

Chez Pierre

Presents ...

Wednesday, October 29, 2025

2:00 pm -3:00 pm

Duboc Room-4-331



Special Chez Pierre Seminar

Abhay Narayan Pasupathy, Columbia University

"Electronic imprint of Boron Nitride substrates"

Abstract: Hexagonal boron nitride (hBN) has long been recognized as an exceptional substrate for revealing the intrinsic electronic properties of mono- and multilayer graphitic systems. However, it is not entirely passive. From the earliest studies, it was understood that hBN induces a periodic moiré potential on a graphene monolayer placed atop it, leading to experimentally observable effects. Traditionally, this moiré potential is modeled as a nearly sinusoidal modulation of the potential energy experienced by the adjacent graphene layer. In this talk, I will present recent scanning tunneling microscopy experiments from my group that demonstrate the limitations of this conventional picture.

Specifically: (a) in rhombohedral graphene, the hBN substrate generates distinct moiré potentials on both the bottom (contact) and top layers; (b) in twisted bilayer graphene, hBN can produce significant electronic inhomogeneity when the moiré wavelengths are comparable; and (c) even in the simplest case of monolayer graphene on hBN, the substrate introduces short-wavelength, spatially periodic intervalley scattering.