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Observational cosmology in higher-order F(R,G) Gravity

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The current study offers a thorough analysis of a dark energy cosmological model in $\mathcal{F}(\mathcal{R},\mathcal{G})$ gravity, where $\mathcal{R}$ and $\mathcal{G}$ denote Ricci scalar and Gauss-Bonnet invariant respectively. In order to solve Einstein field equations, we use the parametrized Hubble parameter in terms of the scale factor. We constrain the model parameters using the Hubble (Hz) dataset of 77 points, $Pantheon$ dataset of 1048 points, and the joint dataset ($Hz + Pantheon$). The evaluated best-fit values of the model parameters are in close agreement with recent observations. The Deceleration parameter transits from decelerating state to an accelerating state in late times. The EoS parameter converges to the quintessence region of the dark energy, which is responsible for the accelerated expansion of the universe in late times. Moreover, we examine the energy conditions that are satisfied except for the strong energy condition, which is unavoidable in the context of modified gravity. Finally, we incorporate the information regarding cosmic observations to execute the statefinder diagnostic and the scalar field.

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