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COEXISTENCE OF QUANTUM THEORY AND SPECIAL RELATIVITY IN SIGNALING SCENARIOS

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Abstract

The coexistence between Quantum Mechanics and Special Relativity is usually formulated in terms of the no-signaling condition. Several authors have even suggested that this condition should be included between the basic postulates of Quantum Theory. However, there are several scenarios where signaling is, in principle, possible: based on previous results and the analysis of the relation between unitarity and signaling we present an example of a two-particle interferometric arrangement for which the dynamics is, in principle, compatible with superluminal transmission of information. This type of non-locality is not in the line of Bell's theorem, but closer in spirit to the one-particle acausality studied by Hegerfeldt and others. We analyze in this paper the meaning of this non-locality and how to preserve the coexistence of the two fundamental theories in this signaling scenario.