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Testing Modified Gravity in Cosmology: a few Phenomenological and Theory-Specific Study Cases

Wednesday 25 June 2025 14:00 (25 minutes)

In this talk I will review how modified gravity parametrizations can, in principle, be exploited to not only test general relativity, but also tackle the problematic tensions that riddle cosmology in its current state, considering these issues by the point of view of both background observables and perturbations. More precisely, I will aim to provide insight into questions such as: can phenomenological modifications in the growth of the large-scale structure, introduced at the linear level of the perturbation equations of general relativity, be detected or detectable by current and future cosmological data, such as the weak lensing of the cosmic microwave background photons? To which extent are modifications to the Hubble expansion rate, within f(R) and f(R, T) theories, valid and useful to resolve the Hubble tension, according to supernovae and baryonic acoustic oscillations data? I will tackle these questions by looking at possible 'slips'away from general relativity in cosmic microwave background data, by means of both inference and reconstruction of μ_0 and Σ_0 , two phenomenological parameters that introduce such 'slips'in the Poisson and lensing equations from general relativity. I will then move onto two specific examples of the f(R) and f(R, T) theories of modified gravity, describing how they can modify the standard model's expansion history and whether current data point to any such deviations from the accepted paradigm.

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