

Service de Physique de l'Univers, Champs et Gravitation

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Sujet de mémoire

## Interactions of massive spin-3/2 fields in the BRST-BV approach

The Lagrangian for a free spin-3/2 particle was studied by Rarita and Schwinger in [1]. Since the advent of supergravity in the late seventies, massless spin-3/2 fields have been extensively studied, together with their couplings to gravity and vector gauge fields. Masslessness imposes stringent constraints on the possible interactions, as proved recently in [2]. Paradoxically, interactions between a *massive* spin-3/2 and itself or with gravity/gauge fields have been less studied.

Recently, the problem of constructing interactions among a set of massive spin-1 fields and massive spin-2 fields has been considered in the BRST-BV approach [3]. This approach enabled to prove the uniqueness of massive gravity [4] and has shed light on the nature of this theory.

The project of this master thesis is to use the BRST-BV method of [3] and apply it to the problem of interactions of massive spin-3/2 fields.

**Prerequisites:** “Théorie des groupes” S-PHYS-201, “Relativité générale” S-PHYS-053 and “Théorie quantique des champs I” S-PHYS-049

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## References

- [1] W. Rarita and J. Schwinger, “On a theory of particles with half integral spin,” *Phys. Rev.* **60** (1941), 61
- [2] N. Boulanger, B. Julia and L. Traina, “Uniqueness of  $\mathcal{N} = 2$  and 3 pure supergravities in 4D,” *JHEP* **04** (2018), 097 [arXiv:1802.02966 [hep-th]].
- [3] N. Boulanger, C. Deffayet, S. Garcia-Saenz and L. Traina, “Consistent deformations of free massive field theories in the Stueckelberg formulation,” *JHEP* **07** (2018), 021 [arXiv:1806.04695 [hep-th]].
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