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Arbitrarily coupled p -forms in cosmological backgrounds

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In this talk we consider a model based on interacting p -forms and explore some cosmological applications. Restricting to gauge invariant actions, we build a general Lagrangian allowing for arbitrary interactions between the p -forms (including interactions with a 0-form, scalar field) in a given background in D dimensions. For simplicity, we restrict the construction to up to first order derivatives of the fields in the Lagrangian. We discuss with detail the four dimensional case and devote some attention to the mechanism of topological mass generation originated by the coupling $B \wedge F$ between a 1-form and a 2-form. As a result, we show the system of the interacting p -forms ($p = 1, 2, 3$) is equivalent to a parity violating, massive, Proca vector field model. Finally, we present a minimalistic cosmological scenario composed by a 3-form coupled to a 0-form. We study the dynamics of the system and determine its critical points and stability. Among the results, we show that this system offers an interesting arena to cosmological applications, such as dark energy, due to the existence of scaling matter solutions.

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