Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Vertical Transport through Twisted Graphene/h-BN Heterostructure[1] XINGYUAN PAN, SHAYAN HEMATIYAN, JAIRO SINOVA, Texas A&M University, MARCO POLINI, NEST, Istituto Nanoscienze-CNR and Scuola Normale Superiore, ALLAN MACDONALD, University of Texas at Austin — Graphene and its heterostructues are promising candidates for high-frequency electronics. Vertical heterostructures created by stacking graphene layers and hexagonal boron nitride layers together display orientational disorder, due to rotational stacking faults. In this work we report our theoretical study of vertical charge transport through a rotated graphene/h-BN heterostructure. Our theoretical model combines the microscopic tight-binding method with the Landauer formalism for electrical transport. Electrical conductances are calculated for a variety of system configurations and system sizes. We found that the electrical conductance has a maximum value when the rotation angle is commensurate. Away from commensurate angles transport is suppressed but cannot be completely ignored. We show that the distance dependence of the transfer integrals between two atoms is crucial in modeling the rotation-angle dependence of the vertical transport.

[1]The authors would like to acknowledge support from ONR and SWAN

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Date submitted: 06 Nov 2012 Electronic form version 1.4