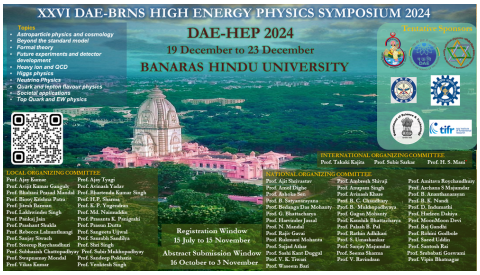

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f-mode universal relation of dark matter admixed quarkyonic stars.

The study of neutron stars (NSs) with dark matter (DM) admixture has gained interest due to its potential to reveal insights into exotic matter and fundamental interactions. Understanding how DM influences NS properties, particularly oscillatory behaviors like f-mode oscillations, is crucial, as these modes could provide observational signatures of DM's presence in such extreme environments. Quarkyonic matter, a phase that includes both quarks and nucleons in a crossover transition, satisfies key NS constraints, including maximum mass and radius, making it an suitable candidate for NS interiors. DM trapped within the NS's gravitational field, offers an opportunity to probe deeper into the internal structure of these compact objects and refine our understanding of the NS equation of state (EOS). In this work, we examine f-mode oscillations in NSs with DM-admixed quarkyonic star, investigating the influence of DM on oscillatory behavior and universal relations. We derive an EOS for DM-admixed quarkyonic stars, assuming nucleon-quark equilibrium within the relativistic mean-field (RMF) formalism. Key parameters, such as transition density (n_t), QCD confinement scale ($\Lambda_{\rm cs}$), and DM Fermi momentum ($k_f^{\rm DM}$), are varied to assess their impact on NS properties. Universal relations in the systematic study of f-mode oscillations (for $l = 2$) of dark matter admixed quarkyonic stars by using the Cowling approximation in linearized general relativity are found to persist.

Field of contribution

Phenomenology

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