



Contribution ID: 22

Type: **not specified**

eBOSS QSO Mock Challenge

Thursday, October 15, 2020 10:15 AM (20 minutes)

The two-point clustering analysis of the eBOSS DR16 QSO sample provides our best cosmological measurements at an effective redshift $z \sim 1.5$. As part of the final analysis, we performed an N-body mock challenge using HOD mocks constructed from the OuterRim simulation. The aim of this was to validate the RSD models used in the analysis, and to measure the modelling systematic uncertainties. This was achieved by creating non-blind mocks, with a range of HOD models, that also included redshift uncertainties and catastrophic redshifts. We also used a technique to rescale the cosmology of the simulation in order to perform a blind analysis. In the mock challenge, we found that the choice of observer position strongly affected the growth rate measurement, despite the huge volume of the simulation. We show that this is due to an anti-correlation between quadrupole measurements for different lines of sight. Averaging over 3 orthogonal lines of sight can reduce the uncertainties in the quadrupole and growth rate measurements by a factor greater than $\sqrt{3}$. This will be very important for future mock challenges, enabling models to be constrained with less computational expense.

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