Based on the kinematics derived from the spectra, we have found that most globular clusters rotate around M81. We have also discovered more than ten globular clusters belonging to M82, and that their kinematics is different from that of young star clusters in the disk of M82. There are few candidates of intra-group globular clusters. We will discuss the implications of these results.

[구 GC- 14] How did the peculiar S0 galaxy M85 form?

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M85 is a merger remnant galaxy in the Virgo Cluster, showing complex merging features. Globular clusters in M85 are a good tracer of its merging history. To investigate globular cluster system of M85, we obtain deep and wide field images of M85 in *ugi* filters covering one square degree using CFHT/MegaCam. We discover about 1,000 globular cluster candidates in these images. The color distribution of the globular cluster candidates within $r < 5'$ from M85 does not show a clear bimodality and blue globular cluster candidates are more than red ones. These features are different from those in massive early-type galaxies. The spatial distribution of the globular cluster candidates is elongated along the faint stellar light of M85. We also investigate the spatial distribution of sub-populations of the globular cluster candidates with different color and brightness and estimate their ages based on their color. We discuss these results in relation with the formation history of M85.

[구 GC-15] Progress Report of the Hubble Constant Determination based on the TRGB Method

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Modern methods in determining the value of the Hubble constant are divided into two main ways: the classical distance ladder method and the inverse distance ladder method. The classical distance ladder method is based on Cepheid calibrated Type Ia supernovae (SNe Ia), which are known as powerful distance indicator. The inverse distance ladder method uses cosmic microwave background radiation, which emitted from the high-z universe, and the cosmological model. Recent estimations of the Hubble constant based on these two methods show a 2~3σ difference, which called the "Hubble tension". It is currently an issue in the modern cosmology. We have been working on the luminosity calibration of SNe Ia based on the Tip of the Red Giant Branch (TRGB), which is a precise population I distance indicator. We present the TRGB distance estimates of 5 SNe Ia host galaxies with the archival Hubble Space Telescope image data. We derive the mean absolute maximum magnitude of 5 SNe Ia and the value of the Hubble constant. Cosmological implications of our estimate will be discussed.

[구 GC-16] The significance of galaxy mergers in stellar mass growth as a function of galaxy and halo mass

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As theoretical and empirical studies have pointed out, galaxy mergers play a pivotal role in galaxy mass assembly histories. Its contribution is considered to be more significant in more massive galaxies. In order to quantitatively understand the origin of stellar components in galaxies, we investigated stellar mass assembly histories as a function of galaxy and halo mass using semi-analytic approaches. In this study, we found that the most massive galaxies ($\log M/\mathbf{M}_{\odot} \sim 11.75$ at $z = 0$), which are mostly the brightest cluster galaxies, obtain roughly 70% of their stellar components via mergers. The role of mergers monotonically declines with galaxy mass: less than 20% for $\log M/\mathbf{M}_{\odot} = 10.75$ at $z = 0$. The contribution of galaxy mergers to stellar mass growth decays more slowly than that of in-situ star formation. Therefore, merger accretion becomes a dominant channel for stellar mass growth of the most massive group since z~2. However, when it comes to central galaxies in haloes less massive than $\mathbf{10^{13}M_{\odot}}$, star formation is always dominant.

[초 GC-17] Carnegie Hubble Program II : Overview and Research Status

Soung-Chul Yang

KASI

Carnegie Hubble Program II (hereafter CHP II) is a large Hubble Space Telescope (HST) observing campaign in the cycle 22 composed of a total of 184 orbits (132 primes + 52 parallels), which aims to measure H0 directly with an unprecedented accuracy. Unlike our previous efforts in CHP I which used Cepheids as a yardstick, CHP II takes the Population II (Pop II) distance indicators such as RR Lyraes and tip of the red giant branch stars (TRGBs) to set up a new calibration to Type Ia supernovae (SN Ia) distance. The Pop II distance scales have two immediate advantages over the classical Cepheid method: 1) The period-luminosity relation of the RR Lyrae has a scatter that is a factor of 2 smaller; 2) The RR Lyrae/TRGB distance scale can be applied to both elliptical and spiral galaxies. This will provide a great systematic benefit by ultimately allowing us to double the number of SN Ia distances based on geometry. By taking advantage of this Pop II route, we expect to measure H0 value to 3 % of error which will be the highest accuracy H0 measurement to date using the "Distance Ladder" method. In this talk I will present a brief background/overview on the CHP II, observations/data acquisition status, and ongoing research progress/preliminary results.

[구 GC-18] How Much Do We Understand the Properties of Supernova Remnants in M81 and M82?

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We present an optical spectroscopic study of 28 supernova remnant (SNR) candidates in M81 and two SNR candidates in M82. The optical spectra of these SNR candidates were obtained using the MMT/Hectospec as a part of the K-GMT Science Program. Based on the [S II]/Hα ratio and the radial velocity, we find that twenty six out of the M81 candidates are genuine SNRs. Two SNR candidates in M82 are thought to be shocked condensations in the galactic outflow or SNRs. In the spectral line ratio diagrams, M81 SNRs are divided into two groups: an [O III]-strong group and an [O III]-weak group. The [O III]-weak SNRs have larger sizes, and may have faster shock velocity. We estimate the nitrogen and oxygen abundance of the SNRs from the comparison with shock-ionization models. We find a radial gradient in nitrogen abundance, $d\mathrm{Log(N/H)}/d\log R = -0.023 \pm 0.009$ dex kpc^{-1}, and little evidence for the gradient in oxygen abundance. The nitrogen abundance shows shallower gradient than those of the planetary nebulae and H II regions of M81. We find five X-ray emitting SNRs. Their X-ray hardness colors are consistent with thermal SNRs.

[구 GC-19] Environmental Dependence of Star-formation Properties of Galaxies at 0.5 < z < 2

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At local, galaxy properties are well known to be clearly different in different environments. However, it is still an open question how this environment-dependent trend has been shaped. In this presentation, we will show the results of our investigation about the evolution of star-formation properties of galaxies over a wide redshift range, from z~ 2 to z~0.5, focusing its dependence on their stellar mass and environment. In the UKIDSS/UDS region, we estimated photometric redshifts and stellar population properties, such as stellar masses and star-formation rates, using the deep optical and near-infrared data available in this field. Then, we identified galaxy cluster candidates at z~0.5-2.

Through the analysis and comparison of star-formation (SF) properties of galaxies in clusters and in field, we found interesting results regarding the evolution of SF properties of galaxies: (1) regardless of redshifts, stellar mass is a key parameter controlling quenching of star formation in galaxies; (2) At z<1, environmental effects become important at quenching star formation regardless of stellar mass of galaxies; and (3) However, the result of the environmental quenching is prominent only for low mass galaxies ($M* < 10^{10}$ $M_\odot$) since the star formation in most of high mass galaxies are already quenched at z > 1.