The causal boundary under the action of isometric group actions

Jónatan Herrera Fernández

Departamento de Matemáticas, Universidad de Córdoba, Spain.
jonatanhf@gmail.com

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ABSTRACT

We discuss how an isometry group G acting freely and properly discontinuously on a spacetime V affects its causal completion. Concretely, we study the principal covering projection $\pi : V \to M$, where $M = V/G$ is again a Lorentz manifold with the induced metric. We show, by means of an example, that such a map cannot be extended in general to the corresponding causal completions. However, under certain mild hypotheses we can ensure both the existence of such an extension and its continuity. Moreover, the extended map allows us to define a homeomorphism which is also a chronological isomorphism between the causal completion of M and a suitable quotient of the causal completion of V. Finally, we present some applications of this result by considering certain isometric group actions over Robertson-Walker spacetimes, including the Anti-de Sitter model.

This presentation is based on joint work with L. Aké (U. Málaga) [1].

References

[1] L. Ake, J. Herrera, *Spacetime coverings and the causal boundary.* Journal of High Energy Physics (2017) 2017:51.