Pseudo Magnetic Faraday and Quantum Hall Effect In Oscillating Graphene

ANITA BHAGAT, KIERAN MULLEN, Homer L. Dodge Department of Physics and Astronomy, Univ. of Oklahoma — When a graphene layer is stressed, the strain changes the phase between sites in a tight binding model of the system. This phase can be viewed as a pseudo-magnetic vector potential. The corresponding pseudo-magnetic field has been experimentally verified in static cases. We examine the case of oscillating graphene ribbons and explore two new effects. The first is to investigate an oscillating pseudo-magnetic field that produces a quantum Hall effect: we calculate the I-V characteristic of an oscillating graphene nanoribbon as a function of frequency, and amplitude in both the oscillations and the applied driving voltage. Second, the time dependent pseudo-magnetic field should produce a pseudo-Faraday effect driving electrons in different valleys in opposite directions. In both cases, we make explicit calculations for experiment.

1This project was supported in part by the US National Science Foundation under Grant DMR-1310407.