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Magnetic field induced Weyl node annihilation in TaP¹

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The discovery of the Weyl semimetal TaAs family has motivated the interest for investigating the topological properties of the Weyl quasiparticles. Particularly interesting is the unique transport features associated with the chirality of the Weyl quasiparticles, for example, negative longitudinal magnetoresistance induced by an ABJ anomaly. I will show our electrical transport measurement results for TaAs and TaP in a magnetic field. Our comprehensive data allow us to exclude other possible origins of the observed negative longitudinal magnetoresistance. Moreover, we observe that the Hall resistivity of TaP exhibits a sharp sign reversal and a step-like feature in an intense magnetic field. This phenomenon occurs at a specific magnetic field value (33T) that corresponds to the momentum space separation of the Weyl node. These findings demonstrate a magnetic field induced Weyl node annihilation and a gap opening in a Weyl semimetal.

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