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EXPLORING COMPACT OBJECT GRAVITATIONAL FIELDS WITHIN EINSTEIN'S GENERAL RELATIVITY FRAMEWORK

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In this research, we examine the gravitational behavior of dense astronomical bodies, specifically white dwarfs and neutron stars, using Einstein's gravitational theories. We explore the effects of deviations from spherical symmetry by applying a simplified mathematical model, incorporating the quadrupole moment to a first-order approximation [1].
Focusing on the interiors of white dwarfs, we use the Salpeter equation of state [2] to study how these stars maintain equilibrium between gravitational pull and internal pressure. We also compare the Chandrasekhar and Salpeter equations of state for ideal fluid solutions in general relativity to understand their influence on spherical objects.
This study provides new insights into the balance of forces within dense stars, enhancing our understanding of celestial mechanics under extreme conditions. Our future work will extend this analysis to non-spherically symmetric objects by adding parameters and refining the model for more accurate descriptions of complex geometries. This will improve our understanding of how different equations of state affect the properties and evolution of astrophysical objects in the universe.

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