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Modified Gravity Approach to Compact Star Study in $f(R,T)$ Model

We study the equilibrium configurations and the radial stability of spherically symmetric relativistic Neutron Stars(NS) with a polytropic equation of state (EoS) in a modified $f(R,T)$ gravity framework by introducing a quadratic term in T (where T is the trace of the conserved energy-momentum tensor $T_{\mu\nu}$ of the matter-energy) for the functional form of $f(R,T)$ with $f(R,T) = R + h(T)$ where $h(T)$ is an arbitrary function of T, R is the Ricci scalar and $h(T) = 2\lambda T + \xi T^2$. Here λ and ξ are the modified gravity parameters. In this work, we have studied the neutron star properties such as mass, radius, pressure and energy density, and their dependence on the modified gravity parameters λ and ξ. For $\xi = 0$ and $= -1, -3, -5$ we find that for the radius of neutron star $R < 8R_\odot$ ($R_\odot$, the Solar radius), its mass M increases, whereas for $R > 8R_\odot$, M decreases with the increase in R. The equilibrium configurations of the neutron star predict a maximum mass limit for neutron stars of $M = 2.44M_\odot$ corresponding to $\lambda = -5$ and $\xi = 0$. This higher value of NS mass can be compared with gravitational wave data(GW170817) which is $2.33M_\odot$.

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