

Abstract Submitted
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Coulomb disorder in three-dimensional Dirac materials BRIAN SKINNER, Argonne National Laboratory — In three-dimensional materials with a Dirac spectrum, weak short-ranged disorder is essentially irrelevant near the Dirac point. This is manifestly not the case for Coulomb disorder, where the long-ranged nature of the potential produced by charged impurities implies large fluctuations of the disorder potential even when impurities are sparse, and these fluctuations are screened by the formation of electron/hole puddles. Here I outline a theory of such nonlinear screening of Coulomb disorder in three-dimensional Dirac systems, and present results for the typical magnitude of the disorder potential, the corresponding density of states, and the size and density of electron/hole puddles. The resulting conductivity is also discussed.

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