Abstract Submitted
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Chiral magnetic effect of Weyl fermions and its applications to cubic noncentrosymmetric metals[1] SUMANTA TEWARI, Department of Physics and Astronomy, Clemson University, Clemson, SC 29634, PALLAB GOSWAMI, National High Magnetic Field Laboratory and Florida State University, Tallahassee, Florida 32310, USA — When the right and the left handed Weyl points are separated in energy, they give rise to a non-dissipative charge current along the direction of a uniform applied magnetic field, even in the absence of an external electric field. This effect is known as the chiral magnetic effect and is a hallmark of the underlying chiral anomaly of the Weyl fermions. According to the linearized continuum theory of Weyl fermions, the induced current is proportional to the magnetic field strength and the energy separation with a universal coefficient e^2/h^2. By considering a generic tight binding model for the cubic non-centrosymmetric metals, we show that such a system naturally supports a set of Weyl points, which are separated in energies. We also show the existence of the chiral magnetic effect for generic band parameters, and recover the universal result of the continuum Weyl fermions for a restricted parameter regime. Our work proves that the cubic non-centrosymmetric metals can serve as suitable platforms for realizing Weyl fermions and the exotic chiral elctrodynamic phenomena, which have promising technological applications.

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