

Quantum graphs

Jon Harrison

Pizza talk 4/28/23

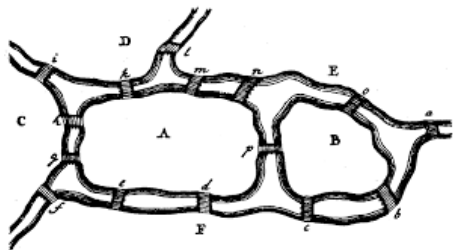
Graphs



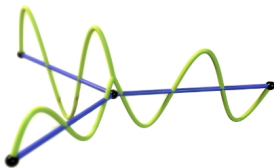
Graphs



Graphs

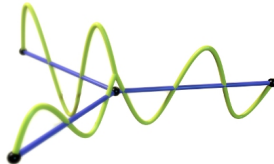


Self-adjoint Hamiltonians acting on functions defined on a quasi-one-dimensional network of intervals.

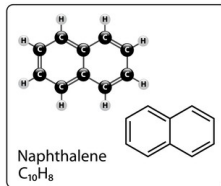


Quantum graphs

Self-adjoint Hamiltonians acting on functions defined on a quasi-one-dimensional network of intervals.



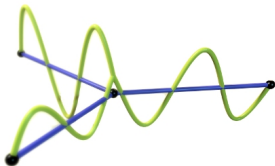
- Free electrons in organic molecules (Pauling '36)



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Quantum graphs

Self-adjoint Hamiltonians acting on functions defined on a quasi-one-dimensional network of intervals.

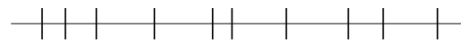


- Superconducting networks
- Photonic crystals
- Nanotechnology
- Quantum chaos
- Anderson localization

Dynamics and quantum graphs



quantum graph
spectrum

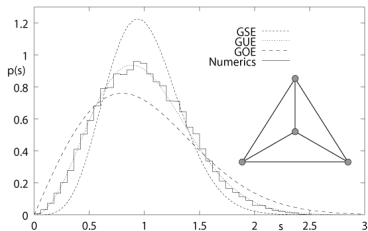
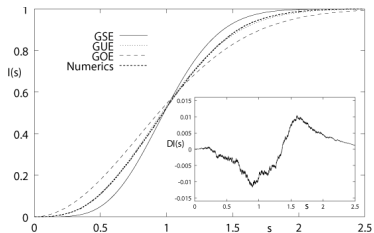


eigenvalues of a
random matrix



uniform random
numbers

Quantum chaos



Conjecture 1 (Bohigas-Giannoni-Schmit '84)

In the high energy limit energy level statistics of a quantum system whose classical analogue is chaotic correspond to eigenvalue statistics of random matrix ensembles.