

Discovery of four Narrow-line Type-1 Quasars at $z = 2.54 - 6.06$ with Subaru 'Onohi'ula PFS-SSP○高橋 歩美¹ (1. 神奈川大学)

How supermassive black holes and their host galaxies evolve on co-evolutionary cosmological timescales remains one of the fundamental questions in astrophysics. Narrow-line Seyfert1 galaxies are classified as a subclass of AGNs, and are characterized by a narrow permitted line (FWHM of $H\beta < 2000$ km/s) and a flux ratio ($[OIII]/H\beta < 3$). It is known that the NLS1-class tend to have low-mass black holes ($< 10^8 M_{\text{sun}}$) and high accretion ratios (> 0.1), and this population will play a critical role in addressing the SMBH-galaxy relation. However, identification of NLS1s uses $H\beta$ lines; thus, $z > 0.8$ objects have lacked statistical investigation. To extend a comprehensive understanding of this population to the more distant universe, we searched for broad-line AGNs (quasars) whose rest-UV spectral shapes resemble those of local NLS1 galaxies, utilizing $Ly\alpha$ line profile. We report the discovery of four narrow-line Type-1 quasars (NLQ1s) at $z = 2.54 - 6.06$ from the Subaru 'Onohi'ula Prime Focus Spectrograph Subaru Strategic Program (PFS-SSP). The obtained spectral properties of NLQ1s are reminiscent of narrow-line Seyfert 1 (NLS1) galaxies known in the local universe. The obtained spectra cover $3800 \text{ \AA}$ to $12600 \text{ \AA}$ in the observed frame, and show a prominent $Ly\alpha$ emission line with a very low continuum level. Although we used only line width information for the NLQ1 selection, the resulting EWs ($Ly\alpha$) are higher (the mean $\sim 200 \text{ \AA}$ in the rest frame) than the typical values of quasars. We measured C IV-based black hole masses and Eddington ratios for three available objects. The resulting black hole masses are $\sim 10^{7-8} M_{\text{sun}}$ with high Eddington ratios (> 0.5), consistent with those of NLS1 galaxies reported in the low- z universe. One PFS-NLQ1 quasar can be classified as a mini-BAL quasar, which further supports the idea that this NLQ1 is indeed a luminous version of an NLS1 galaxy. This is the initial results of the PFS-SSP.