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Multi-mode Fabry-Pérot Interferences in SiO_2-supported Single Layer Graphene, in Large Aspect Ratio 2-terminal Devices[1] JOSEPH LAMBERT, Drexel University, STEVEN CARABELLO, Penn State Harrisburg and Drexel University, ROBERTO RAMOS, Indiana Wesleyan University — The Fabry-Pérot (F-P) interference of charge carriers in graphene occur in 2-dimensional cavities defined between *pn* interfaces. Typically, *pn* interfaces form by local doping of metallic contacts, and serve as partially reflecting mirrors for ballistic charge carriers. Here, we report on observed F-P resonances in very large aspect ratio devices. For all devices studied, the inter-lead distance is $L \approx 0.2$ μm, and the graphene channel widths range from $W \approx 5$ to 17 μm, resulting in aspect ratios up to $W/L \approx 74$. In maps of conductance versus source-drain and gate voltages, we observe long-range tapestry patterns, extending over the gate voltage range from $V_g = -60$ V to 20 V. These features onset at a temperature of $T \approx 20$ K. Upon lowering the temperature, an additional mode appears around $T \approx 3$ K, and remains fairly unchanged down to $T \approx 30$ mK. From the lowest energy features, we estimate the phase coherence length to be on the order of 1 to 2 μm. Using FFT, we have identified two modes: the fundamental longitudinal, and one of the transverse modes, which we propose is a result of smaller cavities formed by the disorder-induced charge puddles.

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