

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Graphene in a periodically alternating magnetic field: an unusual quantization of the anomalous Hall effect** PATRICK BRUNO, ESRF, Grenoble, France, MATHIEU TAILLEFUMIER, University of Oslo, Norway, VITALII K. DUGAEV, Rzeszow University of Technology, Poland, BENJAMIN CANALS, CLAUDINE LACROIX, Institut Néel, CNRS, Grenoble, France — We study the energy spectrum and electronic properties of graphene in a periodic magnetic field of zero average with a symmetry of triangular lattice. The periodic field leads to formation of a set of minibands separated by the gaps, which can be manipulated by external field. The Berry phase, related to the motion of electrons in  $k$  space, and the corresponding Chern numbers characterizing topology of the energy bands are calculated analytically and numerically. In this connection, we discuss the anomalous Hall effect in the insulator state, when the Fermi level is located in the minigap. The results of calculations show that in the model of gapless Dirac spectrum of graphene the anomalous Hall effect can be treated as a sum of fractional quantum numbers, related to the nonequivalent Dirac points.

Patrick Bruno  
ESRF, Grenoble, France

Date submitted: 06 Dec 2010

Electronic form version 1.4