TITLE: Controlling graphene edge state trajectories with a buried gate architecture

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TEXT:
Graphene provides a formidable opportunity for the investigation of one-dimensional quantum Hall edge states. Thanks to the fact that electron conduction occurs directly at the surface, a wide range of scanning probe techniques can be used to track the nature and behaviour of electronic states with nanometric precision [1]. In our work, we demonstrate the control of edge state trajectories in the quantum Hall regime thanks to a split-gate structure buried under a dielectric layer. Devices were fabricated starting from monocrystalline graphene flakes obtained by chemical vapor deposition [2,3]. Different n-type and p-type regions can be induced in our devices and used to create a controllable interaction between co-propagating and counter-propagating edge channels at the boundaries of the various quantum Hall regions. We show that the observed resistance values can be understood in terms of edge conduction and mixing relative to three different filling factors in the bulk of the sample, on top of the split-gate, and in the gap between the split-gates. Differently from previous reports [4], the top surface of graphene is completely accessible and the gating geometry allows an easier electrostatic control of the filling configurations. Perspectives for scanning probe investigation of edge channels [5] are discussed.

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