Inverse boundary value problems for quasilinear hyperbolic equations on Lorentzian manifolds

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Abstract: Inverse problems of recovering the metric and nonlinear terms were originated in the work by Kurylev, Lassas, and Uhlmann for the semilinear wave equation $\Box_g u(x) + a(x)u^2(x) = f(x)$ in a manifold without boundary. The idea is to use the linearization and the nonlinear interactions of distorted planes waves to produce point-source-like singularities in an observable set. In this talk, I will discuss joint works with Gunther Uhlmann which considers the recovery of the metric or nonlinearity terms for two different quasilinear nonlinear wave equations on Lorentzian manifolds with boundary. The main difficulty that we need to handle here is caused by the presence of the boundary.

Our works build on the previous results and I will discuss our methods to overcome the difficulties.