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Colossal Coulomb Drag in Double Bilayer Graphene Heterostructures[1] KAYOUNG LEE, JAIMIN XUE, The University of Texas at Austin, TAKASHI TANIGUCHI, KENJI WATANABE, National 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 hexagonal 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 $n_{\mathrm{drag}} \approx 1-4 \bullet 10^{11}$ 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.

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