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Hierarchical lattice models with evidence of metallic conductance: Implications for localization BRIAN MORITZ, Department of Physics, University of North Dakota; Department of Physics, University of Cincinnati, WILLIAM SCHWALM, Department of Physics, University of North Dakota — A detailed study of linear-wave dynamics on a family of finitely ramified, hierarchical lattices that includes the modified rectangle of Dhar shows that the spectrum contains only a continuum with a smooth local density of states. This is in contrast with the typical spectrum associated with linear-wave models on finitely ramified fractals, like the Sierpiński lattice, that consist of a Cantor-like portion with a sequence of isolated eigenvalues sitting in the gaps of the Cantor set. In addition, at random energy the Greenwood-Peierls conductance shows metallic behavior rather than tending to zero with increasing lattice size either exponentially (strong localization or superlocalization faster than exponential) or as a power law (weak localization). Both the modified rectangle of Dhar and modified cube demonstrate these novel properties and suggest the possibility of cross-over as a function of energy between metallic and insulating regimes.

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