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Magnetotransport properties of three-dimensional Weyl semimetals[1] NAVNEETH RAMAKRISHNAN, MIRCO MILLETARI, SHAFFIQUE ADAM, Natl Univ of Singapore — We investigate theoretically the transport and magnetotransport properties of three-dimensional Weyl semimetals. We consider the RPA-Boltzmann transport theory relevant for non-interacting electrons scattering off randomly distributed charged impurities, and employ an effective medium theory to average over the resulting spatially inhomogeneous carrier density profile. Our formalism allows us to smoothly connect results for the minimum conductivity near the Dirac point with known results for the conductivity at high carrier density. In the presence of a non-quantizing magnetic field, we predict that the magnetoresistance shows a transition from quadratic at low magnetic fields to linear at higher fields. In addition, our formalism can qualitatively explain some recent unexpected experimental results on the mixed-chalcogenide compound TlBiSSe. This work is supported by the Singapore National Research Foundation NRF-NRFF2012-01.

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