

The Intergalactic Medium at redshifts $0 < z < 6$

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The intergalactic medium (IGM), mainly consisting of hydrogen and helium, traces the underlying dark matter distribution in a simple manner, resulting in a cosmic web of intersecting gaseous filaments and sheets. It is also the dominant reservoir of the baryons at all cosmic times. Galaxies and stars are formed out of the IGM, while galaxies and quasars photoionize the IGM, and galactic winds enrich the IGM and suppress star formation in galaxies. Therefore, the IGM provides one of the most unbiased observational constraints to test theories of structure formation, galaxy formation and evolution at $0 < z < 6$. The IGM is easily observed as numerous redshifted neutral hydrogen (HI) Ly-alpha (1216 A) absorption lines in the spectra of distant quasars. I will present how we can use the redshift evolution of general properties of the IGM to test structure formation scenarios. I will also discuss the latest and future development in the IGM field in the era of upcoming 30-m class ground-based telescopes such the E-ELT and the GMT.