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Chiral magnetic effect and SdH oscillations in Dirac and Weyl metals DMITRI KHARZEEV, GUSTAVO MONTEIRO, ALEXANDER ABANOV, Stony Brook University — In the present work, we consider the interplay of chiral anomaly and Shubnikov-de Haas (SdH) oscillations in recently discovered Dirac metals. The kinetic theory describing the transport in these new materials should account for the chiral anomaly. The unbalanced number of chiral zero-modes in the presence of magnetic field due to the chiral anomaly gives rise to an additional contribution to the electric current – the chiral magnetic effect [1]. The zero-modes are topologically protected from scattering and their contribution to the current leads to a negative magnetoresistance [2]. This effect was recently observed in measurements on the Dirac semimetal Cd_3As_2 [3], where the longitudinal (with respect to magnetic field) component of the resistivity tensor shows a negative slope, along with pronounced Shubnikov-de Haas (SdH) oscillations. We develop a combined description of both these phenomena within a chiral kinetic theory.
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