MAR08-2007-000203

Abstract for an Invited Paper
for the MAR08 Meeting of
the American Physical Society

Biased bilayer graphene: Hall effect and zero-energy Edge States

NUNO PERES, University of Minho

We demonstrate that the electronic gap of a graphene bilayer can be controlled externally by applying a gate bias. From the magneto-transport data (Shubnikov-de Haas measurements of the cyclotron mass), and using a tight binding model, we extract the value of the gap as a function of the electronic density. We show that the gap can be changed from zero to mid-infrared energies by using fields of $\lesssim 1$ V/nm, below the electric breakdown of SiO_2. The opening of a gap is clearly seen in the quantum Hall regime. We further report the existence of zero energy surface states localized at zigzag edges of bilayer graphene. It is shown that zero energy edge states in bilayer graphene can be divided into two families: (i) states living only on a single plane, equivalent to surface states in monolayer graphene; (ii) states with finite amplitude over the two layers, with an enhanced penetration into the bulk.