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Coupling metric-affine gravity to a Higgs-like scalar field

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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, we focus on metric-affine gravity, which avoids any assumption about the vanishing of curvature, torsion, or nonmetricity. We use it to construct an action of a scalar field coupled nonminimally to gravity. It encompasses as special cases numerous previously studied models. Eliminating nonpropagating degrees of freedom, we derive an equivalent theory in the metric formulation of GR. Finally, we give a brief outlook of implications for Higgs inflation.

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