Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Stability of Weyl metals under imuurity scattering[1] ZHOUSHEN HUANG, Department of physics, University of California, San Diego, TANMOY DAS, ALEXANDER V. BALATSKY, Theoretical Division, Los Alamos National Laboratory, DANIEL P. AROVAS, Department of physics, University of California at San Diego — We investigate the effects of bulk impurities on the electronic spectrum of Weyl semimetals, a recently identified class of Dirac-type materials. Using a T-matrix approach, we study resonant scattering due to a localized impurity in tight binding versions of the continuum models recently discussed by Burkov, Hook, and Balents, describing perturbed four-component Dirac fermions in the vicinity of a critical point. The impurity potential is described by a strength g as well as a matrix structure Λ. Unlike the case in d-wave superconductors, where a zero energy resonance can always be induced by varying the impurity scalar and/or magnetic impurity strength, we find that for certain types of impurity (Λ), the Weyl node is protected, and that a scalar impurity will induce an intragap resonance over a wide range of scattering stength. A general framework is developed to address this question, as well as to determine the dependence of resonance energy on the impurity strength.

[1]This work is supported in part by the NSF through grant DMR-1007028. Work at LANL was supported by US DoE.

Zhoushen Huang
Department of physics, University of California at San Diego

Date submitted: 09 Nov 2012 Electronic form version 1.4