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Conductivity in nodal line semimetals with charged impurities BRIAN SKINNER, MIT, SERGEY SYZRANOV, University of Maryland — Coulomb disorder has a way of wreaking havoc on electronic systems with vanishing density of states (DoS). The issue is that when the DoS vanishes at the Fermi level, the system becomes incapable of screening the long-ranged potential created by stray charges. As a consequence, materials with vanishing DoS usually manifest large band-bending effects even at arbitrarily small impurity concentrations, and the properties of any nodal points are spoiled. Here we show that this spoilage is, surprisingly, averted in three-dimensional nodal line semimetals, for which the Fermi surface at zero chemical potential is a line or ring in momentum space. We discuss the conductivity in these materials as a function of chemical potential, impurity concentration, and temperature. We show that, due to a strong dielectric screening, nodal line semimetals admit the possibility of a wide regime of minimal conductivity, in which the conductivity is independent of the impurity concentration or the chemical potential. Such a regime was hoped for in graphene but never realized experimentally.

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