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Visualizing the influence of an isolated Coulomb impurity on the Landau level spectrum in graphene using scanning tunneling microscopy[1] ADINA LUICAN-MAYER, Argonne National Laboratory, MAXIM KHARITONOV, GUOHONG LI, CHIHPIN LU, IVAN SKACHKO, ALEM-MAR GONCALVES, EVA Y. ANDREI, Department of Physics and Astronomy, Rutgers University — Charged impurities play a crucial role in determining the electronic properties of graphene. We report on experiments that elucidate the effect of an isolated charged impurity on the electronic spectrum of graphene in a magnetic field. Using scanning tunneling microscopy and gated graphene devices, we follow the evolution of quantized Landau levels with carrier density and find that the apparent strength of the impurity is controlled by the partial filling of the Landau levels. At low filling the impurity is cloaked and becomes essentially invisible. The cloaking effect diminishes with filling until, for fully occupied Landau levels, the impurity reaches its maximum strength causing a significant perturbation in the local density of states. In this regime we report the first observation of Landau level splitting due to lifting of the orbital degeneracy.

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