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Electrostatically-defined graphene nanoribbon YIHANG ZENG, REBECA RIBEIRO-PALAU, Columbia Univ, KENJI WATANABE, TAKASHI TANIGUCHI, Advanced Materials Laboratory, JAMES HONE, CORY DEAN, Columbia Univ, CORY DEAN LAB TEAM, ADVANCED MATERIALS LABORATORY COLLABORATION, JAMES HONE LAB COLLABORATION — Electron confinement of Dirac fermions in graphene has remained a longstanding challenge. Owing to the gapless nature of the bandstructure, conventional depletion-gate schemes cannot be employed. Nano scale constrictions may be realized by etching, however this results in significant edge disorder, that tends to dominate the resulting device characteristics. Here, we discuss a new approach to electrostatic confinement in graphene where we take advantage of either a Moir induced energy gap (present when graphene is fabricated with zero-angle alignment to BN) as well as the $\nu = 0$ quantum Hall state (a magnetic field induced energy gap without edge states). We use a dual-gated structure to set one region to the induced gap, while the other varies the Fermi energy in the confinement region. One dimensional nanoribbons are realized by utilizing carbon nanotubes as one of the electrostatic gates, demonstrated by the appearance of quantized step sin conductance.

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