New type of Weyl semimetals with a material illustration

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Standard Weyl and Dirac topological semimetals (TSM) have point-like Fermi surface. We report a novel TSM state with a new type of Weyl points, for which this standard picture breaks down. General conditions for such Weyl points to emerge are presented. A real material example of this new TSM phase is also provided. Topological Lifshits transitions, topological surface states and surface Fermi arcs are also discussed, as well as anomalous magnetic field response in this material are described in details.