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The importance of neutron star oscillation modes in constraining the neutron star EoS and nuclear parameters from GW observations of binary and isolated neutron stars.

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Detection of Gravitational wave events involving neutron stars (NS) provides an excellent scenario for understanding the NS interior. In a binary system, the excitation of NS oscillation modes, such as rotational r-mode and fundamental f-mode, can draw energy from the orbital energy and introduce a phase shift in the observed GW waveform. The ignorance of such dynamical mechanisms can bias the inferred NS properties and hence the NS equations of state (EoS). We investigate how much bias one would expect due to ignorance of such dynamical oscillations on the NS properties and the nuclear parameters constrained over a population of binary neutron star mergers with the current and future GW detectors. Furthermore, the oscillation modes can be excited in isolated NSs, and their detection can reveal the NS interior. Assuming that the NS f-mode is excited during the pulsar glitches, we try to constrain the NS EoS and the nuclear parameters from the future detection of NS f-modes from potential glitch candidates.

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