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Exotic Chiral Anomaly of Double-Weyl Fermions CHEUNG CHAN, HONG YAO, Institute for Advanced Study, Tsinghua University — Double-Weyl points in a 3D topological semimetal are protected by crystallographic point-group symmetries, as predicted in $\text{Hg}_2\text{Cr}_2\text{Se}_4$. The dispersion of fermions around double-Weyl points is highly anisotropic in momentum space, namely quadratic along x - and y -directions but linear in z -direction in the low energy effective Hamiltonian, which has intriguing physical consequences. For instances, we show that the double-Weyl fermions give rise to anisotropic chiral anomaly, qualitatively different from the usual chiral anomaly of (linear) Weyl fermions. We also discuss how the anisotropic dispersions of double-Weyl fermions affect their transport behaviors.

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