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Quantum Transport in Graphene Nanoribbon Networks ANDRÉS RAFAEL BOTELLO-MÉNDEZ, Institute of Condensed Matter and Nanosciences(IMCN), Universite Catholique de Louvain (UCL), Belgium, EDUARDO CRUZ-SILVA, Oak Ridge National Laboratory (ORNL), USA, JOSÉ MANUEL ROMO-HERRERA, Departamento de Quimica Fisica, Universidad de Vigo, Spain, FLORENTINO LÓPEZ-URÍAS, IPICYT, Mexico, MAURICIO TERRONES, Materials Research Institute, The Pennsylvania State University, USA, BOBBY G. SUMPTER, ORNL, USA, HUMBERTO TERRONES, JEAN-CHRISTOPHE CHARLIER, IMCN, UCL, Belgium, VINCENT MEUNIER, Department of Physics, Applied Physics, and Astronomy, Rensselaer Polytechnic Institute, USA — Focusing on systems that can be realized experimentally, both in-plane conductance of inter-connected graphene nanoribbons and tunneling conductance in out-of-plane nanoribbon intersections are investigated. The quantum transport properties of such networks are computed using first-principles calculations based on the density functional theory formalism. The electronic transport through in-plane nanoribbon cross-points is found to be significantly affected by scattering at the intersections with the exception of all zigzag nanoribbon terminals arranged at a 60 degree angle. This result demonstrates the possibility of designing graphene nanoribbon networks capable of guiding electron along desired and predetermined paths. In addition, the electron transport properties of out-of-plane nanoribbons cross-points with realistic size are described within a simple tight-binding approach. The stacking angle is predicted to play a key role on the electronic transmission through nanoribbon networks.

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