Guided quantum dynamics

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This minicourse is devoted to the quantum graphs and waveguides, that is, quantum dynamics in the situation when the motion is localized in one direction while in the other(s) the system is allowed to propagate. We consider different types of the transverse localization, a hard wall represented by Dirichlet condition, or trapping by a potential, a regular or singular one. We are concerned primarily in relations between the geometry and topology of the confinement on the one hand, and the spectral and transport properties of the these systems on the other. A brief overview of the minicourse:

Lecture I: Quantum graphs, where they come from and what they are good for. Resonances and spectral gaps

Lecture II: Quantum waveguides and layers. Spectral and scattering properties coming from their geometry

*L*ecture III: Taking quantum tunneling into account: leaky graphs and soft waveguides

*L*ecture IV: Graphs violating the time-reversal invariance, and what that means for their spectral and transport properties

*L*ecture V: Spectral optimization of graphs and waveguides. Effects of magnetic fields. Summary and outlook

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