Abstract Submitted
for the APR12 Meeting of
The American Physical Society

The Suitability of Hybrid Waveforms for Advanced Gravitational Wave Detectors ILANA MACDONALD, CITA/University of Toronto, SAMAYA NISSANKE, JPL/Caltech, HARALD PFEIFFER, CITA/University of Toronto — Detectors such as Advanced LIGO are expected to measure gravitational wave (GW) signals from compact binaries within the next few years. In order to be able to characterize this type of signal, these detectors require accurate waveform models, which can be constructed by fusing an analytical post-Newtonian (PN) inspiral waveform with a numerical relativity (NR) late-inspiral-merger-ringdown waveform. NR, though the most accurate model, is computationally expensive: the longest simulations to date taking several months to run. PN theory, an analytic approximation to General Relativity, is easy to compute but becomes increasingly inaccurate near merger. Because of this trade-off, it is important to determine the optimal length of the NR waveform, while maintaining the necessary accuracy for GW detectors. We present a study of the sufficient accuracy of PN and NR waveforms for the most demanding usage case: parameter estimation of strong sources in advanced gravitational wave detectors. We perform a comprehensive analysis of errors that enter such "hybrid waveforms" in the case of equal- and unequal-mass non-spinning binaries.

Ilana MacDonald
CITA/University of Toronto

Date submitted: 05 Jan 2012 Electronic form version 1.4