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Non-singular Durgapal–Fuloria gravastar solutions in $f(R, L_m, T)$ gravity

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Abstract

The Gravastar, also known as a Gravitational Vacuum Star, is a compelling alternative to the Black Hole theory, originally proposed by Mazur and Mottola. This paper considers the form $f(R, L_m, T) = R + \alpha T L_m$ and focuses on the gravastar model within the framework of modified $f(R, L_m, T)$ gravity. According to Mazur and Mottola, the gravastar model consists of three distinct regions, each characterized by a different equation of state (EoS). In this study, we examine the interior region using a space-time characterized by $p = -\rho$. In the dark sector of this region, the EoS $\rho = p$, representing an ultra-relativistic fluid, results in a negative matter-energy density that exerts a repulsive force on the adjacent thin shell. Properties such as proper length, total energy, energy density, and entropy have been analysed. The Schwarzschild–de Sitter solution is employed to describe the vacuum exterior region of the gravastar. Furthermore, the junction between the inner and outer surfaces of the gravastar has been studied using the condition.

Keywords: Gravastar, $f(R, L_m, T)$ gravity theory, junction condition, black holes

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