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The Conjugate Loci and Cut Loci on Simply-Connected Lorentzian Symmetric Spaces

We study conjugate loci and cut loci of Lorentzian symmetric spaces. We prove that if M_1 is a connected simply connected Lorentzian symmetric space of the form $\mathbb{R} \times M$, $D \times M$, and $C \times M$, where M is a connected simply connected compact Riemannian symmetric space, D is the universal covering of the de Sitter space-time with dimension ≥ 3 , and C is a Cahen-Wallach manifold, then for any given point $x \in M_1$, all future (past) nonspacelike cut loci and the locus of first future (past) nonspacelike conjugate loci coincide.

Keywords: Lorentzian symmetric spaces, conjugate loci, cut loci, de Sitter spaces, Cahen-Wallach manifolds.

MSC: 22E46, 53C30