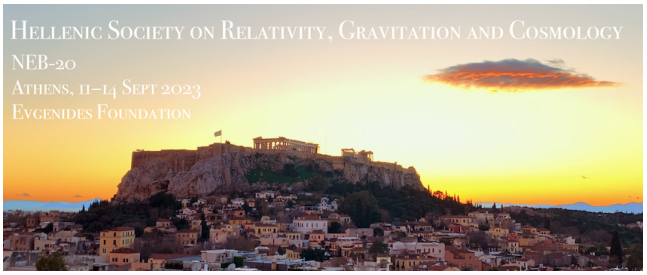

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Exploring the Potential for Detecting Dynamical Shear Instabilities in Neutron Star Merger Remnants with Future Gravitational Wave Detectors

Tuesday, 12 September 2023 12:00 (20 minutes)

We explore the potential for detecting low-$|T/W|$ rotational instabilities (known also as dynamical shear instabilities) with future gravitational wave observatories. Our study employs numerically generated post-merger waveforms, which reveal the re-excitation of the l=m=2 f-mode. We evaluate the detectability of these signals by injecting them into colored Gaussian noise. The signals are reconstructed as a sum of wavelets using Bayesian inference. Computing the overlap and the recovered frequency peak for various models and network configurations, we find that the instability part of the post-merger signal could be detectable by a network of 3G broadband detectors, if the distance is 40Mpc. For a newly suggested high-frequency detector, we find that the instability part is detectable even at 200 Mpc, significantly increasing the anticipated detection rate. For a network consisting of the existing HLV detectors, but upgraded to twice the A+ sensitivity, we confirm that the peak frequency of the whole post-merger gravitational-wave emission will be detectable with a network SNR of 8 at a distance of 40Mpc.

Primary author: SASLI, Argyro (Aristotle University of Thessaloniki)

Presenter: SASLI, Argyro (Aristotle University of Thessaloniki)

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