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Constraining the Generalized SU(2) Proca theory at minimal cost

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Under the same spirit of the Galileon-Horndeski theories, the generalized SU(2) Proca theory was built by demanding that its action is, by construction, free of the Ostrogradski instability. Moreover, it still requires a more exhaustive analysis to guarantee its stability, and therefore to ensure its viability from the theoretical point of view. As a first approach to address this issue, we investigate the general conditions for the absence of ghost and gradient instabilities in the tensor sector. Furthermore, we evaluate the conditions under which the speed of gravitational waves is consistent with recent LIGO/Virgo observations. Thus, in order to fulfill all these restrictions simultaneously, we seek for a suitable parameter space for different combinations of pieces of the SU(2) Lagrangian. From here we determine concrete relations between the coupling constants of the theory and conditions for the gauge field in terms of such constants. Thereby we conclude that, analysis only of the tensor sector constrain this theory without resolving the dynamical cosmological background. The phenomenological interest of these results lies on the possibility of building models driven by solely non-Abelian vector fields.

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