

## Some inverse problems in Lorentzian geometry

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**Abstract:** We consider the recovery of Lorentzian metrics from the observation of light signals or null geodesics. The problem is partly motivated by applications in general relativity. On the linearization level, such problem is related to the light ray transform on Lorentzian manifolds, which concerns the integral of functions along null geodesics. We discuss some recent developments. Then we consider a scattering rigidity problem in the Lorentz setting: for small metric perturbations of the Minkowski space, we show that the scattering relation of null geodesics between two Cauchy surfaces determines the metric perturbation under certain conditions.