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Edge states in a honeycomb lattice: effects of anisotropic hopping and mixed edges. ZI-XIANG HU, Zhejiang Institute of Modern Physics, Zhejiang University, China, HARI DAHAL, NIKOLAI SINITSYN, Los Alamos National Laboratory, KUN YANG, National High Magnetic Field Laboratory and Department of Physics, Florida State Universtiy, ALEXANDER BALATSKY, Los Alamos National Laboratory — We study the effects of anisotropic hopping and mixed edges on the edge states of graphene. The discussion of the edge states in graphene so far is focused on either zigzag or armchair edge with isotropic hopping. In this case the zigzag (arm chair) edge has enhanced (suppressed) local density of states at E=0 near the edge. In practice electrons in graphene can have anisotropic hopping. The lattice can have mixed (zigzag and arm chair) edges. Hence we study the effects of the anisotropic hopping and mixed edges on the edge states. We show that the mixed edges smear the enhanced local density of states at E=0 of the zigzag edge and, the anisotropic hoping enhanced the LDOS at E=0 in the armchair edge. Edge states in graphene can be studied using scanning tunneling microscopy (STM) experiments. We suggest that care must be taken while interpreting the STM data because the distinction between the zigzag and arm chair edge will be affected by the anisotropic electron hopping and the mixed edges.

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