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Observation of the fractional quantum Hall effect in graphene KIRILL BOLOTIN, Vanderbilt University, FERESHTE GHAHARI, Columbia University, MICHAEL D. SHULMAN, Harvard University, HORST L. STORMER, PHILIP KIM, Columbia University — Only a glimpse of correlated electron physics has been observed in graphene so far, mostly due to the strong electron scattering caused by charged impurities in the substrate. To overcome this limitation,we fabricate devices where electrically contacted and electrostatically gated graphene samples are suspended over a substrate. The measured low-temperature sample mobility is found to exceed 100,000 cm2/Vs in such devices. The very high mobility of our specimens allows us to observe previously inaccessible transport regimes in graphene. We report the observation of the fractional quantum Hall effect, supporting the existence of interaction induced correlated electron states in the presence of a magnetic field. In addition, at low carrier density graphene becomes an insulator with an energy gap tunable by magnetic field.

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