Anderson Localization for radial tree-like random quantum graphs

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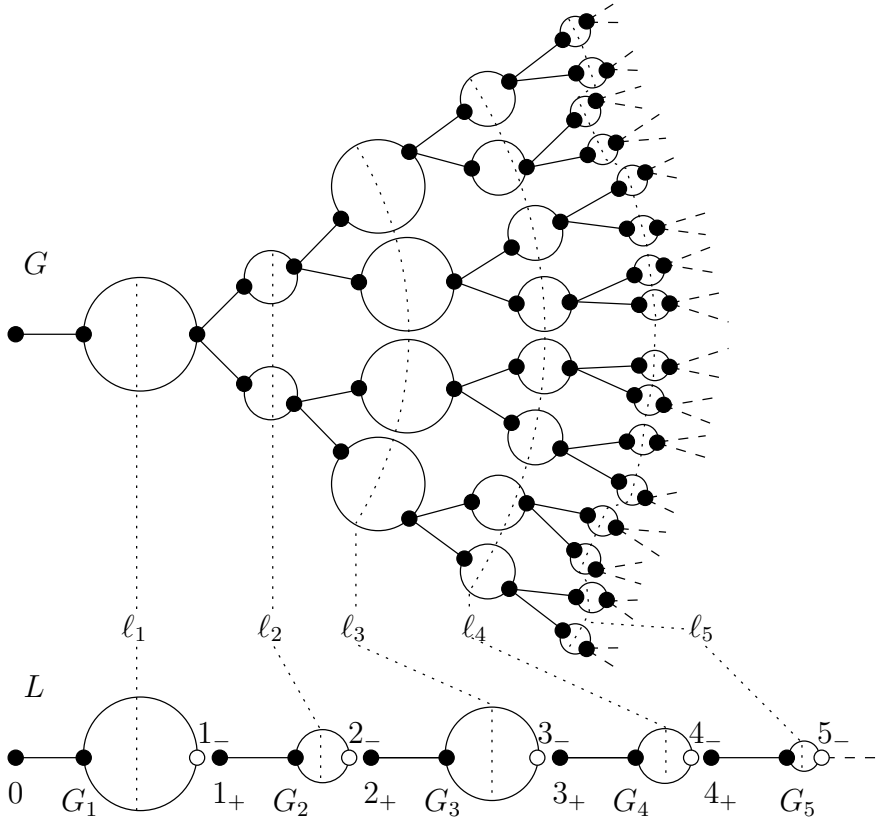
We prove that certain random models associated with radial, tree-like, rooted quantum graphs exhibit Anderson localization at all energies. The two main examples are the random length model (RLM) and the random Kirchhoff model (RKM). In the RLM, the lengths of each generation of edges form a family of independent, identically distributed random variables (iid). For the RKM, the iid random variables are associated with each generation of vertices and moderate the current flow through the vertex. We consider extensions to various families of decorated graphs (cf. Figure below) and prove stability of localization with respect to decoration. In particular, we prove Anderson localization for the random necklace model. The symmetry of radial tree-like graphs allows us to formulate the problem as a problem on a one-dimensional (line-like) graph. This is a joint work with Peter D. Hislop.



A tree-like graph G with a necklace decoration. The random variable ℓ_n in each generation n is the length of the edges of the necklace decoration.