

# Cosmic Cartography 2022: Exploring the Cosmic Web and Large-Scale Structure



Contribution ID: 70

Type: **not specified**

## Clustering statistics of Lyman- $\alpha$ forest beyond 2-point

*Friday, 11 March 2022 17:05 (20 minutes)*

Ly $\alpha$  forest provides a unique probe of studying IGM matter distribution at high- $z$  & upto small scales. While its 2-point clustering statistics have been studied widely, higher-order statistics remain largely unexplored. In addition to probing non-gaussianity in the density fields, they can also complement 2-point statistics in constraining cosmological & astrophysical parameters. In this talk, I will summarize my works on 3-point correlation. We study correlation as clustering of Voigt-profile decomposed Ly $\alpha$  lines that allows us to associate it with physical properties of the IGM. Observationally, we study redshift-space clustering at both low- $z$  ( $z < 0.5$ ) & intermediate- $z$  ( $1.7 < z < 3.5$ ); wherein we report the first detections of 3-point correlation in Ly $\alpha$  absorbers at scales  $\sim 1$ Mpc. We also use simulations to explore effects of various parameters on clustering. I will also talk about transverse clustering studies as a sensitive probe of the thermal history using simulated projected QSO triplets.

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**Session Classification:** Day 5 Afternoon