Abstract Submitted
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On nonlocal, causal quantum field theory, applied to tachyonic neutrinos MAREK RADZIKOWSKI, Dept. of Physics and Astronomy, UBC — Presented is a framework for viewing nonlocal behaviour in the context of quantum field theory, while maintaining a consistent semblance of causality. The framework is comprised of a model for a Klein-Gordon quantum field theory of tachyons on Minkowski spacetime, without exponentially growing modes, and yet with a sensible notion of causality. (The latter may be expressed as a "no antitelephones" or "chronology protection" property.) A criterion for the two-point function of the model, known as the "microlocal spectral condition", is found to be satisfied, suggesting a straightforward inclusion of the free QFT within a renormalizable interacting theory involving other particles (regular or tachyonic). Parity breaking is satisfied for the Dirac version at the free QFT level, suggesting an electroweak interaction involving only V coupling, assuming the tachyonic neutrino hypothesis of Chodos, Hauser and Kostelecky. Lorentz symmetry is necessarily spontaneously broken, requiring the notion of a "tachyon" frame, first developed by Ciborowski and Rembielinski. Such a "tachyon frame", viewed as respecting the principles of relativity, may be of use in describing other candidate nonlocal phenomena, e.g., as seen in quantum entanglement experiments.

Marek Radzikowski
Dept. of Physics and Astronomy, UBC

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