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Single and Multi-channel Quantum Dragons from Rectangular Nanotubes[1] ZHOU LI, MARK NOVOTNY, Mississippi State University — Recently quantum dragons have been discovered theoretically [1]. Quantum dragons are nanostructures with correlated disorder that permit energy-independent total quantum transmission of electrons. Hence the electrical conductance G in a two-terminal measurement should be the conductance quantum $G_0=2e^2/h$. The single-band tight banding model is used. An example of a single-channel quantum dragon is a rectangular nanotube with disorder along the direction z of the electron propagation [1]. Quantum dragons are obtained by solving the time-independent Schrödinger equation to obtain the electrical transmission $\mathcal{T}$ as a function of the incoming electron energy E. A quantum dragon has $\mathcal{T}(E)=1$ for all energies. This work generalizes the solution of the time-independent Schrödinger equation to the case of more than one open channel, and applies the method to nanotubes formed from rectangular lattices. One can envision such single-walled rectangular nanotubes for iron starting from free-standing single-atom-thick Fe membranes which have recently been obtained experimentally [2].
[1] M.A. Novotny, Phys. Rev. B **90**, 165103 [14 pages] (2014).
[2] J. Zhao, et al., Science **343**, 1228 (2014).

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Zhou Li
Mississippi State University

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