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Scaling Solutions in Generalized Proca Theory and its Cosmological Implications

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In the framework of the generalized Proca theories, we derive for the first time the most general Lagrangian allowing for scaling solutions between dark energy and cold dark matter. At background level, we highlight two interesting features for this novel model. Firstly, although its equation of state of is exactly -1, the dark energy component has a dynamical behaviour due to its coupling with the cold dark matter. Secondly, the existence of an attractor point where the scaling condition holds and the universe can undergo accelerated expansion. At the perturbative level, we derive the growth equation for cold dark matter under the sub-horizon and quasi-static approximations. The solutions of this equation show that the strength of gravity can vary at late times, where the differences with respect to the concordance model depend on the parameters of the novel model.

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