

DEPARTMENT OF PHYSICS & ASTRONOMY

Physics & Astronomy Colloquium

Prof. Vikram Deshpande

University of Utah

(Host: Prof. Wade DeGottardi)

3:30 - 4:30 p.m. | Tuesday, April 28, 2026

Rm: ESB I 120



**Title: van Hove singularity engineering via homo- and hetero-strain in
twisted bilayer graphene**

Abstract: Researchers are increasingly exploring moiré materials because of their fascinating properties. However, their remarkable flexibility raises questions about how these materials react to mechanical strain, particularly since inherent strain during fabrication may lead to variations between samples. To address this, we've developed a method to fabricate samples on flexible substrates and apply isotropic strain by displacing them out of plane. By carefully calibrating the strain, we can manipulate the Hofstadter butterfly in twisted bilayer graphene (TBG) samples away from the magic angle. It was shown by Wang et al (PNAS 120 (34) e2307151120 (2023)) that uniaxial heterostrain arising during sample fabrication split the otherwise-degenerate van Hove singularity (vHs) of TBG into three. In our samples we study the behavior of the three vHs's in TBG with applied isotropic strain. We find non-intuitive shifts in energy of the three vHs's with strain indicating that the primary effect of our applied strain in these samples is to rotate the axis of the heterostrain. Our work provides a new route to tuning moire materials in-situ and is helpful toward understanding variability in these samples.

