galaxy morphology based on criteria related to secular or merger related evolution and find that the morphological mixture of galaxies varies considerably from cluster to cluster. Moreover it depends on the characteristics (e.g. cluster mass) of cluster itself which implies that environmental effects in cluster scale is also an important factor to the evolution of galaxies together with intrinsic (secular) and galaxy merger. Our deep imaging survey for morphological inspection of cluster galaxies with low surface brightness is expected to be a useful basis to understand the nature of cluster galaxies and their internal/external evolutionary path.

[포 GC-05] Updating calibration of CIV-based single-epoch black hole mass estimators

Daeseong Park[1], Aaron J. Barth[2], Jong-Hak Woo[3], Matthew A. Malkan[4], Tommaso Treu[4], Vardha N. Bennert[5], Anna Pancoast[6]
[1]Korea Astronomy and Space Science Institute, [2]UC Irvine, [3]Seoul National University, [4]UCLA, [5]Cal Poly, [6]Harvard-Smithsonian CfA

Black hole (BH) mass is a fundamental quantity to understand BH growth, galaxy evolution, and connection between them. Thus, obtaining accurate and precise BH mass estimates over cosmic time is of paramount importance. The rest-frame UV CIV λ1549 broad emission line is commonly used for BH mass estimates in high-redshift AGNs (i.e., $2 \lesssim z \lesssim 5$) when single-epoch (SE) optical spectra are available. Achieving correct and accurate calibration for CIV-based SE BH mass estimators against the most reliable reverberation-mapping based BH mass estimates is thus practically important and still useful. By performing multi-component spectral decomposition analysis to obtained high-quality HST UV spectra for the updated sample of local reverberation-mapped AGNs including new HST STIS observations, CIV emission line widths and continuum luminosities are consistently measured. Using a Bayesian hierarchical model with MCMC sampling based on Hamiltonian Monte Carlo algorithm (Stan NUTS), we provide the most consistent and accurate calibration of CIV-based BH mass estimators for the three line width characterizations, i.e., full width at half maximum (FWHM), line dispersion (σ_{line}), and mean absolute deviation (MAD), in the extended BH mass dynamic range of log $M_{BH}/M_\odot$ = 6.5-9.1.

[포 GC-06] Gravitational Instability of

Rotating Isothermal Rings

Sanghyuk Moon and Woong-Tae Kim
Seoul National University

Nuclear rings at centers of barred galaxies exhibit strong star formation activities.
They are thought to undergo gravitational instability when sufficiently massive. We approximate them as rigidly-rotating isothermal objects and investigate their gravitational instability. Using a self-consistent eld method, we first construct their equilibrium sequences specified by two parameters: α corresponding to the thermal energy relative to gravitational potential energy, and R_B measuring the ellipticity or ring thickness. The density distributions in the meridional plane are steeper for smaller α, and well approximated by those of infinite cylinders for slender rings. We also calculate the dispersion relations of nonaxisymmetric modes in rigidly-rotating slender rings with angular frequency Ω and central density ρ_c. Rings with smaller are found more unstable with a larger unstable range of the azimuthal mode number. The instability is completely suppressed by rotation when Ω exceeds the critical value. The critical angular frequency is found to be almost constant at $0.7(G\rho_c)^{1/2}$ for $\alpha > 0.01$ and increases rapidly for smaller α. We apply our results to a sample of observed star-forming rings and confirm that rings without a noticeable azimuthal age gradient of young star clusters are indeed gravitationally unstable.

[포 GC-07] A case study of extraplanar molecular gas in a Virgo spiral using the ALMA

Bumhyun Lee and Aeree Chung
Department of Astronomy, Yonsei University

NGC 4522 is a spiral galaxy located in the Virgo cluster which appears to be undergoing active ram pressure stripping due to the intracluster medium (ICM). What makes this galaxy special is the extraplanar CO gas, some of which coincides with the extraplanar Hα patches. As one of the few cases where the interstellar molecular gas is thought to have been pushed out from the stellar disk by the ICM, this galaxy provides an opportunity to study the impact of ICM pressure on the dense/star forming gas and its fate in the extraplanar space after stripping. In order to probe detailed molecular gas properties inside and

outside the stellar disk and the associated star formation activities, we have observed NGC 4522 in 12CO (1-0) and 13CO (1-0) using the ALMA. We have targeted two regions, one around the center of the galaxy and one centered on the peak of the extraplanar CO, detecting both lines in both regions. Particularly, this is the first case where 13CO gas has been detected outside the stellar disk in a galaxy undergoing ram pressure stripping. In this work, we present preliminary results from the ALMA observations and discuss the evolution of molecular gas properties and star formation activities inside and outside the stellar disk.

[포 GC-08] Near-infrared photometric properties of red-supergiant stars in nearby galaxies : NGC 4214, NGC 4736, and NGC 5194 / NGC 5195

DooSeok Jung[1], San-Hyun Chun[2], Samyaday Choudhury[3,] Young-Jong Sohn[1]
[1]Department of Astronomy, Yonsei University, 03722, Seoul, Republic of Korea, [2]Astronomy Program, Department of Physics and Astronomy, Seoul National University, 151-742, Seoul, Republic of Korea, [3]Yonsei University Observatory, 120-749, Seoul, Republic of Korea

We study the near-infrared photometric properties of red-supergiant stars (RSGs) in three nearby galaxies located within 15 Mpc: NGC 4214, NGC 4736 and NGC 5194 / NGC 5195. The near-infrared (JHK) imaging data were obtained using the WFCAM detector mounted on UKIRT telescope in Hawaii. We used the DAOPHOT/ALLSTAR pacakge to carry out the photometry. We applied MARCS synthetic fluxes to estimate the effective temperatures and luminosities of the RSGs in all the three galaxies. The results were plotted in the Hertzsprung-Russell(H-R) diagram along with the theoretical evolutionary tracks with different masses. We explore the spatial correlation between the RSGs and H II regions by examing the H-R diagram of the RSGs in the dominant H II regions for each of these three galaxies.

[포 GC-09] Bayesian estimation of kinematic parameters of disk galaxies in large HI galaxy surveys

Se-Heon Oh[1,2] and Lister Staveley-Smith[2]
[1]Korea Astronomy & Space Science Institute (KASI), [2]International Centre for Radio Astronomy Research (ICRAR), The University of Western Australia, Austrlaia

We present a newly developed algorithm based on a Bayesian method for 2D tilted-ring analysis of disk galaxies which operates on velocity fields. Compared to the conventional ones based on a chi-squared minimisation procedure, this new Bayesian-based algorithm less suffers from local minima of the model parameters even with high multi-modality of their posterior distributions. Moreover, the Bayesian analysis implemented via Markov Chain Monte Carlo (MCMC) sampling only requires broad ranges of posterior distributions of the parameters, which makes the fitting procedure fully automated. This feature is essential for performing kinematic analysis of an unprecedented number of resolved galaxies from the upcoming Square Kilometre Array (SKA) pathfinders' galaxy surveys. A standalone code, the so-called '2D Bayesian Automated Tilted-ring fitter' (2DBAT) that implements the Bayesian fits of 2D tilted-ring models is developed for deriving rotation curves of galaxies that are at least marginally resolved (> 3 beams across the semi-major axis) and moderately inclined ($20 < i < 70$ degree). The main layout of 2DBAT and its performance test are discussed using sample galaxies from Australia Telescope Compact Array (ATCA) observations as well as artificial data cubes built based on representative rotation curves of intermediate-mass and massive spiral galaxies.

[포 GC-10] An Ultraviolet Study of Star-Forming Regions in M33

Yongbeom Kang[1], Soo-Chang Rey[1], and Luciana Bianchi[2]
[1]Chungnam National University, [2]Johns Hopkins University

We studied the young stellar populations of star-forming (SF) regions in M33 based on the Galaxy Evolution Explorer (GALEX) ultraviolet (UV) imaging data. The SF regions are defined from far-UV data with various thresholds. We examined the reddening and spatial distribution of hot massive stars within SF regions from Hubble Space Telescope multi-band survey and Local Group Galaxy Survey (LGGS) data. The H-alpha sources from the LGGS are used for comparing with the spatial distribution of SF regions. The GALEX UV flux measurements of SF regions are used to derive their ages and masses. We also estimated the size and density of SF regions. The younger and compact SF regions are often arranged within older and sparser SF complexes. The results allow