Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Quantum Hall Ferromagnetism in Graphene ALLAN H. MACDONALD, JASON HILL, HONGKI MIN, NIKOLAI SINITSYN, Department of Physics, The University of Texas, Austin — In a magnetic field non-interacting electrons with the graphene band structure have four nearly degenerate Landau levels close to the intrinsic Fermi level. The four levels are associated with different spin states and with the two different sites in the honeycomb lattice unit cell. In a single-particle theory weak spin-orbit coupling and Zeeman fields split the four levels by an amount that is small compared to the electronic self-energy. We discuss the quantum Hall effect in graphene using at integer filling factors $\nu = -1$, $\nu = 0$, and $\nu = 1$ in a picture where the ground state is a broken symmetry SU(4) ferromagnet and these weak single-particle terms act as symmetry breaking external fields. We also discuss the consequences of the difference in interaction strength beteween electrons on the same and different sublattice and sample quality criteria necessary to realize quantum Hall ferromagnetism in graphene.

Nikolai Sinitsyn
Department of Physics, The University of Texas, Austin

Date submitted: 30 Nov 2005 Electronic form version 1.4