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Tidal deformability of strange stars with Buchdahl potential

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Following its many successes in developing physically viable stellar models, the Buchdahl ansatz is invoked in the context of 5-dimensional Einstein-Gauss-Bonnet (EGB) gravity accompanied by a strange star equation of state to develop an anisotropic fluid distribution. The analytical model serves as a useful testbed for the phenomenon of tidal deformability in light of data from the GW170817 event. The exact model constructed yields gravitational redshift values coinciding with the ranges usually attributed to neutron stars for a range of well studied pulsars. Significant increase in density was evident in the core regions of the star. All the physical quantities for the 5D EGB model satisfied elementary tests for applicability to realistic stars. In addition, it was observed that while the EGB invariants influenced the stellar distribution profoundly in contrast the corresponding Einstein model displayed deficiencies. The model was analysed for stability as well as obeying the energy conditions. The mass-radius profiles were well behaved in general within the radius of applicability. Finally, our analysis reveals that as the parameter β, associated with strange matter, increases, the equation of state becomes stiffer, allowing for more massive stars with greater tidal deformability. Notably, both cases comfortably meet the GW170817 constraint of $\Lambda_{1.4} < 800$, in line with current observations.

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