X66a EIGER: Tracing the evolution of the connection between galaxies and the IGM during the final stages of reionization

柏野大地 (国立天文台)

Understanding the evolution of the intergalactic medium (IGM) during reionization, along with the properties of ionizing sources, has long been a central focus in astrophysics and cosmology. Here, we present results from the EIGER survey, a completed JWST/NIRCam WFSS campaign targeting fields of luminous quasars at $z \gtrsim 6$. Our analysis includes observations from six quasar fields, identifying 948 [O III]-emitting galaxies with spectroscopic confirmation across a redshift range of $z = 5.3$–7.0. By examining both the spatial distribution of galaxies and the transmission spectra of the background quasars, we have releaved specific instances of co-location between galaxies and ionized regions, as traced by Lyman-alpha and/or Lyman-beta transmission spikes, at $z \gtrsim 5.7$. These observations provide direct evidence that galaxies facilitated localized reionization events. From statistical analysis, we have shown that at lower redshifts ($z < 5.7$), approaching the end of reionization, transmission is more suppressed nearer to galaxies within 10 cMpc, likely reflecting overdensities and elevated recombination rates. Conversely, at higher redshifts, excess transmission is observed around galaxies over scales of ≈ 5–25 cMpc. All these findings align with the "inside-out" scenario, where reionization progressed from overdense regions hosting early galaxy formation, and they are consistent with results from state-of-the-art simulations.