

Igor Herbut: "Fixed point collisions and tensor order parameters in Luttinger semimetals and some popular field theories"

Wednesday, 20 June 2018 10:00 (45 minutes)

Luttinger semimetals are ubiquitous electronic systems that have their chemical potential right at the point where two bands touch quadratically. They can be understood as higher-spin cousins of the better-known Weyl semimetals, and turn out to be more susceptible to effects of electron-electron interaction. I will discuss the possibility of a non-trivial scale-invariant infrared fixed point in these materials and introduce a general mechanism that works against it.

It will be argued that this mechanism with its concomitant separation of energy scales is also operative in low-dimensional QED, and responsible

for the notorious phenomenon of chiral symmetry breaking below the critical number of fermionic components. Finally, the notion of spin-two (nematic) order parameter which arises naturally in Luttinger semimetals will suggest a possible new path towards UV-complete $O(N)$ field theories above four dimensions.

Key words: quantum phase transitions, scale invariance, fixed points, QED3, UV completion, Dirac systems, non-Fermi liquid, triviality

Session Classification: Morning session