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**Alternative theories of gravity and Lorentz violation**  
RUI XU, INDIANA UNIVERSITY, JOSHUA FOSTER, UNIVERSITY OF MICHIGAN, V. ALAN KOSTELECKY, INDIANA UNIVERSITY — General relativity has achieved many successes, including the prediction of experimental results. However, its incompatibility with quantum theory remains an obstacle. By extending the foundational properties of general relativity, alternative theories of gravity can be constructed. In this talk, we focus on fermion couplings in the weak-gravity limit of certain alternative theories of gravity. Under suitable experimental circumstances, some of these couplings match terms appearing in the gravitational SME, which is a general framework describing violations of local Lorentz invariance. Existing limits on Lorentz violation can therefore be used to constrain certain Lorentz-invariant alternative theories of gravity.

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