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Non-Equlibration of Edge States at the Graphene P-N Junction Interface SON LE, NIKOLAI KLIMOV, DAVID NEWELL, CURT RICHTER, NIST - Natl Inst of Stds & Tech, JUN YAN, Department of Physics, University of Massachusetts, Amherst, MA, PRATIK AGNIHOTRI, EVERETT COMFORT, JIUNG LEE, College of Nanoscale Science and Engineering, SUNY PI, NY — The interaction of chiral quantized edge states at the graphene pn-junction (pnJ) interface at low temperature and high magnetic fields is topic of intense research recently [1]. It has been presumed that electron and hole edge states completely equilibrate with each other at the pnJ interface, creating an unique set of quantized longitudinal resistance values depending on the number of edge states that present in the device [2]. Experimentally, we have used a unique buried-split gate structure to electrostatically form a graphene pnJ with independent control of the number of edge state in the n- and p-regions of the device's channel. Measurement of both longitudinal and pseudo-Hall resistance shows quantized values that cannot be explained by using the complete equilibration model. We present a new "non-equilibration" model, in which only the lowest Landau level's (LLs) edge states equilibrate at the pnJ interface, while edge states arising from higher filling factor LLs propagate along the interface without equilibration. Our new model agrees with both the longitudinal and pseudo-Hall resistance results.

[1] J. R. Williams, L. DiCarlo, and C. M. Marcus, Science 317, 638 (2007).
[2] D. A. Abanin and L. S. Levitov Science 317, 641 (2007).

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