

Z120a The Most Concentrated Quasars Revealed by Subaru HSC and PFS at $z \sim 2$

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Selected in MAMMOTH-Subaru survey, J0210 field is associated with a cluster of 11 luminous quasars ($L_{\text{bol}} > 10^{46} \text{ erg s}^{-1}$) at $z \sim 2.2$, the only one region found from the entire 1 Gpc^3 survey volume of SDSS/(e)BOSS. It represents the most concentrated quasars at $z > 2$ with the overdensity 30 times the field at 17σ significance. Subaru HSC mapped the region with NB387 to identify Ly α emitters (LAEs) at a similar redshift. Intriguingly, the quasar overdensity is not aligned with the highest density peaks traced by LAEs but is situated in the middle of a large-scale filament extending 100 cMpc. With the quasars located where phase transition happens, this filament's nodes exhibit puzzling dual-phase characteristics in both the LAE properties and the IGM ionization stage inferred from the HI tomography based on SDSS spectra. The Subaru PFS's wide FoV and efficient MOS capability will enable us to simultaneously determine the precise LAE redshifts to test their association with the quasars and reconstruct a 3D IGM tomography map with a spatial resolution better than SDSS/(e)BOSS by ten times. These efforts will uncover the quasars' intensively triggering mechanisms and their interaction with large-scale environments in an extreme structure, complementing the SSP survey on more typical fields.