

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**The exchange instability in a graphene bilayer** JOHAN NILSSON, ANTONIO CASTRO NETO, Boston University, NUNO PERES, Univ. Minho, FRANCISCO GUINEA, ICM — We study the problem of the formation of electron-hole pockets in a graphene bilayer (two layers of graphite). By means of a variational calculation in a simple model we show that pockets can be formed due to the combined effects of the Coulomb interaction and a coherent nearest neighbor hopping within the planes and between the layers. The variational calculation shows that the non-interacting ground-state is unstable and that a small net ferromagnetism can be obtained. Upon doping the system away from half filling the instability goes away above a critical value of the doping. We also discuss how modifications to the model such as the inclusion of screening and disorder will affect the instability.

Johan Nilsson  
Boston University

Date submitted: 16 Jan 2006

Electronic form version 1.4