Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Quantum transport modeling of magnetic focusing in graphene p-n junctions[1] SAMUEL LAGASSE, State Univ of NY - Albany, JI UNG LEE, State Univ of NY - Polytechnic Institute — We demonstrate a new model for studying transverse magnetic focusing experiments in graphene p-n junctions, using quantum transport methods. By including a combination of dephasing edge contacts and Landauer-Büttiker multi-terminal analysis, we observe an exceptional degree of agreement with recent experimental data from Chen et al (*Science*, 2016), without fitting parameters. Our model captures both the resonance and off-resonance nonlocal resistances from experiment. Our calculated quantum transmission functions indicate the origin of the sign of the measured resistance. Spatially resolved flow maps of local particle current density are used to explain our results and rapidly convey the mechanisms of device operation. Mode-by-mode analysis of transport shows the complex interplay between semi-classical skipping orbits and quantum effects. Quantum interference, p-n filtering, and edge scattering are clearly seen. Additionally, we are able to explain subtle features from experiment, such as the p-p^- to p-p^+ transition and the second p-n focusing resonance.

[1]The authors acknolwedge financial support provided by the U.S. Naval Research Laboratory (Grant Number: N00173-14-1-G017).

Samuel LaGasse
State Univ of NY - Albany

Date submitted: 10 Nov 2016 Electronic form version 1.4