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Quantum Hall Effect of Hybrid Monolayer-bilayer Graphene Structures: Observation of Broken electron-hole Symmetry YONG P. CHEN, JIFA TIAN, ISAAC CHILDRES, HELIN CAO, Department of Physics, Purdue University — Quantum Hall Effect (QHE) in both monolayer (1L) and bilayer (2L) graphene has been well studied in the past few years. Little attention has been paid to the magneto-transport across the 1L ∼2L graphene interface. Here, we present the magnetotransport measurements of several exfoliated graphene quasi-Hall bar devices which consist of partly 1L and partly 2L graphene. We focused on the Hall resistance (R_{xy}) across the interface between 1L and 2L graphene when the carrier types and densities are changed using a back gate voltage. We observed that when the carrier type is p type (hole), R_{xy} typically shows QHE of bilayer graphene with filling factor of 4N, N being integers. When the carrier type is changed into n type (electron), the corresponding R_{xy} typically shows QHE of single layer graphene with filling factor of 4(N+1/2), N being integers. We discuss possible explanations for the observed broken electron-hole symmetry in such hybrid structures.

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