

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Long-range electron interactions in Weyl and Dirac materials"

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Abstract: We consider the effect of long-range electron-electron interaction in Dirac and Weyl fermions in solids. Those relativistic particles are now known to appear in materials such as the quantum critical point of topological insulators and Weyl semimetals. The intriguing features of them are the linear energy dispersion and a nodal Fermi surface. The long-range interaction is relevant in such systems since vanishing density of states does not screen the electron-electron interaction. We investigate its effect by the renormalization group analysis and consider the behavior at low energies. We take Dirac fermion systems and type-II Weyl semimetals as examples of emergent Lorentz invariance, and extend our analysis for the $J=3/2$ model with cubic symmetry to find a novel quantum criticality. We also treat the case of nonlinear band touching, where a non-Fermi liquid fixed point is found.

12:00pm

Tuesday, April 12, 2016

Duboc Room (4-331)

Host: Michael Pretko