

# Statistical Nuances in BAO Analysis Likelihood Formulations and Non-Gaussianities

*Wednesday 3 September 2025 10:30 (20 minutes)*

In this talk, we will present a systematic comparison of statistical approaches to Baryon Acoustic Oscillation (BAO) analysis using DESI DR2 data. We evaluate different methods for handling the nuisance parameter such as marginalization, profiling, Taylor expansion, and full likelihood analysis across multiple cosmological models. We demonstrate the how different cosmological models are constrained through the different likelihoods. We will also discuss the use of eigenvalue decomposition of Fisher matrices to identify extreme parameter degeneracies in the different cosmological models, the information content and also the deviations from Gaussianity. Our analysis aims to demonstrate the importance of careful statistical treatment when extracting cosmological constraints from increasingly precise measurements.

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