Abstract Submitted
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Fractionalization in graphene-like systems

CONAN WEEKS, UBC, MARCEL FRANZ, University of British Columbia — I will discuss the possible interaction-driven instabilities that can arise in a system of massless Dirac fermions modeled by the extended Hubbard model on the $\pi$ flux square lattice and the honeycomb lattice, and their relevance to fractionalization in 2D graphene-like systems. Through numerical studies we have shown that these instabilities can result in a number of interesting phases. In addition to the charge density wave and various stripe phases these include the exotic “quantum anomalous Hall” (Haldane) phase and the dimerized “Kekulé” phase. A self consistent calculation inside the Kekulé phase on the $\pi$ flux lattice indicates that a discretized $U(1)$ vortex can be stabilized in this region leading to a zero-energy bound state with fractional charge $e/2$.

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