

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**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  $e/2$ .

Conan Weeks  
University of British Columbia

Date submitted: 19 Nov 2008

Electronic form version 1.4