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We will present a scenario of the presence of a second AGN in a nearby Seyfert galaxy, NGC 1068. Using VLT/MUSE IFU data, we investigated the complex kinematics of ionized gas in the central region of NGC 1068. Interestingly, at a distance of 180 pc to the northeast from the nucleus of NGC 1068, we detected a kinematical signature of the launching point of AGN gas outflows, which suggests that there would be a second AGN. We will also discuss another supporting evidence of the second AGN based on previous spectropolarimetric results.

[구 GC-11] Merging, Recoiling, or Slingshotting of Supermassive Black Holes in a Red AGN 1659+1834

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We report the Gemini Multi-Object Spectrograph (GMOS) Integral Field Unit (IFU) observation of a red active galactic nucleus (AGN), 2MASSJ165939.7+183436 (1659+1834). 1659+1834 is a prospective merging supermassive black hole (SMBH) candidate due to its merging features and double-peaked broad emission lines. The double-peaked broad emission lines are kinematically separated by 3000 km/s, with the SMBH of each component weighing at 10^8.9 and 10^7.1 solar mass. Our GMOS IFU observation reveals that the two components of the double-peaked broad emission line are spatially separated by 0.085" (~250pc). In different assumptions for the line fitting, however, a null (<0.05") or a larger spatial separation (~0.15") are also possible. For this GMOS IFU observational results of 1659+1834, various models can be viable solutions, such as the disk emitter and multiple SMBH models. We believe that these results show the need for future research of finding more multiple SMBH systems in red AGNs.

[구 GC-12] The faintest quasar luminosity function at z ~ 5 from Deep Learning and Bayesian Inference

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To estimate the contribution of quasars on keeping the IGM ionized, building a quasar luminosity function (LF) is necessary. Quasar LFs derived from multiple quasar surveys, however, are incompatible, especially for the faint regime, emphasizing the need for deep images. In this study, we construct quasar LF reaching $M_{1450} \sim -21.5$ AB magnitude at z ~ 5, which is 1.5 mag deeper than previously reported LFs, using deep images from the Hyper Suprime-Cam Subaru Strategic Program (HSC-SSP). We trained an artificial neural network (ANN) by inserting the colors as inputs to classify the quasars at z ~ 5 from the late-type stars and low-redshift galaxies. The accuracy of ANN is > 99 %. We also adopted the Bayesian information criterion to elaborate on the quasar-like objects. As a result, we recovered 5/5 confirmed quasars and remarkably minimized the contamination rate of high-redshift galaxies by up to six times compared to the selection using color selection alone. The constructed quasar parametric LF shows a flatter faint-end slope $\alpha = -1.27^{+0.16}_{-0.15}$ similar to the recent LFs. The number of faint quasars ($M_{1450} < -23.5$) is too few to be the main contributor to IGM ionizing photons.

[구 GC-13] The Relative Role of Bars and Galaxy Environments in AGN Triggering of SDSS Spirals

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We quantify the relative role of galaxy environment and bar presence on AGN triggering in face-on spiral galaxies using a volume-limited sample with 0.02 < z < 0.055, Mr < 19.5, and σ > 70 km s-1 selected from Sloan Digital Sky Survey (SDSS) Data Release 7. To separate their possible entangled effects, we divide the sample into bar and non-bar samples, and each sample is further divided into three environment cases of isolated galaxies, interacting galaxies with a pair, and cluster galaxies. The isolated case is used as a control sample. For these six cases, we measure AGN fractions at a fixed central star formation rate and central velocity dispersion, σ. We demonstrate that the internal process of the bar-induced gas inflow is more efficient in AGN triggering than the external mechanism of the galaxy interactions in groups and cluster outskirts. The significant effects of bar instability and galaxy environments are found in galaxies with a relatively less massive bulge. We conclude that from the perspective of AGN-galaxy coevolution, a massive black hole is one of the key drivers of spiral galaxy evolution. If it is not met, a bar instability helps the evolution,