

Abstract Submitted
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Chiral magnetic effect in Weyl semimetals and insulators MOHAMMAD VAZIFEH, MARCEL FRANZ, University of British Columbia — It has been proposed recently, on the basis of field-theoretical considerations, that the effective electromagnetic action of Weyl semimetals (as well as the closely related Weyl insulators) contains an axion term with the θ -angle dependent on time t or spatial position \mathbf{r} . If correct this would lead to a number of novel observable phenomena, such as the chiral magnetic effect, whereby an applied uniform magnetic field induces a dissipationless bulk current $\mathbf{j} \propto \mathbf{B}$. In this work we construct a simple lattice model for a Weyl semimetal (insulator) and use it to explicitly test for the chiral magnetic effect by means of numerical techniques combined with analytical calculations. We discuss possible ways to engineer a suitable material in layered nanostructures and comment on the physical observability of the effect.

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