Contribution ID: **7** Type: **not specified**

Frame dragging effect around slowly rotating stars in modified gravity theories

Thursday 21 September 2023 14:00 (30 minutes)

We study the frame-dragging effect in the context of slowly rotating stars in Horndeski theory (HT), Generalized Proca theory (GPT) and Generalized SU(2) Proca theory (GSU2P). The last two differ in that while GPT does not have internal simmetries, the GSU2P is invariant under SU(2) group of global transformations. The frame-dragging effect occurs when a rotating compact object distorts spacetime and inertial observers are dragged along when they are in free fall from infinity. James Hartle developed a methodology to study this effect for slowly rotating stars in General Relativity (GR) through a perturbative treatment of the GR's field equations in powers of ^{2} , being the angular velocity of the star. Applying the same methodology, we find that deviations from GR are very tiny in HT; these results holds for both, the interior and exterior regions of the star. For the GPT and GSU2P, we find important deviations from GR which exhibit the role that the vector field plays in the gravitational interaction for both theories. We also find constraints in the relevant modified gravity couplings which could be compared with possible future results from multimessenger astronomy.

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