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Dirac Fermions in an Antiferromagnetic Semimetal[1] PEIZHE TANG, QUAN ZHOU, GANG XU, SHOU-CHENG ZHANG, Stanford Univ, PROF. SHOU-CHENG ZHANG'S GROUP TEAM — Analogues of the elementary particles have been extensively searched for in condensed matter systems for both scientific interest and technological applications. Recently, massless Dirac fermions were found to emerge as low energy excitations in materials now known as Dirac semimetals. All the currently known Dirac semimetals are nonmagnetic with both time-reversal symmetry $\mathcal{T}$ and inversion symmetry $\mathcal{P}$. Here we show that Dirac fermions can exist in one type of antiferromagnetic systems, where both $\mathcal{T}$ and $\mathcal{P}$ are broken but their combination $\mathcal{PT}$ is respected. We propose orthorhombic antiferromagnet CuMnAs as a candidate, analyze the robustness of the Dirac points under symmetry protections, and demonstrate its distinctive bulk dispersions as well as the corresponding surface states by *ab initio* calculations. Our results provide a possible platform to study the interplay of Dirac fermion physics and magnetism.

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