Abstract Submitted
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Quantum Transport through Hanoi Networks M.A. NOVOTNY, CHRIS VARGHESE, Mississippi State U., STEFAN BOETTCHER, Emory U. — We present a renormalization group (RG) method to calculate the transmission of quantum particles through networks. The RG method is based on finite-dimensional matrix algebra for a tight-binding Hamiltonian [1], not a Green's function method [2]. The RG method is particularly well suited to application to hierarchical lattices. We apply the RG to obtain the quantum transmission T for Hanoi networks [3] HN3 (three bonds per site) and HN5 (on average 5 bonds per site). We give the transmission T as a function of the energy E of the incoming particle and the tight-binding parameters (on-site energy ϵ and hopping parameters t) for both linear and ring geometries. We have obtained T for up to 2^{200} sites, and have analyzed the RG equations to obtain asymptotic expressions. We find that the HN3 lattice exhibits band gaps, while no such band gaps exist in linear networks or in HN5.

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[2] S. Datta, *Electronic Transport in Mesoscopic Systems* (Cambridge U. Press, Cambridge UK, 1997), and references therein.
[3] S. Boettcher and B. Goncalves, Europhysics Lett. **84** 30002 (2008).

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