

(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 to 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

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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  $4^{\circ}$ - $5^{\circ}$ , 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 ( $\sigma [Fe/H] = 0.12$ ) from MCPS data, and  $[Fe/H] = -0.39$

dex ( $\sigma [Fe/H] = 0.10$ ) 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 ( $-0.049 \pm 0.002$  dex kpc<sup>-1</sup> to  $-0.066 \pm 0.006$  dex kpc<sup>-1</sup>). 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

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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 ( $1^{\circ} \times 1^{\circ}$ ) 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  $R \sim 30'$  ( $\sim 80$  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

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