Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Interaction-driven capacitance in graphene electron-hole bilayer in the quantum Hall regime[1] BAHMAN ROOSTAEI, YOGESH JOGLEKAR, IUPUI — Fabrication of devices made by isolated Graphene or Graphene-like single layers (such as h-BN) has opened up possibility of examining highly correlated states of electron systems in parts of their phase diagram that is impossible to access in their counterpart devices such as semiconductor heterostructures. An example of such states are Graphene (or Graphene like) double layer electron-hole systems under strong magnetic fields where the separation between layers can be of the order of one magnetic length with interlayer tunneling still suppressed. In those separations correlations between electrons and holes are of crucial importance and must be included in determination of observables. Here we report a thorough mean-field study of the coherent and crystalline ground states of the interacting balanced electron-hole Graphene systems in small and intermediate separations with each layer occupying up to four lowest lying Landau levels. We calculate the capacitance of such states as a function of layer separation and filling factor. Our calculations show significant enhancement of the capacitance compared to geometrical value due to quantum mechanical corrections.

[1]US nsf-dmr 1054020

Bahman Roostaei
IUPUI

Date submitted: 11 Nov 2013 Electronic form version 1.4