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Crossing Relations Derived from (Extended) Relativity

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Abstract

Recently, Special Relativity has been straightforwardly extended to Superluminal inertial frames and faster-than-light objects. The 'Extended Relativity' theory not only allowed building up a self-consistent 'classical theory' of tachyons, but reveals itself useful also for the understanding of standard (subluminal) physics, i.e. of usual particles. In this paper, it is shown that Extended Relativity allows: (i) deriving the usual 'Crossing Relations' of elementary particle (high-energy) physics; and (ii) deriving the CPT-covariance theorem as a particular case of G-covariance (i.e., covariance under the new group of Generalised Lorentz transformations, both subluminal and Superluminal).

In this framework, the 'Analyticity' postulate is unnecessary: it is better substituted by the G-covariance requirement.

Moreover, new 'crossing-type' relations are predicted on the basis of mere Extended Relativity. They may well serve as a test for relativistic covariance of 'force fields' like strong interactions and, particularly, weak interactions, and possible new 'interaction fields' (which *a priori* are not relativistically covariant).

1. *Introduction*

1.1. *Extended Relativity*

Recently, Special Relativity (SR) has been straightforwardly extended (Parker, 1969; Mignani & Recami, 1973a, 1973b, 1973c; Recami, 1973; Recami & Mignani, 1974) to Superluminal inertial frames and to faster-than-light objects (tachyons).* Extended relativity immediately allowed building up a 'classical theory' of tachyons (Baldo *et al.*, 1970; Recami & Mignani, 1972; Mignani & Recami, 1973a, 1973b, 1973c, 1973d; Recami, 1973; Recami & Mignani, 1974).

However, here we want to deal with the consequences that Extended

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* *Note added in proofs*: Different theories have been proposed (Antippa & Everett, 1973; Goldoni, 1973) but these theories, however, *violate* the usual postulates of relativity.