Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Statistical and systematic uncertainties in extracting the source properties of neutron star - black hole binaries with gravitational waves YIWEN HUANG, CARL-JOHAN HASTER, SALVATORE VITALE, Massachusetts Institute of Technology, VIJAY VARMA, Cornell University, FRANCOIS FOUCART, University of New Hampshire, SYLVIA BISCOVEANU, Massachusetts Institute of Technology — Gravitational waves emitted by neutron star black hole mergers encode key properties of neutron stars – such as their size, maximum mass and spins – and black holes. However, the presence of matter together with singularity makes generating long and accurate waveforms from these systems hard with numerical relativity, and not much is known about systematic uncertainties due to waveform modeling. We simulate gravitational waves from neutron star black hole mergers by hybridizing numerical relativity waveforms with a recent numerical relativity surrogate and analyze these signals with a range of available waveform families. We find that at a network signal-to-noise ratio (SNR) of 30, statistical uncertainties are usually larger than systematic offsets, while at an SNR of 70 the two become comparable. The individual black hole and neutron star masses, as well as the mass ratios, are typically measured very precisely, though not always accurately at high SNR. At a SNR of 30, the neutron star tidal deformability can only be bound from above, while for louder sources it may be measured and constrained away from zero. All neutron stars in our simulations are non-spinning, but in no case we can constrain the neutron star spin to be smaller than ~ 0.4 (90% credible interval).

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Date submitted: 07 Jan 2021 Electronic form version 1.4