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Enhancing Binary Neutron Stars Studies by Combining Inspiral and Postmerger Information

Recent discoveries of binary black holes by gravitational-wave detection hint at the opportunity of observing binaries containing neutron stars. Unlike with black holes alone, the presence of a neutron star can help us constrain the equation of state (EOS) of ultradense matter. The feasibility of constraining the equation of state through gravitational-wave detections have typically been studied using the inspiral and postmerger stages separately. We quantify the benefits of combining the inspiral and the postmerger stages when analysing binary neutron star signals. Moreover, we show that one can constrain the EOS by probing at what mass the merged object remains in an extended hyper-massive neutron star phase or promptly collapses into a black hole.

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