Preprint Series in Particles and Cosmos Physics

nº IPARCOS-UCM-24-015

INSTITUTO DE FÍSICA
DE PARTÍCULAS Y DEL COSMOS

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Particle detectors under chronological hazard

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February 2024

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Abstract

We analyze how the presence of closed timelike curves (CTCs) characterizing a time machine can be discerned by placing a local particle detector in a region of spacetime which is causally disconnected from the CTCs. Our study shows that not only can the detector tell if there are CTCs, but also that the detector can separate topological from geometrical information and distinguish periodic spacetimes without CTCs (like the Einstein cylinder), curvature, and spacetimes with topological identifications that enable time machines.

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