Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**Spatially Separated Spin Carriers in Spin-Semiconducting Graphene Nanoribbons**[1] ZHENGFEI WANG, University of Utah, SHUO JIN, Beihang University, FENG LIU, University of Utah — A graphene nanoribbon with sawtooth edges has a ferromagnetic ground state. Using first-principles and tight-binding model calculations, we show that, under a transverse electrical field, the sawtooth graphene nanoribbons become a spin semiconductor whose charge carriers are not only spin polarized in energy space but also spatially separated at different edges. Low-energy excitation produces spin-up electrons localized at one edge and spin-down holes at the opposite edge, and the excitation energy of spin carries can be tuned by the electric field to reach a new state of spin gapless semiconductor. Also, the spin semiconducting states are shown to be robust against at least 10% edge disorder. These features demonstrate a good tunability of spin carriers for spintronics applications.

[1]This work was supported by DOE-BES (No. DE-FG02-04ER46148) and NSF-MRSEC (No. DMR-1121252).

Zhengfei Wang
University of Utah

Date submitted: 15 Nov 2013 Electronic form version 1.4