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Single channel ballistic transport in epitaxial graphene nanoribbons CLAIRE BERGER, CNRS & Georgia Tech, MING RUAN, Georgia Tech, JENS BARINGHAUS, FREDERIK EDLER, Leibniz Univ., JAMES PALMER, ZELEI GUO, JOHN HANKINSON, Georgia Tech, CHRISTOPH TEGENKAMP, Leibniz Univ., WALT A. DE HEER, Georgia Tech — We present transport results on high quality epitaxial graphene nanoribbons about 40 nm in width, with annealed edges, grown on sidewall SiC. The nanoribbons are produced directly in their final shape with no post-graphene growth patterning. We show that the nanoribbons are neither semiconductors, nor have a transport gap, but are single channel room temperature ballistic conductors. The graphene ribbons behave as electronic waveguides or quantum dots. The low-temperature transport properties of top-gated ribbons indicates that transport is dominated by two components of the ground state transverse waveguide mode, one that is ballistic and temperature independent, and a second thermally activated component that appears to be ballistic at room temperature and insulating at cryogenic temperatures. These properties appear to be related to the lowest energy quantum states in the charge neutral ribbons.

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