the difficulty in automatically identifying bars for bulge-dominated galaxies. In particular, ellipse fitting methods could miss early-type barred galaxies when a large bulge weakens the transition between a bar and disk. The other is caused by the difference in the correlation between the bar types and host morphology for strong bars and weak bars. Strong bars are preponderant in early-type spirals which are red, bulge-dominated and highly concentrated, whereas weak bars are frequent in late-type spirals which are blue, disk-dominate and less-concentrated. Therefore, how much weak bars they contain affects the trend of bar fraction on host galaxy properties. We also discuss the effect of host properties on the formation, evolution, and destruction of bars.

[구 GC-16] How does the gas in a disk galaxy affect the evolution of a stellar bar?

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In barred galaxies, gaseous structures such a nuclear ring and dust lanes are formed by a non-axisymmetric stellar bar potential, and the evolution of the stellar bar is influenced by mass inflows to the center and central star formation. To study how the presence of the gas affects the evolution of the stellar bar, we use the mesh-free hydrodynamics code GIZMO and run fully self-consistent three-dimensional simulations. To explore the evolution with differing initial conditions, we vary the fraction of the gas and stability of initial disks. In cases when the initial disk is stable with Q=1.2, the bar strength in the model with 5% gas is weaker than that in the gas-free model, while the bar with 10% gas does not form a bar. This suggests that the gaseous component is unfavorable to the bar formation dynamically. On the other hand, in models with relatively unstable disk with Q=1.0, the presence of gas helps form a bar: the bar forms more rapidly and strongly as the gas fraction increases. This is because the unable disks form stars vigorously, which in turn cools down the stellar disk by adding newly-created stars with low velocity dispersion. However, the central mass concentration also quickly increases as the bar grows in these unstable models, resulting in fast bar dissolution in gas rich models. We will discuss our results in comparison with previous work.

[구 GC-17] The Most Massive Active Galactic Nuclei at $1<z<2$

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We obtained near-infrared spectra of 26 SDSS quasars at $0.7<z<2.5$ with reported rest-frame ultraviolet black hole mass (MBH)~$10^{10}M_{\odot}$ to critically examine the systematic effects involved with their mass estimations. We find that active galactic nuclei (AGNs) heavier than $10^{10}M_{\odot}$ often display double-peaked Hα emission, extremely broad FeII complex emission around MgII, and highly blueshifted and broadened CIV emission. The weight of this evidence, combined with previous studies, cautions against the use of MBH values based on any emission line with a width over 8000 km/s. Also, the MBH estimations are not positively biased along the presence of ionized narrow line outflows, anisotropic radiation, or the use of line FWHM instead of σ for our sample, and unbiased with variability, scatter in broad line equivalent width, or obscuration for general type-1 quasars. Removing the systematically uncertain MBH values, ~$10^{10}M_{\odot}$ BHs in $1<z<2$ AGNs can still be explained by anisotropic motion of the broad line region from ~$10^{9.5}M_{\odot}$ BHs, although current observations support they are intrinsically most massive, and overmassive to the host's bulge mass.

[구 GC-18] Are Quasars Growing Fast in the Early Universe?: The Lowest Eddington Ratio Quasar at z~6

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To date, luminous quasars at z ~ 6 have been found to be in maximal accretion with the Eddington ratios, λEdd ~ 1, suggesting enhanced nuclear activities in the early universe. However, this may not be the whole picture of supermassive black hole (SMBH) growth since previous studies have not reached on faint quasars that are more likely to harbor SMBHs with low λEdd. To understand the accretion activities in quasars at high redshift, we obtained the deep near-infrared (NIR) spectrum of a quasar, IMS J2204+0112, one of the few faintest quasars that have been identified at z ~ 6. From the NIR spectrum, we find that IMS J2204+0112 harbors a SMBH with about a billion solar mass, with log(λEdd) = -0.91. This is the lowest accretion rate found so far for quasars at z ~ 6, but a common value among quasars at z ~ 2. The inclusion of this object in the λEdd analysis gives the intrinsic λEdd distribution of z ~ 6 quasars, which is lower than previous results that are based on bright quasars, but it is still higher than λEdd of z ~ 2 quasars. Although the number statistics needs to be improved in future, the low peak λEdd value is consistent with the SMBH growth from a massive black hole seed (~ 105 Msun) or from a stellar mass black hole through short-duration super-Eddington accretion events (λEdd > 10).

[구 GC-19] What we have learned about Gamma-ray bright AGNs using the iMOGABA program

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A Korean VLBI Network Key Science Program, the Interferometric Monitoring of Gamma-ray Bright AGNs (iMOGABA) program continues to aim at revealing the origins of the gamma-ray flares that are often detected in active galactic nuclei (AGNs). Here in this presentation, we would like to present what we have learned about the Gamma-ray bright AGNs based on the recent results of the Korean VLBI Network Key Science Program: the iMGOABA. The results will include a) the source properties of the whole samples obtained from a single-epoch observation, and b) some of scientific highlights for the iMOGAGBA on specific sources. From those highlighted works, we find that the Gamma-ray bright AGNs become fainter at higher frequencies, yielding optically thin spectra at mm wavelengths. Based on the studies on specific sources, taking into account the synchrotron self-absorption model of the relativistic jet, we estimated the magnetic field strength in the mas emission region during the observing period.

[구 GC-20] Phase-space Analysis in the Group and Cluster Environment: Time Since Infall and Tidal Mass Loss

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Using the latest cosmological hydrodynamic N-body simulations of groups and clusters, we study how location in phase-space coordinates at z = 0 can provide information on environmental effects acting in clusters. We confirm the results of previous authors showing that galaxies tend to follow a typical path in phase-space as they settle into the cluster potential. As such, different regions of phase-space can be associated with different times since first infalling into the cluster. However, in addition, we see a clear trend between total mass loss due to cluster tides and time since infall. Thus, we find location in phase-space provides information on both infall time and tidal mass loss. We find the predictive power of phase-space diagrams remains even when projected quantities are used (i.e.,line of sight velocities, and projected distances from the cluster). We provide figures that can be directly compared with observed samples of cluster galaxies and we also provide the data used to make them as supplementary data to encourage the use of phase-space diagrams as a tool to understand cluster environmental effects. We find that our results depend very weakly on galaxy mass or host mass, so the predictions in our phase-space diagrams can be applied to groups or clusters alike, or to galaxy populations from dwarfs up to giants.

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