

Are current binary black hole waveforms accurate enough for future detectors?

Michael Pürrer^{1,*} and Carl-Johan Haster²

¹*Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Am Mühlenberg 1, Potsdam 14476, Germany*

²*LIGO Laboratory and Kavli Institute for Astrophysics and Space Research,
Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA*

(Dated: March 11, 2019)

Future ground-based gravitational wave (GW) detectors, such as the Einstein Telescope and Cosmic Explorer, will have unprecedented sensitivities that will allow us to study the entire population of stellar mass binary black holes in the Universe, while the A+ and Voyager detectors will significantly improve over advanced LIGO & Virgo design sensitivities. To infer binary parameters from a GW signal we need accurate models of the gravitational waveform as a function of masses, spins, etc. Such waveform models are built from numerical relativity simulations and/or semi-analytical expressions in the inspiral. I will discuss up to which detector sensitivity current models will yield unbiased parameter estimates for typical binary black hole systems and what biases we can expect beyond and their implications for GW astrophysics.

* michael.puerrer@aei.mpg.de