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Mapping Dirac Quasiparticles near a Single Coulomb Impurity on Graphene YANG WANG, VICTOR BRAR, Physics Department, UC Berkeley and LBNL, ANDREY SHYTOV, School of Physics, University of Exeter, QIONG WU, WILLIAN REGAN, Physics Department, UC Berkeley and LBNL, HSIN-ZON TSAI, Physics Department, UC Berkeley, ALEX ZETTL, Physics Department, UC Berkeley and LBNL, LEONID LEVITOV, Department of Physics, Massachusetts Institute of Technology, MICHAEL CROMMIE, Physics Department, UC Berkeley and LBNL, PHYSICS DEPARTMENT, UC BERKELEY TEAM, LBNL TEAM, SCHOOL OF PHYSICS, UNIVERSITY OF EXETER COLLABORATION, DEPARTMENT OF PHYSICS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY COLLABORATION — We have locally mapped the response of charge carriers to a single Coulomb potential placed on a gated graphene device. Scanning tunneling microscopy and spectroscopy were used to fabricate a tunable charge impurity and to measure how Dirac fermions screen it. By mapping spatial variation in the electronic structure of graphene we have directly probed the strength of screened electronic interactions, obtaining a value of epsilon = 3 for the intrinsic graphene dielectric constant. This small value suggests that microscopic electron-electron interactions contribute significantly to intrinsic graphene properties.

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