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ELECTROWEAK STANDARD MODEL WITH VERY SPECIAL RELATIVITY

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Abstract

The Very Special Relativity Electroweak Standard Model (VSR EW SM) is a theory with $SU(2)_L \times U(1)_R$ symmetry, with the same number of leptons and gauge fields as in the usual Weinberg-Salam (WS) model. No new particles are introduced. The model is renormalizable and unitarity is preserved. However, photons obtain mass and the massive bosons obtain different masses for different polarizations. Besides, neutrino masses are generated. A VSR invariant term will produce neutrino oscillations and new processes are allowed. In particular, we compute the rate of the decays $\mu \to e + \gamma$. All these processes, which are forbidden in the Electroweak Standard Model, put stringent bounds on the parameters of our model and measure the violation of Lorentz invariance. Violations of Lorentz invariance have been predicted by several theories of Quantum Gravity. It is a remarkable possibility that the low energy effects of Lorentz violation induced by Quantum Gravity could be contained in the non-local terms of the VSR EW SM.

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