

Z134a IGM–galaxy connections around AGNs

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The link between the intergalactic medium (IGM) and galaxies is key to understanding the evolution of baryonic matter and galaxies. Motivated by our lack of understanding of the IGM–galaxy connection depending on galaxy properties, we conduct an IGM neutral hydrogen (HI)–galaxy cross-correlation analysis to various properties of galaxies in the CLAMATO field (Lee et al. 2016, 2018) as well as cosmological hydrodynamical simulations (Momose et al. 2020a, b). In this talk, we present results for active galactic nuclei (AGNs) and star-forming galaxies (SFGs). We measure the cross-correlation function (CCF) for about 600 SFGs and 20 AGNs at $z = 2$, and found clear differences in their CCFs. The CCF of SFGs monotonically approaches toward the cosmic mean with the strongest (i.e., highest-amplitude) signal at $r = 0$, indicating that the IGM HI density around SFGs is on average a decreasing function of r as expected from the Λ CDM paradigm. On the other hand, the CCF of AGNs has a negative peak at $r = 5 - 6$ comoving Mpc implying that they tend to be in locally low HI density regions. We suspect that it is due to the photoionization of IGM HI by AGN, i.e., the proximity effect. We also find a possible difference in the CCF as well as the IGM environment depending on AGN type. We discuss how those CCF differences can be explained in terms of galaxy evolution.