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RESEARCH ANNOUNCEMENTS

The purpose of this department is to provide early announcement of significant new results, with some indications of proof. Although ordinarily a research announcement should be a brief summary of a paper to be published in full elsewhere, papers giving complete proofs of results of exceptional interest are also solicited. Manuscripts more than eight typewritten double spaced pages long will not be considered as acceptable. All research announcements are communicated by members of the Council of the American Mathematical Society. An author should send his paper directly to a Council member for consideration as a research announcement. A list of the members of the Council for 1971 is given at the end of this issue.

CAUSALLY ORIENTED MANIFOLDS AND GROUPS

BY IRVING SEGAL[1]

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A C^∞ manifold is said to be *causally oriented* if there is given in the tangent plane at each point p a nontrivial convex cone defined locally by C^∞ inequalities. A *time-like arc* is an oriented C^∞ curve whose forward tangent at each point lies in $C(p)$; the manifold is *strongly causal* if no nontrivial time-like arc is closed. There is then a partial ordering $x<y$ on M, defined by the existence of a nontrivial time-like arc with initial point x and terminal point y. If neither $x<y$ nor $y<x$, x and y are *incommunicable*; a *space-like submanifold* is a submanifold, any two of whose points are incommunicable. These notions are in part abstractions of some of those treated in [1].

A temporal displacement T is an automorphism of (M, C) such that either $x<Tx$ for all $x\in M$ ("forward displacement"), or $Tx<x$ for all $x\in M$, or $Tx=x$ for all $x\in M$. A causally oriented manifold (M, C) is said to be *homogeneous* if there exists a maximal space-like surface S, on which the subgroup of automorphisms leaving S fixed as a set is transitive, both on the points of S and on the directions at each point and a smooth one-parameter group T_t of temporal displacements such that $M=\bigcup_{t\in R^1} T_t(S)$.

THEOREM. *The finite coverings of the conformal compactification* [2] $\overline{M}$ *of n-dimensional Minkowski space-time M admit causal orientations compatible with that in Minkowski space, but are not strongly causal.*

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