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Electron Transport in Graphitic Nanostructures

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Local control of the electrostatic potential in graphene nanostructures can provide a new insight into Dirac fermions in confined geometries in electric and magnetic fields. In this presentation, we report electronic transport measurements in patterned locally gated graphene nanoconstrictions and locally gated single walled carbon nanotubes with tunable transmission and bipolar heterojunctions. We observe various unusual transport phenomena, such as energy gap formation in confined graphene structures and series of fractional quantum Hall conductance plateaus at high magnetic fields as the local charge density is varied in the graphene heterojunction regions. These observed results can be explained in terms of equilibration of chiral edge states at the heterojunction interfaces, indicating charge polarity dependence of quantum Hall edge state equilibration.