NSYSU physics 書報討論

Weekly Seminar

Quantum Transport Simulations for Twisted Bilayer MoS_2 and Spin-Orbit-Proximitized Graphene

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15:10-16:00 Thu-5/Dec/2024, at PH2006

Abstract

In this talk, I would like to share two latest works of my research group: Quantum transport in twisted bilayer MoS_2 [1] and graphene proximitized by WSe_2 with strong spin-orbit coupling [2, 3]. In the former, we considered two MoS_2 layers twisted from each other by approximately 1 degree, which are found to exhibit very different transport behaviors arising from the distinct symmetry of the resulting moire potential, which can be switched between hexagonal and honeycomb by reversing the gate-tunable electric field. The latter was initiated from our previous theoretical work in collaboration with an experimental group working on transport in graphene/WSe_2 van der Waals stacks, revealing a strong spin-orbit coupling strength in graphene that exceeds 10 meV [2]. In the latest work [3], we further investigate the effect of the radial Rashba spin-orbit coupling that was recently predicted to emerge in graphene/WSe_2 with certain special twist angles. Before showing these results, the Landauer-Buttiker formalism and real-space Green's function method will be briefly introduced.

References

1. Garcia-Ruiz, A. and Liu, M.-H., Nano Letters, accepted (2024).
2. Rao, Q. et al., Nature Communications 14 (2023).
3. Kang, W.-H. et al., Phys. Rev. Lett. 133 (2024) 216201.

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