

644th ASRC Seminar

Date: 10:00 ~ 11:30 Friday, August 5

Location: 103 Meeting Room, ASRC Bldg.

Speaker: Dr. Michihiro Hirata
(Tohoku University)

Title: Anisotropic Dirac cone renormalization
and novel correlation effects of massless Dirac
fermions in an organic conductor

Abstract: The Coulomb interaction (CI) among graphene Dirac fermions is unscreened around the isotropic Dirac points, causing a logarithmic velocity renormalization and a Dirac cone reshaping. In less symmetric Dirac materials with anisotropic cones and tilted axes, the CI can provide still more exotic phenomena which have not been experimentally unveiled yet. In this talk, I will present NMR evidence for a non-uniform cone reshaping accompanied by a bandwidth reduction and an emergent ferrimagnetism in tilted Dirac cones that appear on the verge of charge ordering in an organic compound. Theoretical analyses based on the renormalization-group approach and the Hubbard model show that these observations are the direct consequences of the long-range and short-range parts of the CI, respectively. The cone reshaping and the bandwidth renormalization, as well as the novel magnetism revealed here, can be ubiquitous and vital for many Dirac materials.

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