Constraining models of extended theories of gravity with Terrestrial and Astrophysical Experiments

PhD thesis abstract

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In this Thesis we report a general review of Extended Theories of Gravity and the fundamental aspects of General Relativity. We show the technicality of development of field equation with respect to Newtonian, Post-Newtonian approach and the post-Minkowskian limit. We analyse also the problem of how conformally transformed models behave in the weak field limit approximation. This issue could be extremely relevant in order to select conformally invariant physical quantities. The photon deflection is considered in the framework of the Newtonian Limit of a general class of $f\left(R, R_{\alpha\beta}R^{\alpha\beta}, R_{\alpha\beta\gamma\delta}R^{\alpha\beta\gamma\delta}\right)$- Gravity where f is an unspecific function of the Ricci scalar R, Ricci tensor square $R_{\alpha\beta}R^{\alpha\beta}$ and Riemann tensor square $R_{\alpha\beta\gamma\delta}R^{\alpha\beta\gamma\delta}$.

Studying in the weak-field approximation - Newtonian and Post-Newtonian limit - the *geodesic* and *Lense-Thirring* processions by using the recent experimental results of the Gravity Probe B and LARES satellite and using the damping of the orbital period of coalescing stellar binary systems, we impose constraints on the free parameters of such models of Extended Theories of Gravity.