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Topological kink states at the tilt boundary in gated multi-layer graphene EUN-AH KIM, ABOLHASSAN VAEZI, Cornell University, YUFENG LIANG, Washington University, DARRYL NGAI, Cornell University, LI YANG, Washington University — Search for new realization of symmetry protected topological states with protected edge states is an active area of research. We show that a tilt boundary in gapped multi-layer graphene supports topologically protected gapless kink states. We investigate such kink states from two perspectives: the microscopic perspective of tight-binding model and an ab-initio calculation on bilayer, and the perspective of symmetry protected topological (SPT) states for general multi-layer. We show that the bilayer tilt boundary supports gapless kink states that are undeterred by strain concentrated at the boundary. Further we establish the kink states as concrete examples of edge states of *time-reversal symmetric Z*-type SPT, protected by T and two $U(1)$ symmetries in the absence of inter-valley mixing. Recent observations of such boundaries in multi-layer samples suggest that transport through these topological kink states might explain the long standing puzzle of sub-gap conductance. We discuss possible topological phase transitions upon breaking subset of symmetries from SPT perspective.

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