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Seminar of the theory group of APC

Mardi 24 Octobre 2017, 14 :00
APC, 483 A - Malevitch
Domaines : hep-th

Titre : *Two-body problem in modified gravities and EOB theory*

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Résumé : *The effective-one-body (EOB) approach has proven to be a very powerful framework to describe analytically the coalescence of compact binary systems in general relativity (GR). In this seminar, we address the question of extending it to the frame of modified gravities, focussing on the first building block of the EOB approach ; that is, mapping the conservative part of the two-body dynamics to the Hamiltonian of a single test particle in effective external fields.*

We first consider the example of massless scalar-tensor (ST) theories, whose two-body dynamics is known at second post Keplerian (2PK) order. Two distinct ST-EOB Hamiltonians will be proposed : (i) a ST-deformation of the general relativistic EOB Hamiltonian, which allows to incorporate scalar-tensor (2PK) effects as parametrized corrections to GR (parametrized EOB, or PEOB), and (ii) the Hamiltonian of a ST test-body problem, which is well suited to regimes that depart strongly from GR. Both ST-EOB Hamiltonians lead to simple (yet canonically equivalent) formulations of the conservative 2PK two-body problem, but also define two distinct resummations of the dynamics that may provide information on the strong-field regime ; in particular, the ISCO location and associated orbital frequency.

The class of Einstein-Maxwell-dilaton (EMD) theories, which provide simple examples of « hairy » black holes, will also be discussed. In particular, we compute the associated post-Keplerian two-body Lagrangian, and show that it can, as well, be incorporated within the parametrized effective-one-body (PEOB) framework.