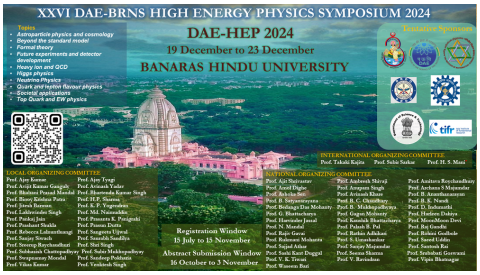

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The Role of Adiabatic Sound Speeds in Neutron Star Radial Oscillations and Stability

In gravitational wave astronomy, radial oscillations help to probe the internal structure and stability of neutron stars (NSs). This study examines static NS models with hadronic and hybrid equation of states (EOSs), focusing on the out-of-equilibrium fluid composition to analyze radial perturbations. Adiabatic sound speeds show smoother trends than equilibrium sound speeds, with the f-mode frequencies differing notably.
Our Mass-Radius analysis indicates that adiabatic conditions allow the stable branch to extend to higher masses, possibly explaining the radius measurements of high-mass NSs such as PSR J0740 + 6620. This extension of the stability limit for adiabatic cases solely depends on the compositions, the different EOSs carried with their models. These findings emphasize the importance of adiabatic effects on NS stability and dynamics, providing insights into observable properties and stability limits.

Field of contribution

Phenomenology

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