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Costraining f(R)-gravity with cosmological data

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We are looking at how to constrain 𝑓(R)-modified gravity models, such as 𝑓(R) =βRn (a toy model) or more realistic 𝑓(R)-gravity models like the Starobinsky or Hu-Sawicki model, to cosmological data. We used 236 intermediate redshift and 123 low redshift Type 1A Supernovae data obtained from the SDSS-II/SNLS3 Joint Light-curve Analysis (JLA), with absolute magnitudes for the B-filter found on the NASA Extragalactic Database (NED). We then developed a Monte-Carlo Markov Chain (MCMC)-simulation to find the best fit (firstly to the ΛCDM model) to obtain the cosmological parameters (Ωm and ℏ). We then used the concordance model results to constrain the priors for the 𝑓(R)-gravity models on the MCMC-simulation. We assumed a flat Universe Ωk = 0 and a radiation density Ωr that is negligible in both the ΛCDM model and 𝑓(R) -gravity models. Thus, the only difference between the ΛCDM model and 𝑓(R)-gravity models, will be Dark Energy and arbitrary free parameters. This will tell us if there exist viable 𝑓(R)-gravity models, when we compare them to the results of the ΛCDM model and thus, constraining the generic 𝑓(R)-gravity models with cosmological data.

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