Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Effects of interlayer twists in proximitized graphene-dichalcogenide layers[1] ABDULRHMAN ALSHARARI, Ohio University, MAHMOUD ASMAR, Louisiana State University, SERGIO ULLOA, Ohio University — Proximity effects on deposited graphene on a TMD substrate are expected to change the dynamics of the electronic states in graphene, inducing spin orbit coupling (SOC) and staggered potential effects. An effective Hamiltonian that describes different symmetry breaking terms in graphene, while preserving time reversal invariance, shows that an inverted mass regime is possible. A transition from an inverted mass phase to a staggered gap is possible in real materials, as a relative gate voltage between the layers is applied. Berry curvature and valley Chern numbers demonstrate that the system may exhibit quantum spin Hall and valley Hall effects [1]. We further study relative rotation angles of the layers as they may give rise to interesting physical behavior not present in commensurate structures. We use a continuum model capable of describing the commensurate as well as the incommensurate systems with relative rotation angle and anisotropic expansion, and examine the topological characteristics of the resulting electronic states. Contrasting with tight binding results when appropriate, we explore the behavior of gaps and proximitized spin-orbit couplings in the system as function of twist angle and other structure characteristics. [1] A. M. Alsharari et al.,arXiv:1608.00992

[1]Supported by NSF-DMR 1508325, NSF-DMR 1410741 and NSF-DMR 1151717.

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Date submitted: 10 Nov 2016 Electronic form version 1.4