Abstract Submitted
for the APR16 Meeting of
The American Physical Society

Lattice Study of Magnetic Catalysis in Graphene Effective Field Theory CHRISTOPHER WINTEROWD, CARLETON DETAR, Univ of Utah, SAVVAS ZAFEIROPOULOS, University of Frankfurt — The discovery of graphene ranks as one of the most important developments in condensed matter physics in recent years. As a strongly interacting system whose low-energy excitations are described by the Dirac equation, graphene has many similarities with other strongly interacting field theories, particularly quantum chromodynamics (QCD). Graphene, along with other relativistic field theories, have been predicted to exhibit spontaneous symmetry breaking (SSB) when an external magnetic field is present. Using nonperturbative methods developed to study QCD, we study the low-energy effective field theory (EFT) of graphene subject to an external magnetic field. We find strong evidence supporting the existence of SSB at zero-temperature and characterize the dependence of the chiral condensate on the external magnetic field. We also present results for the mass of the Nambu-Goldstone boson and the dynamically generated quasiparticle mass that result from the SSB.

Christopher Winterowd
Univ of Utah

Date submitted: 07 Jan 2016

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