Diverse Manifestations of Electron Correlation in Organic Conductors

Kazushi. Kanoda
University of Tokyo, Japan

Coulomb interactions among electrons have huge impacts on their behavior through competitions of charge localization/delocalization and spin order/disorder Layered BEDT-TTF compounds hostflexible lattice geometriesand appreciable Coulomb interactions, both of which are varied by pressure or chemical substitution to display diverse emergent phenomena like a showcase of correlation physics. In case of a half-filled band, the Mott metal-insulator transition shows universal quantum criticality at high temperatures[1] but exhibits lattice-specific behaviour at low temperatures[2]; in particular, a Mott insulator with a triangular lattice carries a spin liquid[3], which can be doped[4] and superconduct. When a band is quarter-filled, electrons on a triangular lattice, which imposes frustration against Wigner crystallization, exhibitan exoticglass[5], which crystalizes in a long time[6]. Alternatively, electrons are partially ordered, leading to the emergence of massless Dirac fermions, which show Dirac-cone reshaping[7], anomalous spin correlation and incipient mass-generation instability due to unscreened long-range Coulomb repulsion[8]. In organic materials, correlated electronsseek for connection to soft-matter physics or particle physics beyond the conventional discipline of correlation physics.

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