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Ballistic transport in nanometer-scale suspended graphene V. TAYARI, A.C. MCRAE, S. YIĞEN, J. PORTER, J.O. ISLAND, A. R. CHAMPAGNE, Department of Physics, Concordia University, Montreal, Canada — We study electron transport in suspended ultra-short graphene transistors. We fabricate narrow bowtie gold junctions on exfoliated graphene, and use oxygen plasma to etch away the graphene crystal except under the gold junctions. We then use a wet etch to remove the SiO_2 under the junctions and suspend the devices. Finally, we use a feedback-control electromigration procedure to break the gold junctions and expose sections of graphene which are $\sim$100 nm wide, and as short as $\sim$10 nm. Using low-temperature electron transport, we observe Fabry-Perot oscillations in the conductivity as a function of charge density, as expected for ballistic transport. The conductivity is asymmetric for electron and hole gate-doping, signaling charge doping from the gold contacts and the formation of p-n junctions. At temperatures below $\approx$ 1 Kelvin, a very strong hysteresis is observed in the gate-dependence of conductivity. We study these devices as a function of charge density, temperature, magnetic field and aspect ratio.

V. Tayari
Department of physics Concordia University

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