Chez Pierre

Presents ...

Monday, December 19, 2022
12:00 pm
Duboc Room - 4-331

Chez Pierre Seminar

Jia Leo Li , Brown University

"Parity, time-reversal and rotational symmetry breaking in twisted trilayer graphene".

Using a new scheme of angle-resolved transport measurement, I will report the identification and characterization of electronic orders that break parity, time-reversal and in-plane rotational symmetry in twisted trilayer graphene. The angular dependence of linear transport response offers direct characterization of electronic anisotropy, whereas the angular dependence of the second-harmonic nonlinear response provides a strong indication for a new type of electronic order that breaks both parity and time-reversal symmetry. By mapping out the evolution with the band-filling, temperature, and twist angle, our findings provide a novel window into the underlying connection between electron anisotropy and cascade of isospin polarization transitions. At the same time, I will analyze the dependence on the magnetic field, current flow, and field-effect doping, which points towards a loop current state that is distinct from the orbital ferromagnetism and nematicity. Our findings point towards the universal presence of loop current order and electron anisotropy across the moire flatband, with important implications for understanding intertwined and competing orders, such as ferromagnetism, nematicity, and superconductivity, in graphene-based moir\'e systems.