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Joint reconstructions of growth and expansion histories with minimal assumptions

Tuesday, 13 June 2023 15:00 (20 minutes)

Using data from upcoming (Stage-IV) cosmological surveys, we jointly reconstruct the Universe's growth and expansion histories using forward modeling and Gaussian Processes. Our approach only relies on a few reasonable assumptions, namely:

- A (flat) Friedmann-Lemaître-Robertson-Walker metric,

- An Einstein De Sitter (matter-dominated) Universe at high redshift.

We forecast the upcoming surveys' potential to accurately reconstruct the Dark Energy (DE) evolution and thus detect any possible deviation from a cosmological constant. We generate mock data for various alternative DE models and illustrate how our method captures the correct DE behavior in all cases —being capable of distinguishing them from Λ at more than 95% C.L.
Finally, we extend our methodology to include possible deviations from General Relativity (GR) at low-z, by simultaneously reconstructing the phenomenological function $G_{\mathrm{eff}}(z)$ governing the growth of (dust-like) matter density perturbations.

Secondary category for the parallel session (optional)

Cosmology

Primary author: CALDERON, Rodrigo (Korea Astronomy and Space Science Institute (KASI))

Co-authors: Prof. STAROBINSKY, Alexei (L. D. Landau Institute for Theoretical Physics); Prof. SHAFIELOO, Arman (Korea Astronomy and Space Science Institute (KASI)); Prof. L'HUILLIER, Benjamin (Sejong University); Prof. POLARSKI, David (Laboratoire Charles Coulomb, Montpellier Univ.)

Presenter: CALDERON, Rodrigo (Korea Astronomy and Space Science Institute (KASI))

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