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Transport properties of nanoconstrictions in armchair graphene ribbons[1] IGOR ROMANOVSKY, CONSTANTINE YANNOULEAS, UZI LANDMAN, School of Physics, Georgia Institute of Technology — The transport properties of nanoconstrictions and quantum-point contacts formed in atomically precise segmented armchair graphene nanoribbons (SaGRs) are investigated using a tight-binding non-equilibrium Green's function (TB-NEGF) approach and relativistic quantum-field theory modeling.[2] The TB behavior is accounted for by a one-dimensional Dirac-transfer-matrix (DTM) model using variable-mass (scalar-field) barriers assigned to the junctions between the nanoribbon segments. It is shown that the topology of the junctions (sharp versus smooth) and the ratio of length over width of the constriction are the principal factors influencing the height of the mass barriers, and thus they control the extent of trapping and confinement by the constriction of graphene's relativistic carriers, even in the case of all-metallic SaGRs. A rich variety of transport patterns ensues, ranging from ballistic quantized conductance to resonant tunneling associated with Coulomb blockade.

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[2]I. Romanovsky, C. Yannouleas, and U. Landman, Phys. Rev. B **87**, 165431 (2013)

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