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Constraining the time evolution of gravitational couplings with the CMB

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The idea that the strength of gravity may have evolved over cosmic history has attracted considerable attention for several decades. This possibility is often thought of in terms of modified theories of gravity, where, for example, the gravitational coupling is controlled by some new fundamental field. The best constraints to date on the present-day time variation of Newton's constant are obtained from Solar System experiments. They correspond to specific parameters, called the parameterised post-Newtonian (PPN) parameters, that are defined to test gravity in astrophysical settings. Some attempts have been made to study the cosmological evolution of G , but it is not clear that they refer to the PPN parameters rather than to some other coupling. I will present novel constraints on the time variation of the PPN parameters over cosmic history, using data from the cosmic microwave background. These constraints can be combined directly with astrophysical constraints.

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