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Topological mass generation and generalized 2-forms

Wednesday 23 September 2020 14:00 (20 minutes)

In this talk we discuss the relation between topological mass generation of 2-forms and generalized Galileon theories for 2-forms involving the systematic construction of quartic Lagrangians in four dimensions. In terms of massless 1– and 2-forms A and B respectively, the mechanism of topological generation of mass arises as a consequence of the topological interaction term $B \wedge F$, where $F = \mathrm{d}A$ is the field strength of the 1–form. On the other hand, using the systematical Galileon construction it was shown that, apart from the quadratic and quartic Lagrangians, Galileon-like derivative self-interactions for the massive 2-form do not exist with the only exception of the quartic term $\epsilon^{\mu\nu\rho\sigma}\epsilon^{\alpha\beta\gamma}{}_{\sigma}\partial_{\mu}B_{\alpha\rho}\partial_{\nu}B_{\beta\gamma}$ which corresponds to a total derivative on its own but ceases to be so once an overall general function is introduced. Here we show that it exactly corresponds to the same interaction of topological mass generation. Based on the decoupling limit analysis of the interactions, we bring out supporting arguments for the uniqueness of such a topological mass term and absence of further Galileon-like interactions. Finally, we discuss some preliminary applications in cosmology, mostly related with non minimal coupling between gravity and 2−forms.

Author: BELTRAN, Juan Pablo (Universidad Nacional de Colombia)

Co-authors: VALENZUELA-TOLEDO, Cesar A. (Universidad del Valle); Dr GUARNIZO, Alejandro (Universidad Antonio Nariño)

Presenter: BELTRAN, Juan Pablo (Universidad Nacional de Colombia)

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