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Investigating the impact of anisotropy on the fundamental mode of nonradial oscillations in neutron stars within a fully general relativistic framework

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The effects of anisotropy on the fundamental (f-) mode oscillation frequency and the dimensionless tidal deformability of neutron stars are investigated within a fully general relativistic framework. To this end, the equations governing nonradial stellar oscillations and tidal deformability are reformulated from their conventional expressions to incorporate an anisotropic contribution. The matter composing the compact star is described by an equation of state obtained by connecting microscopic nuclear physics calculations with perturbative QCD results through a piecewise-polytropic interpolation scheme. The anisotropy is modeled using a local prescription that remains regular throughout the stellar interior and vanishes at both the center and the surface. Our results indicate that anisotropy can produce appreciable modifications in both the f-mode frequency and the dimensionless tidal deformability. Finally, we examine the relationship between the anisotropy parameter and the constraints on dimensionless tidal deformability derived from the GW170817 gravitational-wave event.

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