

Harald Pfeiffer (Albert Einstein Institute, Potsdam)

Simulations of binary black holes and applications to gravitational wave astronomy

Abstract

The past two years have witnessed the advent of gravitational wave (GW) astronomy with observations of coalescing black hole binaries and a neutron star binary. GW astronomy relies on knowledge of the gravitational waveforms for a variety of tasks: To design the search strategies for detection of GWs, to infer properties of the coalescing compact objects, and also to test general relativity and to search for signatures of physics beyond classical general relativity. Direct numerical solutions to the full non-linear Einstein equations are the only means to study coalescing binaries in the non-linear and dynamic regime near merger of the compact objects. This talk will focus on numerical simulations of binary black holes. I will describe how such simulations are performed, and how we validate the results. I will furthermore indicate open challenges and the ongoing efforts to address them in the coming years.