Analysis and PDE
Seminar

Wave decay for star-shaped waveguides

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Abstract: Let $\Omega \subset \mathbb{R}^d$ be an unbounded open set. We wish to understand how decay of solutions to the wave equation on Ω is related to the geometry of Ω.

When $\mathbb{R}^d \setminus \Omega$ is bounded, this is the celebrated obstacle scattering problem. Then a particularly favorable geometric assumption, going back to the original work of Morawetz, is that the obstacle is star shaped. We adapt this assumption to the study of waveguides, which are domains bounded in some directions and unbounded in others, such as tubes or wires. We prove sharp wave decay rates for various waveguides, including the example of a disk removed from a straight planar waveguide, that is to say $\Omega = ((-1,1) \times \mathbb{R}) \setminus D$, where D is a closed disk contained in $(-1,1) \times \mathbb{R}$. Our results are based on establishing estimates and pole-free regions for the resolvent of the Laplacian near the continuous spectrum.

This talk is based on joint work with Tanya Christiansen.

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