(1) The correlation between the mass of supermassive black holes (SMBHs) and the properties of their host galaxies suggests that SMBHs and host galaxies are closely linked in their formation and evolution. While the exact origin of their relationship is still under debate, theoretical models often invoke feedback from active galactic nuclei as a crucial mechanism for establishing the BH-host correlation. In the first part of my talk, I will present our efforts to find observational sign of the AGN feedback in young luminous AGNs. (2) While intermediate-mass black hole (IMBH) is thought be cosmologically important class to understand the link between stellar mass black holes and SMBHs, it is extremely rare in the present-day Universe. In the second part of this talk, I will report a Gemini/GMOS-N IFU study of an ultraluminous X-ray source in NGC 5252, which is a possible candidate of an off-nuclear non-stellar black hole.

외부은하 / 은하단

[구 GC-01] The first of its kind metallicity map of the Large Magellanic Cloud

Samyaday Choudhury[1], Annapurni Subramaniam[2], Andrew A.Cole[3]
[1]Yonsei University Observatory, 120-749, Seoul, Republic of Korea, [2]Indian Institute of Astrophysics, Koramangala, Bangalore 560034, India, [3]School of Physical Sciences, University of Tasmania, Private Bag 37, Hobart, Tasmania 7001, Australia

We have estimated a metallicity map of the Large Magellanic Cloud (LMC) using the Magellanic Cloud Photometric Survey (MCPS) and Optical Gravitational Lensing Experiment (OGLE III) photometric data. This is a first of its kind, high-spatial resolution map of metallicity up to a radius of 4°-5°, derived using large area photometric data and calibrated using spectroscopic data of Red Giant Branch (RGB) stars. The RGB is identified in the V, (V - I) colour- magnitude diagrams of small subregions of varying sizes in both data sets. The slope of the RGB is used as an indicator of the mean metallicity of a subregion, and it is calibrated to metallicity using spectroscopic data for field and cluster red giants in selected subregions. The mean metallicity of the LMC is found to be [Fe/H] = -0.37 dex (σ [Fe/H] = 0.12) from MCPS data, and [Fe/H] = -0.39 dex (σ[Fe/H] = 0.10) from OGLE III data. The bar is found to have an uniform and higher metallicity compared to the disk, and is indicative of an active bar in the past. Both the data sets suggest a shallow radial metallicity gradient up to a radius of 4 kpc (-0.049 ±0.002 dex kpc-1 to -0.066 ±0.006 dex kpc-1). This metallicity gradient of the LMC disk, though shallow, resembles the gradient seen in spiral galaxies, and similar to that found in our Galaxy.

[구 GC-02] Tracing the Giant Metal-poor Halo Around the Sombrero

Jisu Kang[1], Myung Gyoon Lee[1], In Sung Jang[1,2], Youkyung Ko[1], Jubee Sohn[1,3], and Narae Hwang[4]
[1]Department of Physics and Astronomy, Seoul National University, [2]Astrophysikalisches Institut Potsdam, [3]Smithsonian Astrophysical Observatory, [4]Korea Astronomy and Space Science Institute

M104 (NGC 4594, the Sombrero) is an intriguing disk galaxy classified as an elliptical galaxy nowadays. It hosts a luminous bulge and a massive disk, but it is still mysterious how M104 acquired such peculiar structures. Globular clusters are an useful tracer to investigate the formation history of early-type galaxies. In this study we present a wide field imaging study of the globular clusters in M104. Using wide (1° × 1°) and deep ugi images of M104 obtained with the CFHT/MegaCam observations, we detect a large number of globular clusters. The color distribution of these globular clusters shows that there are two subpopulations: a metal-poor system and a metal-rich system. The radial number density of the metal-poor globular clusters shows a long tail reaching R ~ 30′ (~ 80 kpc), indicating clearly the existence of a giant metal-poor halo in M104. This result is consistent with the previous studies on the dual halos of massive early-type galaxies. We will discuss implications of these results in relation with the formation history of M104.

[구 GC-03] A Spectroscopic Investigation of the Globular Clusters in the M81 Group

Nawon Lee[1], Sungsoon Lim[2], Myung Gyoon Lee[1], Jubee Sohn[3], Youkyung Ko[1], Narae Hwang[4], Sang Chul Kim[4], and Hong Soo Park[4]
[1]Department of Physics and Astronomy, Seoul National University, [2]Kavli Institute for Astronomy and Astrophysics, Peking University, Beijing, 10087, China, [3]Harvard-Smithsonian Center for Astrophysics, 60 Garden Street Cambridge, MA

02138, USA, [4]Korea Astronomy and Space Science Institute

The M81 Group is the nearest among the known groups of galaxies. HI maps show that all main galaxies of this group are interacting, indicating that this group is in the active phase of formation. On the other hand, wide field imaging shows that globular cluster candidates are found not only in the member galaxies but also between the galaxies in this group. In this study we present preliminary results based on MMT/Hectospec spectroscopy of the globular cluster candidates in this group. We find that the intragroup globular clusters have mostly low metallicity, while the globular clusters in M81 have mostly high metallicity. We will discuss the implication of this result and the kinematics of the globular clusters in relation with the formation history of the M81 Group.

[구 GC-04] Intensive Monitoring Survey of Nearby Galaxies

Myungshin Im[1], Changsu Choi[1], Gu Lim[1], Sangyun Lee[1], Sung Chul Yoon[1], Sang Hyun Chun[1], Hyun-Il Yoon[2], Yeong-Beaom Jeon[2], Sang Gak Lee[3], Wonseok Kang[3,] Sun-gil Kwon[3], Soojong Pak[4], Shuhrat Eghamberdiev[5]
[1]Astronomy Program/CEOU, Dept. of Physics & Astronomy, Seoul National University
[2]Korea Astronomy & Space Science Institute
[3]National Youth Space Center
[4]School of Space Research and Institute of Natural Sciences, Kyunghee University
[5]Ulugh Beg Astronomical Institute, Uzbekistan

SNe light curves have been used to understand the expansion history of the universe, and a lot of efforts have gone into understanding the overall shape of the radioactively powered light curve. However, we still have little direct observational evidence for the theorized SN progenitor systems. Recent studies suggest that the light curve of a supernova shortly after its explosion (< 1 day) contains valuable information about its progenitor system and can be used to set a limit on the progenitor size, R∗. In order to catch the early light curve of SNe explosion and understand SNe progenitors, we are performing a ~8hr interval monitoring survey of nearby galaxies (d < 50 Mpc) with 1-m class telescopes around the world. Through this survey, we expect to catch the very early precursor emission as faint as R=21 mag (~0.1 Rsun for the progenitor). In this talk, we outline this project, and present a few scientific highlights, such as the early light curve of SN 2015F in NGC 2442.

[구 GC-05] The Contribution of Mergers on Star Formation Activities in Nearby Galaxies.

Gu Lim(임구), Myungshin Im(임명신), Changsu Choi(최창수), Yongmin Yoon(윤용민)
Center for Exploration of the Origin of the Universe (CEOU), Astronomy Program, 1Dept. of Physics & Astronomy, Seoul National University (서울대학교)

We present our study of the correlation between the UV luminosity and the merging activities of nearby galaxies (d < 300 Mpc). Our study uses ~600 UV-selected galaxies with deep optical imaging data, where the UV selection is made using the GALEX Atlas of Galaxies (Gil de Paz et al. 2007) and the updated UV catalog of nearby galaxies (Yu Bai et al. 2015). Deep optical images allow us to classify merger features using visual inspection, and we also estimate unobscured SFR using UV continuum luminosity. The fraction of galaxies with merger features in each UV luminosity bins are obtained to see if how the fraction of galaxies with merging features changes as a function of UV luminosity, Finally, we will show, above what UV luminosity (or SFR), the merging mechanism becomes an important process in enhancing star formation of galaxies.

[구 GC-06] The Vertical Disk Structure and Star Formation in Nearby Edge-On Galaxies

Kijeong Yim[1], Tony Wong[2], Richard Rand[3], and Erik Rosolowsky[4]
[1]Korea Astronomy and Space Science Institute, Korea, [2]Department of Astronomy, University of Illinois, USA, [3]Department of Physics and Astronomy, University of New Mexico, USA, [4]Department of Physics, University of Alberta, Canada

We present the radial variations of the scale heights and the vertical velocity dispersions in a sample of nearby edge-on galaxies using BIMA/CARMA ^{12}CO (J=1→0), VLA/EVLA HI, and Spitzer 3.6 μm data. Both the disk thicknesses and the velocity dispersions of gas and stars vary with radius, contrary to assumptions of previous studies. We investigate how the interstellar gas pressure and the gravitational instability parameter differ from values derived assuming constant velocity dispersions and scale heights. Using the