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How Ubiquitous is Total Electron Transmission through Nanostructures (Quantum Dragons)?[1] MARK NOVOTNY, Mississippi State University — In transport through nanostructures connected to two semi-infinite leads, the transmission probability $\mathcal{T}(E)$ as a function of the energy E of the incoming electron plays a central role in the Landauer calculation of the electrical conductance G. A quantum dragon nanostructure [1] is one which when connected to appropriate leads has total electron transmission for all energies, $\mathcal{T}(E)$=1. In two-lead measurements of single-channel quantum dragons, the quantum of conductance, G_0=$2e^2/h$, should be observed. A quantum dragon may have strong scattering. In [1] the disorder was along the axis of electron propagation, the z axis. We show that quantum dragon nanostructures can be found for strong disorder perpendicular to the z axis. In select types of nanostructures, we find the ratio of the dimension of the parameter space where quantum dragons exist to that of the complete parameter space. The results use the single-band tight-binding model, and are for the case with only one open channel and homogeneous leads. One type of nanostructure with $\mathcal{T}(E)$=1 has completely disordered slices perpendicular to the z axis, but identical slices along the z direction.
[1] M.A. Novotny, Phys. Rev. B **90**, 165103 [14 pages] (2014)

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