ID de Contribution: **4** Type: **Non spécifié**

Innermost stable circular orbit of compact binaries at the fourth post-Newtonian order

mardi 3 juin 2025 16:45 (45 minutes)

We compute by means of post-Newtonian (PN) methods the innermost stable circular orbit (ISCO) of compact binaries. Two methods are used, with equivalent results: one based on the equations of motion in harmonic coordinates and one on the Hamiltonian formalism in ADM coordinates. The ISCO is deduced from an invariant stability criterion, extending the 3PN criterion of Blanchet and Iyer (2003) to the 4PN order. The heart of the derivation of this 4PN criterion is the study of the perturbation of the tail integrals appearing in the dynamics, which are non-local in time. We also explicitly show that the 4PN Lagrangian and 4PN Hamiltonian intermediate results are equivalent by deriving the relation between harmonic and ADM coordinates.

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