as a Dirac semimetal candidate with zero gap.

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