Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Van der Waals forces and electron-electron interactions in two strained graphene layers[1] ANAND SHARMA, PETER HARNISH, ALEXANDER SYLVESTER, VALERI N. KOTOV, Univ of Vermont — We evaluate the van der Waals (vdW) interaction energy at T=0 between two undoped graphene layers which are separated by a finite distance. Our study is carried out within the Random Phase Approximation and the interaction energy is obtained for variation in the strength of effective Coulomb interaction and anisotropy due to applied uniaxial strain. We consider the following three models for the anisotropic case: a) where one of the two layers is uniaxially strained, b) the two layers are strained in the same direction, and c) one of the layers is strained in the perpendicular direction. We find that for all the three models and any given value of the coupling, the vdW interaction energy increases with increasing anisotropy. The effect is most striking for the case when both the layers are strained in the parallel direction where we observe up to an order of magnitude increase in the strained graphene relative to the unstrained case. We also investigate the effect of intra-layer electron-electron interactions in the region of large separation between the strained graphene layers. We conclude that the many-body contributions to the correlation energy are non-negligible and the vdW interaction energy decreases as a function of increasing distance between the layers.

[1]Alexander Sylvester acknowledges financial assistance from the Research Experiences for Undergraduates (REU) Program of the National Science Foundation (NSF) focussing on complex materials.

Anand Sharma
Univ of Vermont

Date submitted: 15 Nov 2013 Electronic form version 1.4