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Conductance Quantization in Graphene Nanoconstrictions DRAGOMIR DAVIDOVIC, CHRISTOPHER MALEC, BRADLEY ELKUS, Georgia Institute of Technology — We present measurements of conductance quantization in a narrow Graphene constriction, of approximate width 200nm. Graphene is exfoliated on top of a Silicon Dioxide, and is not suspended. In high mobility samples ($>10000 cm^2 V^{-1} s^{-1}$) , we observe pinch-off at the Diract point, with a resistance at 4.2K of $\sim$ 40kΩ. As a function of gate voltage at zero magnetic field, the conductance displays a few plateaus with the quantized value close to $G_0=2e^2/h$, indicating valley degeneracy splitting. At high carrier density ($>5x10^{12}/cm^2$) in a weak magnetic field, conductance exhibits strong beating in the Shubnikov-de Haas oscillations, which is also attributed to the valley splitting, analogous the Rashba interaction beats observed in the Shubnikov-de Haas oscillations in semiconducting quantum wells. In the Quantum Hall regime, the conductance of the constriction has quantized values nG_0, ..,. In comparison, measurements in the leads of the constriction display normal graphene behavior without the valley splitting.

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