Contribution ID: **92**   Type: **Poster**

Cosmological forecasts from the 21cm angular power spectra: a Monte Carlo approach

A recent project which aims to understand dark energy properties is the BINGO Telescope: an Intensity Mapping instrument designed to measure BAO in the radio band, through the measurement of the 21cm line of emission. In this work we present cosmological forecasts for BINGO by the nested sampling Monte Carlo method. This method is more robust and reliable, although more computationally expensive, than the Fisher matrix method, which relies on the assumption that the parameters are linearly correlated. Our work is the first to make forecasts for BINGO in a Monte Carlo approach. The likelihood depend on at least two ingredients: the angular power spectra measured from the observations and an estimate of the covariance matrix of the spectra. Since BINGO did not make observations yet, we use mocks created for develop and test the data-analysis pipeline. The mocks constitute in dark matter halos from the Horizon Run 4 catalogue populated with Hydrogen in order to mimic the BINGO Intensity Mapping signal. For the covariance matrix we used 500 lognormal simulations using the FLASK code. As a first analysis we place constraints on the ΛCDM model without taking in account noise or foreground removal. We compare constraints for BINGO + Planck with Planck alone, and we find that we can place better constraints combining Planck with BINGO.

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Session Classification: Poster session