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Bound States of Conical Singularities in Graphene-Based Topological Insulators ANDREAS RUEGG, UC Berkeley, CHUNGWEI LIN, University of Texas at Austin — We investigate the electronic structure induced by wedge-disclinations (conical singularities) in a honeycomb lattice model realizing Chern numbers $\gamma = \pm 1$. We establish a correspondence between the bound state of (i) an isolated $\Phi_0/2$-flux, (ii) an isolated pentagon ($n = 1$) or heptagon ($n = -1$) defect with an external flux of magnitude $n\gamma\Phi_0/4$ through the center and (iii) an isolated square or octagon defect without external flux, where $\Phi_0 = h/e$ is the flux quantum. Due to the above correspondence, the existence of isolated electronic states bound to the disclinations is robust against various perturbations. These results are also generalized to graphene-based time-reversal invariant topological insulators.

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