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Can dark energy emerge from a varying G and spacetime geometry?

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The accelerated expansion of the Universe implies the existence of an energy contribution known as dark energy. Associated with the cosmological constant in the standard model of cosmology, the nature of this dark energy is still unknown. In this talk I will discuss an alternative gravity model in which this dark energy contribution emerges naturally, as a result of allowing for a time-dependence on the gravitational constant, G, in Einstein Field Equations. With this modification, Bianchi identities require an additional tensor field to be introduced so that the usual conservation equation for matter and radiation is satisfied. The equation of state of this tensor field is obtained using additional constraints, coming from the assumption that this tensor field represents the space-time response to the variation of G. I will also present the predictions of this model for the late Universe data, and show that the energy contribution of this new tensor is able to explain the accelerated expansion of the Universe without the addition of a cosmological constant. Unlike many other alternative gravities with varying gravitational strength, the predicted G evolution is also consistent with local observations and therefore this model does not require screening. I will finish by discussing possible other implications this approach might have for cosmology and some future prospects.

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