

Electromagnetism and hidden vector fields in modified gravity theories: Spontaneous and induced vectorization

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In general relativity, Maxwell's equations are embedded in curved spacetime through the minimal prescription, but this could change if strong-gravity modifications are present. We show that with a nonminimal coupling between gravity and a massless vector field, nonperturbative effects can arise in compact stars. We find solutions describing stars with nontrivial vector field configurations, some of which are associated with an instability, while others are not [1]. The vector field can be interpreted either as the electromagnetic field, or as a hidden vector field weakly coupled with the standard model.

[1] L. Annulli, V. Cardoso, and L. Gualtieri, Phys. Rev. **D99**, 044038 (2019), arXiv:1901.02461 [gr-qc].