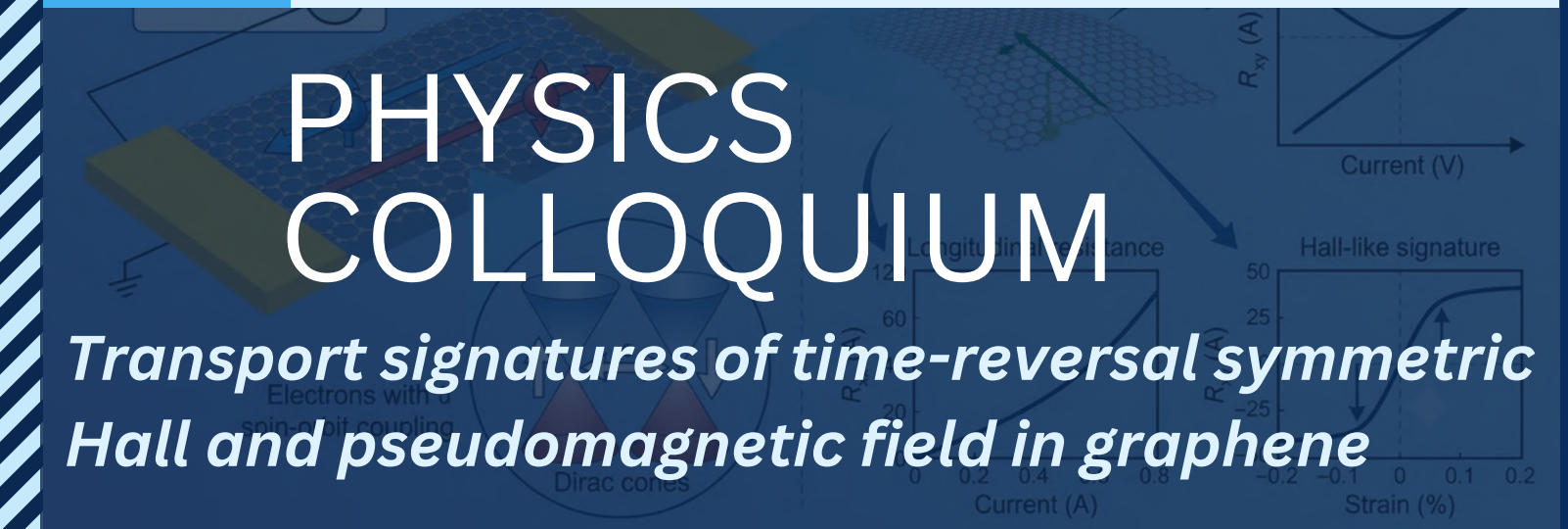
DEPARTMENT OF PHYSICS
INDIAN INSTITUTE OF TECHNOLOGY KANPUR

PHYSICS COLLOQUIUM

Transport signatures of time-reversal symmetric Hall and pseudomagnetic field in graphene



Abstract

In the first part of my talk, I will report the observation of a time-reversal symmetric Hall effect at zero magnetic field in a graphene device, proximitized by WSe2. We observed that the Hall response shows a sign change across the charge neutrality point and remains robust up to room temperature. Through combined experimental and theoretical analysis, we attribute the effect to strain-induced inversion symmetry breaking and anisotropic band dispersion resulting from lattice mismatch between graphene and WSe2. These results establish a new class of Hall transport driven by spatial symmetry breaking.

I will then discuss our recent observation of pseudomagnetic field (PSM) in strained graphene through transport measurements. Our measurements reveal distinct beating patterns in both the carrier density dependence of longitudinal resistance at fixed magnetic field and in magnetoresistance oscillations at a fixed carrier density. We attribute these beatings to a strain-induced pseudomagnetic field, which leads to a slight splitting in the Landau level spectrum and gives rise to interference between closely spaced oscillation frequencies. To the best of our knowledge, this work represents the first transport-based detection of a pseudomagnetic field in monolayer graphene.

References:

1. Divya Sahani, Sunit Das, Kenji Watanabe, Takashi Taniguchi, Amit Agarwal, and Aveek Bid, Phys. Rev. Lett. 134, 106301 (2025)
2. Divya Sahani, Sunit Das, Kenji Watanabe, Takashi Taniguchi, Amit Agarwal, Aveek Bid, Phys. Rev. Lett. 136, 166604 (2026)

FB-382 (Prof. Amal Kumar Raychaudhuri Seminar Room)

Friday, October 30, 2026 at 5:15 PM (Refreshments at 5:00 PM)

Speaker



Prof. Aveek Bid
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