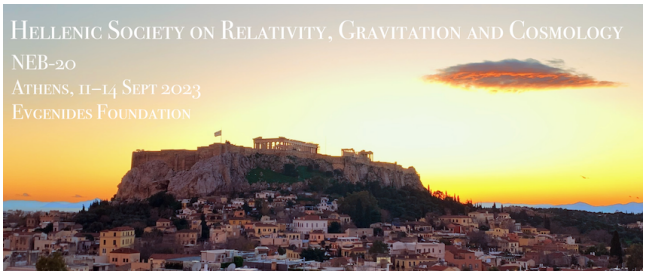

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Binary neutron star mergers with a non-convex equation of state

Thursday, 14 September 2023 17:40 (20 minutes)

Binary neutron star mergers can provide new insights about the equation of state (EoS) above supranuclear densities. Therefore many gravitational wave template banks are under construction. However, it has been suggested that a naive numerical treatment of regions where the sound speed has a non-monotonic dependence with the rest-mass density (the so-called non-convex regions), as the ones appearing during first-order hadron-quark phase transitions, may lead to wrong conclusions. We consider binary neutron star mergers undergoing merger. The stars are modeled using a phenomenological, non-convex EoS. Following merger, we identify an observable imprint of the appearance of non-convex regions on the gravitational waves. In particular, we observe that the appearance of these regions induce a significant shift in the GW fpeak with respect to that of a large set of convex, nuclear (piecewise) EoS. These changes in the GW frequency may be incorrectly interpreted as the imprint of ongoing physical processes in the binary remnant.

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