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Quantum Dot Behavior in Graphene Nanoconstrictions KATHRYN TODD, HUNG-TAO CHOU, SAMI AMASHA, PATRICK GALLAGHER, DAVID GOLDHABER-GORDON, Stanford University — Graphene nanoribbons have been proposed as novel high-frequency transistors due to their high mobility and transport gap that scales inversely with width. In order to understand the origin of the transport gap in long nanoribbons, we measure transport through short side-gated nanoconstrictions. Unlike in long (≥250 nm) nanoribbons, where we observe transport through multiple quantum dots in series, shorter (≤60 nm) constrictions display behavior characteristic of single and double quantum dots. We find that dot size scales with constriction width. In the narrowest short constrictions, high on/off ratios are achievable, while in wider (≥35 nm) constrictions we observe quantum dot behavior overlaid on a highly conducting background. We hypothesize that the metal side gates in close proximity to our short constrictions suppress the importance of edge disorder, and compare constrictions fabricated with and without metal side gates. We propose a model where transport occurs through quantum dots nucleated by disordered background potential in the presence of a confinement gap.

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