Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Colossal Coulomb Drag in Double
Bilayer Graphene Heterostructures

KAYOUNG LEE, JAIMIN XUE, The
University of Texas at Austin, TAKASHI TANIGUCHI, KENJI WATANABE, Na-
tional Institute for Materials Science, EMANUEL TUTUC, The University of Texas
at Austin — Double-layer electron systems, where charge carriers are apart into two
parallel layers, have been of interest thanks to their various interlayer interaction
phenomena. One of the peculiar interaction features is Coulomb drag, in which
current flowing in one layer (drive layer) induces voltage drop in the opposite layer
(drag layer) via interlayer momentum transfer. Recent progress in the fabrication
of heterostructures consisting of atomic layer materials such as graphene and hexag-
onal boron nitride (hBN) has led to high mobility double layer systems. Here we
probe Coulomb drag in double bilayer graphene heterostructures separated by 2 –
5 nm thick hBN dielectrics. At temperatures (T) lower than 30 K, we observe an
anomalous Coulomb drag in the vicinity of the drag layer charge neutrality points,
which increases as T is reduced. At T = 1.4 K, the lowest temperature studied
here, the drag resistivity becomes comparable to the layer resistivity at a finite drag
layer density \( n_{\text{drag}} \approx 1 - 4 \times 10^{11} \text{ cm}^{-2} \). The ratio of the drag to layer resistivity
increases as the hBN thickness reduces, and also as the drag layer mobility increases.
At T > 50K, we observe diffusive drag, which increases with T.

We thank ONR, NRI and Intel for support.

---

Kayoung Lee
The University of Texas at Austin