Searching for topological semi-metals in realistic materials

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Topological semi-metal (TSM) is a new type of quantum phases in condensed matter, which includes Dirac semi-metal (DSM) and Weyl semi-metal (WSM) phases. The appearance of DSM phase requires additional crystal symmetry to generate Dirac points along some special directions. And the WSM phase requires breaking of either time reversal or inversion symmetry to remove the spin degeneracy. In the present talk, I will summarize the TSM materials found recently in our group by first principle methods. Besides the exotic physical properties of these TSMs, I will also introduce from the symmetry point of view where and how to find these materials.