The Damping Wing in $z \sim 5-6$ Quasars

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1 Background

The Epoch of Reionization (EoR) is the final phase transition of the universe as the diffuse, neutral intergalactic medium (IGM) is ionized by the first generation of galaxies. Observations of this era are limited. The main constraints on the timing of the EoR come from measurements of the optical depth from the cosmic microwave background (CMB). Recent measurements place $\tau \sim 0.05$, which corresponds to a reionization midpoint of $z_r \sim 7.5$, depending on the exact ionization history used (Planck Collaboration et al., 2018). Since the form of the ionization history is not known, this allows for various reionization scenarios, but most plausible scenarios place the end of reionization to be prior to $z \sim 6$.

In a related problem, the Lyα optical depth of individual quasars is known to show a large degree of spatial fluctuation, signficantly larger than expected from density fluctuations alone (e.g. Becker et al., 2015). Typical explanations for this problem either make use of a fluctuating UV background (Chardin et al., 2017) or

Our project will attempt to either measure or place an upper limit on the bulk neutral fraction at z<6.

References

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Chardin, J., Puchwein, E., & Haehnelt, M. G. 2017, MNRAS, 465, 3429

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