
The unforeseen IGM – constraining Cosmic Reionization through quirks of the inter-galactic medium

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Abstract

The high-redshift inter-galactic medium (IGM) has a rich variety of features that start to be unveiled by observations. Some of them are particularly surprising and, possibly, challenge our understanding of the Epoch of Reionization (EoR). I will describe how, employing state-of-the-art hydrodynamical and radiative-transfer simulations of cosmological volumes, we were able to put new constraints on sources and properties of the EoR. We have shown that the highly-debated quasar-dominated EoR scenario is inconsistent with available observations of the IGM temperature and optical depth. Using synthetic quasar absorption spectra, we showed that the mismatch between the predicted and observed IGM inhomogeneity at the tail end of Reionization could hint to a sub-dominant contribution from quasars during the EoR. In order to infer such contribution, we devised an observational test employing the intermediate-redshift HeII Lyman-alpha forest. Finally, I will show that transmission spikes embedded in high-redshift Gunn-Peterson troughs carry valuable informations on the properties of the high-redshift IGM and on the sources driving the reionization process.

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