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Generalized SU(2) Proca theory reloaded and beyond

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As a modified gravity theory that introduces new gravitational degrees of freedom, the generalized SU(2) Proca theory (GSU2P for short) is the non-Abelian version of the well known generalized Proca theory where the action is invariant under global transformations of the SU(2) group. This theory was formulated for the first time in Phys. Rev. D 94 (2016) 084041, having implemented the required primary constraint to make the Lagrangian degenerate and remove one degree of freedom from the vector field in accordance with the irreducible representations of the Poincaré group. It was later shown in Phys. Rev. D 101 (2020) 045009 that a secondary constraint, which trivializes for the generalized Proca theory but not for the SU(2) version, was needed to close the constraint algebra. It is the purpose of this talk to implement this secondary constraint in GSU2P and to make more transparent the construction of the theory. Since several terms in the Lagrangian were dismissed in Phys. Rev. D 94 (2016) 084041 via their equivalence to other terms through total derivatives, not all of the latter satisfying the secondary constraint, the work was not so simple as directly applying the secondary constraint to the resultant Lagrangian pieces of the old theory. Thus, we were motivated to reconstruct the theory from scratch. In the process, we found the beyond GSU2P.

Authors: RODRIGUEZ GARCIA, Yeinzon (UAN & UIS (Colombia)); GOMEZ, gabriel; GALLEGO CADAVID, ALEXANDER

Presenter: RODRIGUEZ GARCIA, Yeinzon (UAN & UIS (Colombia))

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