

New Insights into Dark Energy from DESI DR2 with CMB and SNIa

Saturday, 18 October 2025 16:10 (20)

Analyses by the Dark Energy Spectroscopic Instrument (DESI) collaboration suggest a significant deviation from the Λ CDM model when their baryon acoustic oscillation (BAO) measurements are combined with Planck cosmic microwave background (CMB) data and various Type Ia supernova (SNIa) samples. In this work, we systematically investigate the origin of the deviations from the Λ CDM reported in recent cosmological analyses by combining different CMB datasets, BAO measurements, and DESY5 SNIa samples within the w_0w_a CDM framework. We find that the DESY5 SNIa sample, particularly its low-redshift component (DES-lowz), the Planck CMB data, the lensing measurements of Planck and ACT-DR6, and the DESI-DR2 BAO measurements contribute most significantly to the observed tensions. In contrast, combinations involving DES-SN, WMAP, SPT, and ACT-DR6 remain consistent with Λ CDM within $\sim 1\sigma$. Our results highlight the critical impact of SNIa systematics, CMB data, and the choice of BAO dataset on constraints of dynamical dark energy models. These findings underscore the importance of improved calibration, homogeneity, and cross-validation of observational datasets to robustly assess potential deviations from the standard cosmological model.

Presenter(s) : QIANG, Da-Chun (Henan Academy of Sciences)

Session Classification : Parallel-1