Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Snake orbits in graphene underneath an array of $Ni_{0.80}Fe_{0.20}$ nano-dots ADAM NEAL, JIANGJIANG GU, TONY LOW, PEIDE YE, Purdue University — The existence of snake orbits in 2DEG formed at AlGaAs/GaAs heterojunction is theoretically predicted and experimentally demonstrated by creating a spatially inhomogeneous magnetic field [1]. Due to its ambipolar nature, graphene opens up new possibilities to investigate snake orbits and other exotic phenomena by simply creating a p-n junction in a homogenous magnetic field. We have fabricated periodic arrays of $Ni_{0.80}Fe_{0.20}$ nano-dots on graphene with the dot diameter of 80 nm or 150 nm and the period of 160 nm or 300 nm, respectively. A quasi-periodic magneto-resistance oscillation is observed in the low-temperature magneto-transport measurement. We ascribe it to Aharonov-Bohm oscillations induced by snake orbits of carriers underneath the nano-dots. Due to the high work-function of $Ni_{0.80}Fe_{0.20}$, it is possible to generate local circular n-p and p–p junctions underneath the nano-dots, which form the snake orbits of carriers in an external applied magnetic field. Dependence of these oscillations on temperature and carrier density and simulation work on snake orbits will be presented.

[1] J.E. Muller, Phys. Rev. Lett. 68, 385 (1992); P.D. Ye et al., Phys. Rev. Lett. 74, 3013 (1995).

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Date submitted: 28 Dec 2010 Electronic form version 1.4