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(G*) Unified Interacting Quark Stars in 4D Gauss-Bonnet Gravity

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Since the derivation of a well-defined $D \rightarrow 4$ limit for 4D Gauss-Bonnet (4DGB) gravity coupled to a scalar field, there has been interest in testing it as an alternative to Einstein's general theory of relativity. Using the Tolman-Oppenheimer-Volkoff (TOV) equations modified for 4DGB gravity, we model the stellar structure of quark stars (QS) using a novel interacting quark matter equation of state, since it is feasible that some of the stranger gravitational wave observations may have come from QS systems. We find that increasing the Gauss-Bonnet coupling constant α or the interaction parameter λ both tend to increase the mass-radius profiles of QS described by this theory, allowing a given central pressure to support a larger QS in general. Additionally, we analytically identify a critical central pressure, below which no QS solutions exist due to the pressure function having no roots.

Keyword-1

quark stars

Keyword-2

4d gauss bonnet

Keyword-3

modified gravity

Author: GAMMON, Michael (University of Waterloo)

Co-authors: MANN, Robert; Ms ROURKE, Sarah

Presenter: GAMMON, Michael (University of Waterloo)

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