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Theory and Tests of Lorentz Violation

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Lorentz invariance is a key feature of our present theories of nature, including General Relativity and the Standard Model. However, this symmetry may be broken in a more fundamental theory that unifies gravity with quantum physics. Whatever the origin of the breaking, the ensuing physical effects at accessible scales are described by the Standard-Model Extension, which is the effective field theory for general Lorentz and CPT violation. Observable signals are potentially within the reach of existing technology, and they are actively being sought in numerous sensitive experiments.