Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Optical conductivity of disordered Weyl semimetals in collisionless regime at zero temperature VLADIMIR JURICIC, Nordita, Center for Quantum Materials, KTH Royal Institute of Technology, and Stockholm University, Roslagstullsbacken 23, S-106 91 Stockholm, BITAN ROY, Condensed Matter Theory Center, Department of Physics, University of Maryland, College Park, MD 20742, USA — Weyl semimetals have recently attracted considerable attention as prime examples of topologically nontrivial gapless states of quantum matter. They have been experimentally found and the chiral anomaly, which represents their hallmark feature, has been measured. In this work, we study transport in the disordered Weyl semimetals using the Kubo formalism. We consider point-like impurity potentials, which are irrelevant in the renormalization-group sense, and compute the corresponding leading correction to the collisionless conductivity at zero temperature. As a result, we find that all eight possible types of the point-like disorder potentials give rise to a correction to the real part of the optical conductivity in the clean limit, which is universal up to a sign. Consequently, the dielectric constant of a Weyl material receives a disorder correction which is linear in frequency. Finally, we discuss some experimental consequences of our findings.

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Date submitted: 28 Jan 2016 Electronic form version 1.4