Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Effect of disorder on the critical behavior of interacting 3D Dirac and Weyl semimetals JOSE GONZALEZ, Instituto de Estructura de la Materia (CSIC), Madrid, Spain — We investigate the effect of disorder on the critical behavior of 3D Dirac and Weyl semimetals with long-range Coulomb interaction. We show that short-range disorder potentials (correlated disorder) do not destabilize the non-Fermi liquid phase of these systems at strong interaction strength, but they induce in general a decrease of the Fermi velocity that competes with a significant screening of the interactions. As a consequence of that, we find a line of unstable fixed points (at weak interaction strength) where the effective couplings of the disorder and the interaction remain scale invariant. At one side of the line, the system flows to a regime with regular Fermi liquid behavior. At the other side, the disorder plays the dominant role to drive the system towards a phase with vanishing quasiparticle weight. At intermediate interaction strength, screening effects always prevail, stabilizing a semi-metallic phase with renormalized quasiparticle parameters.

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Date submitted: 10 Nov 2016 Electronic form version 1.4