Rigidity of Lorentzian Metrics with the Same Scattering Relations

Yiran WANG

Department of Mathematics, Emory University, USA

Email: yiran.wang@emory.edu

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. More precisely, for small metric perturbations of the Minkowski spacetime, we show that the scattering relation of null geodesics between two Cauchy surfaces determines the metric perturbation under certain conditions. 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 also discuss some recent developments.