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Asteroseismology of compact stars with nucleonic and strange-quark matter cores

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The fundamental and first two lowest-frequency excited modes of radial oscillation have been computed in the high nuclear density regime for a set of seven realistic equations of state (EoS) as functions of central energy density. Various types of zero-temperature EoS of cold nucleonic, hyperonic, and strange-quark matter models are used in the inner core to determine the internal structure in and around the hydrostatic equilibrium states and investigate the influence of each EoS on the dynamical behavior of non-rotating neutron stars. We confirm the principal results of earlier, related studies that suggest an underlying correlation between the frequency spectrum of the fundamental oscillation mode and the variation of the adiabatic index over the high nuclear-density regime. We provide valuable information to impose further constraints on the plausible set of realistic EoS models, in addition to the practical applications for the rapidly evolving field of asteroseismology of compact objects.

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Primary authors: Mr KACSKOVICS, Balázs (Wigner RCP); Dr BARTA, Dániel (Wigner RCP)

Presenter: Dr BARTA, Dániel (Wigner RCP)

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