Energetics of two-body Hamiltonians in post-Minkowskian gravity

Andrea Antonelli*

* *Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Potsdam*

The post-Newtonian (PN) and post-Minkowskian (PM) approximations are complementary schemes that enable us to study relativistic binary systems. PN theory assumes weak fields and small velocities and is applicable to *bound* orbits. The PM approximation, valid for weak fields and arbitrary velocities, most naturally applies to *unbound*, scattering systems. It has been recently suggested that PM results (currently reaching 3PM order, i.e. G^3) can lead to improved models for the inspirals of bound systems, especially when taken as inputs for effective-one-body Hamiltonians. I present recent work (with A. Buonanno, J. Steinhoff, M. van de Meent and J. Vines, arXiv:1901.07102) towards exploring this possibility. We compare the binding energies of PN and PM Hamiltonians for a binary on a circular orbit against numerical-relativity (NR) predictions and assess their utility for waveform modeling. We find that, whereas 3PM results improve the agreement with NR with respect to 2PM, it is crucial to push PM calculations at higher orders to achieve better performances than state-of-the-art waveform models used in LIGO-Virgo data analysis.