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Stacking effects on bilayer graphene and dichalcogenide hybrid structures[1] ABDULRHMAN ALSHARARI, Ohio University, MAHMOUD ASMAR, Louisiana State University, SERGIO ULLOA, Ohio University — Heterostructures of graphene (G) and transition metal dichalcogenides (T) create novel 2D systems with exotic properties[1]. In multilayers, stacking ordering is crucial to the resulting band structure in such systems. We use a tight binding formalism to calculate the band structure and analyze it in terms of the symmetries of the Hamiltonian. We characterize state topology through the calculation of Berry curvatures, and Chern numbers, and study zigzag edge states to identify and classify different phases. A superstructure of G-G-T is shown to exhibit a massive Dirac band structure at low energy similar to the TMDs band structure with scaled parameters. A possible inverted mass gap regime appears upon changing Rashba spin orbit coupling strength. A second G-T-G superstructure preserves mirror symmetry (z to -z) which leads to the formation of bands with definite parity 1(-1) that do not interact with each other. These two sets of bands have inverted and parabolic band structure, respectively. Possible symmetry breaking effects, e.g., mirror symmetry breaking in the presence of a field, may lead to distinct topological phases in the system. [1] A. M. Alsharari et al.,arXiv:1608.00992.

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