

Baryogenesis in $f(P)$ Gravity

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In this work, we investigate gravitational baryogenesis in the framework of $f(P)$ gravity to understand the applicability of this class of modified gravity in addressing the baryon asymmetry of the Universe. For the analysis, we set $f(P)=\alpha P$ where α is the model parameter. We found that in $f(P)$ gravity, the CP-violating interaction acquires a modification through the addition of the nontopological cubic term P in addition to the Ricci scalar R and the mathematical expression of the baryon-to-entropy ratio depends not only on the time derivative of R but also the time derivative of P . Additionally, we also investigate the consequences of a more complete and generalized CP-violating interaction proportional to $f(P)$ instead of P in addressing the baryon asymmetry of the Universe. For this type of interaction, we report that the baryon-to-entropy ratio is proportional to R' , P' and $f'(P)$. We report that for both of these cases, rational values of α and χ generate acceptable baryon-to-entropy ratios compatible with observations.

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