Abstract Submitted
for the BPNMC18 Meeting of
The American Physical Society

Simulating Black Hole-Neutron Star Mergers[1] JENNIFER SANCHEZ, Cal State University, Fullerton, LIGO COLLABORATION, GRAVITATIONAL WAVES PHYSICS AND ASTRONOMY CENTER (GWPAC) TEAM
— Gravitational waves are ripples in space and time predicted by Einsteins theory of relativity; in 2015, Advanced LIGO observed these waves passing through Earth for the first time. Looking forward, we hope to observe black hole-neutron star mergers as they are the most exciting sources of gravitational waves since they are multi-messengers, emitting both electromagnetic and gravitational waves. Highly accurate mathematical descriptions of these waves are crucial for helping experiments to detect as many gravitational waves from merging black holes and neutron stars as possible, and to help determine whether observed gravitational waves are from merging black holes or from a black hole-neutron star merger. Using the Spectral Einstein Code, we are modeling black hole-neutron star mergers for different binaries, computing the emitted gravitational waves, the properties of the black hole before, during, and after the merger, and the behavior of the neutron-star matter as it is torn apart, forming a disk around the black hole. So far, we have focused on low-mass mergers with non-spinning black holes, a case where tidal effects on the emitted gravitational waves are especially strong. In the future, we will extend this work to rapidly spinning merging black holes.

[1]National Science Foundation Grants PHY-1606522, PHY-1654359, PHY-1429873, and AST-1559694.

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Date submitted: 15 Oct 2018 Electronic form version 1.4