외부은하 / 은하단

[구 GC-01] The Limited Impact of AGN Outflows: IFU study of 20 local AGNs

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To investigate AGN outflows as a tracer of AGN feedback on the host galaxies, we perform integral-field spectroscopy of 20 type 2 AGNs at z<0.1 using the Magellan/IMACS and the VLT/VIMOS. The observed objects are luminous AGNs with the [O III] luminosity $>10^{41.5}$ erg/s, and exhibit strong outflow signatures in the [O III] kinematics. We obtain the maps of the narrow and broad components of [O III] and Hα lines by decomposing the emission-line profile. The broad components in both [O III] and Hα represent the non-gravitational kinematics, (i.e., gas outflows), while the narrow components represent the gravitational kinematics (i.e., rotational disks), especially in Hα. By using the spatially integrated spectra within the flux-weighted size of the narrow-line region, we estimate the outflow energetics. The ionized gas mass is $(1.0\text{-}38.5)\times10^5 M_\odot$, and the mean mass outflow rate is $4.6\pm4.3\ M_\odot$/yr, which is a factor of ~260 higher than the mean mass accretion rate $0.02\pm0.01\ M_\odot$/yr. The mean energy injection rate is 0.8±0.6% of the AGN bolometric luminosity Lbol, while the mean momentum flux is $(5.4\pm3.6)\times L_{bol}/c$, except for two most kinematically energetic AGNs. The estimated energetics are consistent with the expectations for energy-conserving outflows from AGNs, yet we do not find any supporting evidence of instantaneous star-formation quenching due to the outflows.

[구 GC-02] Star Formation of Merging Disk Galaxies with AGN Feedback Effects

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Using numerical hydrodynamics code RAMSES, we perform idealized galaxy merger simulations and study the star formation of merging disk galaxies. In our simulations, we consider the active galactic nucleus (AGN) feedback effect. In order to investigate the star formation influenced by AGN, we run ~60 simulations with various initial conditions. We confirm that star formation is more efficiently suppressed in merging galaxies than in isolated galaxies. In the mergers, AGN effect is more significant when the masses of two galaxies are similar. Furthermore, we find that bulge fraction does not affect the star formation when the AGN effect is considered. We discuss the implications on semi-analytic galaxy formation models and the limitation of the current AGN prescriptions.

[구 GC-03] Interferometric Monitoring of Gamma-ray Bright AGNs: S5 0716+714

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We present the results of very long baseline interferometry (VLBI) observations of gamma-ray bright blazar S5 0716+714 using the Korean VLBI Network (KVN) at the 22, 43, 86, and 129 GHz bands, which are part of the KVN key science program known as the Interferometric Monitoring of Gamma-ray Bright AGNs (iMOGABA). Multi-frequency VLBI observations were conducted in 29 sessions from January 16, 2013 to March 1, 2016. The source was detected and imaged in all available frequency bands. For all observed epochs, the source is compact on the milliarcsecond (mas) scale, yielding a compact VLBI core dominating the synchrotron emission on the mas scale. Based on the multi-wavelength data at 15 and 230 GHz, we found that the source shows multiple prominent enhancements of the flux density at the centimeter (cm) and millimeter (mm) wavelengths, with mm enhancements leading cm enhancements with a time lag of 18±5 days. Turnover frequency is found to vary over our observations between 22 to 69GHz. Taking into account the synchrotron self-absorption model of the relativistic jet in S5 0716+714, we estimated the magnetic field strength in the mas emission region to be 0.4-66 mG during the observing period, finding that the magnetic field strength is strongly correlated with the turnover frequency and the