

Finch-Skea Stellar Structures in $F(R, \phi, X)$ Theory of Gravity Using Bardeen Geometry

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Abstract : The current study aims to examine the physical characteristics of charge compact spheres employing anisotropic fluid under $f(R, \phi, X)$ modified gravity approach, exploring how this theoretical context influences their attributes and behavior. To accomplish our goal, we adopt the Spherically Symmetric (SS) space-time and, additionally, employ a specific Adler-based mode for the metric potential (g_{tt}), which yields a broader class of solutions, Then, by making use of the Karmarkar condition, we successfully derive the other metric potential. A primary component of our current analysis is utilizing the Bardeen geometry as extrinsic space-time to determine the constant parameters of intrinsic space-time. Further, to validate the existence of Bardeen stellar spheres, we debate the behavior of physical properties and parameters such as components of pressure, energy density, anisotropy, parameters of EoS, stability and dynamical equilibrium, energy bounds, mass function, adiabatic index, compactness factor, and surface redshift. Conclusively, all the obtained results show that the system under consideration is physically stable, free from singularity, and viable models.

Keywords : cosmology, GR, Bardeen BH, modified gravities

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