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Einstein's Equivalence Principle. An Explicit Statement and Its Derivation from Special Relativistic Presymmetry*

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Abstract. We propose a statement of the observable implications of the equivalence principle that is precise and general rather than allusive and illustrative. This statement is derived from previously formulated principles of special-relativistic presymmetry. The substantial identity of our result with Einstein's curved-space formulation is exhibited.

1. Introduction

This paper challenges the traditional view that the equivalence principle conflicts with special relativity and requires a nonlinear space-time. The principle of special relativity was stated in an operationally explicit manner, including external fields, in previous papers [1–4]. The assumptions, slightly augmented, are used to derive a result which, we believe, is a more explicit form of Einstein's equivalence principle.

The idea that many results of Einstein's theory can be obtained within the framework of Minkowski space M is, of course, not new. The equivalence principle in its general form has, however, not been among the results so obtained.

Our approach is inspired by algebraic local quantum field theory. In addition to the algebra $\mathscr{A}$ of observables we find it necessary to use an algebra $\mathcal{O}$ of observation procedures of which $\mathscr{A}$ is a homomorphic image. The principal difference between these two algebras is the requirement that two local subalgebras $\mathcal{O}(R_1)$ and $\mathcal{O}(R_2)$ associated to nonintersecting space-time regions R_1 and R_2 have only a trivial (scalar)

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