Título/Title:
Exploring the impact of modifications of gravity law on cosmological observables

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Descrição/Description:
An outstanding problem faced by modern cosmology concerns cosmic acceleration, i.e. the phase of accelerated expansion recently entered by the Universe, for which we still lack a satisfactory theoretical explanation. Within the context of General Relativity, an accelerated expansion can be achieved adding an extra ingredient in the energy budget of the Universe, commonly referred to as dark energy. A different approach is to modify the law of gravity describing the Universe at large scales.
A plethora of models addressing the phenomenon of cosmic acceleration have been proposed and analyzed. Moreover, the ability to constrain various properties of cosmological models using observational data such as the anisotropies of the cosmic microwave background, the large scale structure of the galaxy distribution, the expansion and acceleration rate of the universe and other such quantities, has become an essential part of modern cosmology. A crucial aspect of this endeavour is to be able to accurately calculate a range of observables from the cosmological models. This is done with Einstein-Boltzmann (EB) solvers, i.e. codes that solve the linearized Einstein and Boltzmann equations on an expanding background. A popular EB code is CAMB which was developed to accurately model the standard cosmology, i.e. General Relativity with a cosmological constant. Recently, an extension of CAMB, dubbed EFTCAMB, has been developed with the purpose of testing a broad class of modified gravity theories.

In this project the student will study the basis of linear cosmological theory of gravity with application to modified gravity. He/she will be familiar with EB code, EFTCAMB and will investigate the deviations from the standard cosmological model of a specific modified gravity model, i.e. Hybrid metric Palatini f(R) gravity.