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Reconstruction of Lorentzian manifolds from boundary light observation sets. (English)
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Summary: On a time-oriented Lorentzian manifold \((M, g)\) with nonempty boundary satisfying a convexity assumption, we show that the topological, differentiable, and conformal structure of suitable subsets \(S \subset M\) of sources is uniquely determined by measurements of the intersection of future light cones from points in \(S\) with a fixed open subset of the boundary of \(M\); here, light rays are reflected at \(\partial M\) according to Snell’s law. Our proof is constructive, and allows for interior conjugate points as well as multiply reflected and self-intersecting light cones.

MSC:
53B30 Local differential geometry of Lorentz metrics, indefinite metrics
53B50 Applications of local differential geometry to the sciences

Keywords:
topological, differentiable, and conformal structure; future light cones; light rays; multiply; self-intersecting light cones

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