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Cosmological tests of modified gravity vs. dark energy

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Modifications of general relativity provide an alternative explanation to dark energy for the observed acceleration of the universe. We examine the relationships between perturbations in the metric potentials, density and velocity fields, and discuss strategies for measuring them using gravitational lensing and other probes of large-scale structure. We show how a broad class of gravity theories can be tested by combining these probes. The possible clustering of dark energy can mimic features of modified gravity theories. We consider the question: how conclusively can signatures of modified gravity be established in upcoming observational tests.