



GRAVITY: CHALLENGES BEYOND GENERAL RELATIVITY

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The Fate of Matter Fields in Metric-Affine Gravity

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General relativity (GR) exists in different formulations. They are equivalent in pure gravity but generically lead to distinct predictions once matter is included. After a brief overview of various versions of GR, I will focus on metric-affine gravity, which avoids any assumption about the vanishing of curvature, torsion, or nonmetricity. With a view toward the Standard Model, we can construct a generic model of (complex) scalar, fermionic, and gauge fields coupled to GR and derive an equivalent metric theory, which features numerous new interaction terms. There are multiple phenomenological consequences, which I will detail: an improved setting for Higgs inflation, a new (purely gravitational) production channel for fermionic dark matter, and an outlook on axion inflation.

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