Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Broken SU(4) Symmetry and The Fractional Quantum Hall Effect in Graphene[1] INTI SODEMANN, ALLAN MACDONALD, University of Texas at Austin — We describe a simple variational approach to understand the spin-valley broken symmetry states in the fractional quantum Hall regime of graphene. Our approach allows to predict the incompressible ground states and their charge gaps and is able to explain the observed differences between filling factor ranges $|\nu| < 1$ and $1 < |\nu| < 2$. We find that in the SU(4) invariant case the incompressible ground state at $|\nu| = 1/3$ is a three-component incompressible state, not the Laughlin state, and discuss the competition between these two states in the presence of SU(4) spin-valley symmetry breaking terms. We find that the lowest energy fractionally charged quasi-particles involve spin/valley flips in several prominent fractions. We discuss the expected behavior of the gaps under tilting the magnetic field away from normal which allows to tune the relative strength of Zeeman and valley symmetry breaking interactions.

[1]Supported by DOE Division of Materials Sciences and Engineering under grant DE-FG03-02ER45958 and by the Welch foundation under grant TBF1473

Inti Sodemann
University of Texas at Austin

Date submitted: 15 Nov 2013 Electronic form version 1.4