

COSMOLOGICAL CONSTRAINTS FROM BARYONIC ACOUSTIC OSCILLATIONS

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In this paper, we use measurements of baryon acoustic oscillation (BAO) measurements by the Dark Energy Spectroscopic Instrument (DESI) to obtain constraints on cosmological parameters in the Λ CDM model.

The Λ CDM Model

We begin with a brief review of the Λ CDM model and some of its variants.

Energy density is split into 6 species, baryonic matter Ω_b , cold (i.e. non-relativistic) dark matter Ω_c , electromagnetic radiation Ω_γ , curvature Ω_K , neutrinos Ω_ν , and dark energy Ω_{DE} . Baryonic and cold dark matter is grouped as $\Omega_{bc} = \Omega_b + \Omega_c$, while non-relativistic matter including neutrinos is grouped as $\Omega_m = \Omega_{bc} + \Omega_\nu$. Using standard equation of state parameters for Ω_{bc} , Ω_γ , and Ω_K , we can write the time-dependent Hubble parameter as:

$$\frac{H(z)}{H_0} = \left[\Omega_{bc}(1+z)^3 + \Omega_\gamma(1+z)^4 + \Omega_K(1+z)^2 + \Omega_\nu \frac{\rho_\nu(z)}{\rho_{\nu,0}} + \Omega_{DE} \frac{\rho_{DE}(z)}{\rho_{DE,0}} \right]^{1/2}. \quad (1)$$

Bayesian Analysis in Cosmology

Results

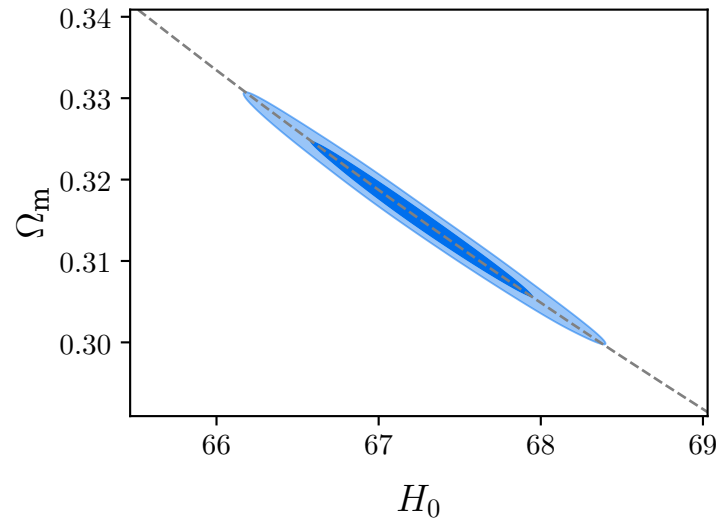


Figure 1:

[1]

References

- [1] DESI Collaboration et al. *DESI DR2 Results II: Measurements of Baryon Acoustic Oscillations and Cosmological Constraints*. 2025.