Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

The effect of Landau level mixing on the fractional quantum Hall effect in spin and valley polarized graphene[1] MICHAEL PETERSON, California State University Long Beach, CHETAN NAYAK, Microsoft Research, University of California Santa Barbara — The fractional quantum Hall effect (FQHE) in graphene presents many theoretical and experimental challenges and is not yet fully understood even in the lowest Landau level (LL). Besides spin and valley degrees of freedom being important, LL mixing is also important since it does not depend on the strength of the magnetic field (in contrast to the FQHE in semiconductors, i.e., parabolic bands) but instead depends on the dielectric of the substrate or lack thereof. Recently, we have produced an effective Hamiltonian for the FQHE in graphene that incorporates the effects of LL mixing. As a first step, we numerically study the FQHE in spin and valley polarized graphene in both the lowest and first excited LL while fully incorporating LL mixing. We find the interesting results that the lowest LL of graphene is nearly identical to that of semiconductors, even in the presence of LL mixing, and the anti-Pfaffian is stabilized in the half-filled first LL under moderate LL mixing.

[1]We acknowledge support from DARPA, Microsoft Station Q, and California State University Long Beach.

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Date submitted: 14 Nov 2013 Electronic form version 1.4