hydrodynamical simulations, we investigate where simulated galaxies fall in phase space. We find the galaxies with different cluster infall times often separate cleanly in phase space. We also investigate how a galaxy's location in phase space is correlated with its tidal mass loss, and ram pressure stripping. By comparing our simulated cluster galaxies to observed cluster galaxies, we show how phase space diagrams are essential tools for understanding environmental effects acting on cluster galaxies.

[박 GC-11] Study of galaxies in extensive area of the Virgo cluster

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Nearby galaxy clusters and their surrounding regions represent the current endpoint of evolution galaxy cluster evolution. We present a new catalog of 1589 galaxies, what we call Extended Virgo Cluster Catalog (EVCC), in wider area of the Virgo cluster based on the Sloan Digital Sky Survey (SDSS) Data Release 7. The EVCC covers an area 5.2 times larger than the footprint of the classical Virgo Cluster Catalog, and reaches out to 3.5 times the virial radius of the Virgo cluster. The EVCC contains fundamental information such as membership, morphology, and photometric parameters of galaxies. The EVCC defines a comprehensive galaxy sample covering a wider range in galaxy density that is significantly different from the inner region of the Virgo cluster. It will be the foundation for forthcoming galaxy evolution studies in the extended Virgo cluster region, complementing ongoing and planned Virgo cluster surveys at various wavelengths. We also present the large scale structures in the field around the Virgo cluster. We identified seven galaxy filaments and one possible sheet in three dimensions of super-galactic coordinates based on the HyperLEDA database. By examining spatial distribution and Hubble diagram of galaxies, we found that six filaments are directly associated with the main body of the Virgo cluster. On the other hand, one filament and one sheet are structures located at background of the main body of Virgo cluster. The EVCC and the filament structures will be the foundation for forthcoming studies of galaxy evolution in various environments as well as buildup of the galaxy cluster at z ~ 0, complementing ongoing and planned Virgo cluster surveys at various wavelengths.

[구 GC-12] Systemic search for gas outflows in AGNs and star-forming galaxies

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We present a census of AGN-driven gas outflows based on the kinematics of ionized gas and stars, using a large sample of ~11,000 emission line galaxies at z < 0.3, selected from SDSS. First, a broad correlation between gas and stellar velocity dispersions indicates that the bulge gravitational potential plays a main role in determining the ionized gas kinematics. However, the velocity dispersion of the [OIII] emission line is larger than stellar velocity dispersion by a factor of 1.3-1.4, suggesting that the non-gravitational (non-virial) component, i.e., outflows, is almost comparable to the gravitational component. Second, gas-to-stellar velocity dispersion ratio increases with both AGN luminosity and Eddington ratio, suggesting that non-gravitational kinematics are clearly linked to AGN accretion. The distribution in the [OIII] velocity - velocity dispersion diagram dramatically expands toward large values with increasing AGN luminosity, implying that the launching velocity of gas outflows increases with AGN luminosity. Third, the fraction of AGNs with a signature of the non-gravitational kinematics, steeply increases with AGN luminosity and Eddington ratio, while the majority of luminous AGNs presents the non-gravitational kinematics in the [OIII] profile. These results suggest that ionized gas outflows are prevalent among type 2 AGNs. On the other hand, we find no strong trend of the [OIII] kinematics with radio luminosity, once we remove the effect of the bulge gravitational potential, indicating that ionized gas outflows are not directly related to radio activity for the majority of type 2 AGNs. We will discuss the implication of these results for AGN feedback in the local universe.

[구 GC-13] Bar effects on the central SF and AGN activities in the SDSS galaxy sample

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We explore the role of bars in AGN-galaxy co-evolution using a volume-limited face-on late-type galaxy sample with $M_r < -19.5$ and $0.02 < z < 0.055$ selected from SDSS DR7. In this study, we investigate how $SFR_{\rm fib}$ as a proxy of gas contents at galactic center (over 1~1.5 kpc bulge scale) and central stellar velocity dispersion, σ, of host galaxies are connected to the bar presence and AGN activity. We find that galaxies are distributed in three distinct regions over the $SFR_{\rm fib}-\sigma$ space and the behaviors of their bar fraction ($f_{\rm Bar}$) are clearly different for each region. Galaxies at the AGN dominant region tend to be gas-deficient as $f_{\rm Bar}$ increases and bars are more frequently found in fully-quenched late-type galaxies at the quiescent region, suggesting that bars speed up of the consumption of gas by SF and lead a sudden decline in the central gas. Overall, the bar effects on the AGN activity are positive over the same space except for quiescent galaxies with $\sigma > 170$ km s^{-1}. Most significant bar effect on the AGN activity occurs in the less massive galaxies having sufficient gas, whereas the effect on galaxies at the AGN dominant region with higher the AGN fraction is relatively small. We suggest that the bar affect both central SF and AGN activities, but differently for central gas amount and BH (or bulge) mass of galaxies. We also investigate the AGN-bar connection with only pure AGNs and then confirm that they give marginally the same results.

[구 GC-14] Constraining the shielded wind scenario in PG 2112+059

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The physical scenario describing the origin of quasar winds remains largely unsettled due to our failure to account for X-ray weak BAL quasars. We approach this problem by studying the relation between the inner part of the outflow which is likely to be shielding the X-ray emission and thereby helping to drive the UV winds characterised by broad absorption lines (BALs). In particular, we aim to probe the wind-shield connection in the highly X-ray variable BAL quasar PG 2112+059, which has exhibited periods of X-ray weakness and X-ray normality in the past. A set of two 20 ks Chandra observations and two contemporaneous HST observations, separated by at least eight months, combined with a nearly simultaneous archival Chandra-HST observation from 2002, afford us a unique opportunity to study the connection between the shield (which is thought to be responsible for the X-ray absorption) and the ionisation state of the wind (observed as UV BAL features; e.g., C IV and O VI lines) over various timescales.

[구 GC-15] The long-term centimeter variability of active galactic nuclei: A new relation between variability timescale and black hole mass

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We study the long-term radio variability of 43 radio bright AGNs by exploiting the data base of the University of Michigan Radio Astronomy Observatory (UMRAO) monitoring program. The UMRAO database provides high quality lightcurves spanning 25 - 32 years in time at three observing frequencies, 4.8, 8, and 14.5 GHz. We model the periodograms (temporal power spectra) of the observed lightcurves as simple power-law noise (red noise, spectral power $P(f) \propto f^{-\beta}$ using Monte Carlo simulations, taking into account windowing effects (red-noise leak, aliasing). The power spectra of 39 (out of 43) sources are in good agreement with the models, yielding a range in power spectral index (β) from ≈ 1 to ≈ 3. We find a strong anti-correlation between β and the fractal dimension of the lightcurves, which provides an independent check of the quality of our modelling of power spectra. We fit a Gaussian function to each flare in a given lightcurve to obtain the flare duration. We discover a correlation between β and the median duration of the flares. We use the derivative of a lightcurve to obtain a characteristic variability timescale which does not depend on the assumed functional form of the flares, incomplete fitting, and so on. We find that, once the effects of relativistic Doppler boosting on the observed timescales are corrected, the variability timescales of our sources are proportional to the black hole mass to the power of $\alpha = 1.70 \pm 0.49$ We see an indication for AGNs in different regimes of