

구두발표초록

초청강연

[초 IT-01] Gravitational Microlensing AstrophysicsCheongho, Han
CBNU

I introduce the field of gravitational microlensing that I have worked on for more than 2 decades. I describe how microlensing can be applied to various fields in astrophysics including dark matter, Galactic structure, binary objects, and extrasolar planets and present my scientific achievements in the individual fields. I start with a description of basic microlensing physics and state how microlensing can be applied to various fields. Finally, I briefly describe ongoing efforts and future projects in microlensing.

[초 IT-02] High Resolution Imaging Optics: Satellite Camera and Astronomical Telescope (고해상도결상광학기술: 공위성카메라와천체망원경)Yun Woo Lee (이윤우)
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최근에 국내 광산업은 고해상도 카메라를 장착한 휴대폰의 판매호조로 세계 최고수준의 소형 광학모듈 시장을 주도하고 있다. 하지만 국가 위상제고에 필요한 고해상도 인공위성 카메라와 대형 천체 망원경은 소수 선진국이 전략물자로 분류하여 관련 기술을 독점하고 있다. 우리나라는 국가우주개발계획에 의하여 다양한 위성카메라를 국산화하고, 기초과학 선진화를 위한 Giant Magellan Telescope사업에 참여함으로써 우주산업 선진국을 추격하고 있다. 빛을 이용하여 물체를 관측하는 결상광학계는 분해능을 향상시키기 위하여 구경을 더욱 크게 하거나 특수한 비구면 형상의 거울을 사용하므로 새로운 광학 설계, 연마, 측정, 조립, 시험 등의 기술들이 필요하다. 본 발표에서는 다양한 첨단 결상광학계와 한국표준과학연구원 우주광학센터에서 개발중인 위성카메라와 천체망원경에 관하여 자세히 소개한다.

[초 IT-03] Hidden heroes over Hubble time - Supermassive black holes and their evolution.Jong-Hak Woo
Seoul National University

19세기 중반에 세이퍼트 은하와 퀘이사의 발견으로 시작된 거대질량 블랙홀 연구는 90년대 중후반에 발견된 역학적 증거를 바탕으로 은하들의 중심에 거대질량 블랙홀이 존재한다는 새로운 패러다임이 나오며 활발한 전기를 맞고 있다. 본 강연은 은하진화 과정에서 블랙홀의 역할을 규명하고 블랙홀의 물리현상을 밝혀내는 연구결과들을 소개한다. 특히 빛의 메아리 효과 등을 이용한 블랙홀 질량 측정과 은하와의 공동진화, 가스분출을 통한 AGN feedback 의 주제를 다룰 것이다.

[초 IT-04] What Determines Star Formation Rates?Neal Evans
University of Texas, Austin

The relations between star formation and properties of molecular clouds are studied based on a sample of star forming regions in the Galactic Plane. Sources were selected by having radio recombination lines to provide identification of associated molecular clouds and dense clumps.

Radio continuum and mid-infrared emission were used to determine star formation rates, while ^{13}CO and submillimeter dust continuum emission were used to obtain masses of molecular and dense gas, respectively.

We test whether total molecular gas or dense gas provides the best predictor of star formation rate. We also test two specific theoretical models, one relying on the molecular mass divided by the free-fall time, the other using the free-fall time divided by the crossing time. Neither is supported by the data.

The data are also compared to those from nearby star forming regions and extragalactic data. The star formation "efficiency," defined as star formation rate divided by mass, spreads over a large range when the mass refers to molecular gas; the standard deviation of the log of the efficiency decreases by a factor of three when the mass of relatively dense molecular gas is used rather than the mass of all the molecular gas.

[초 IT-05] Observational Evidence for the Coevolution between Supermassive Black Holes and Host GalaxiesMinjin Kim
Korea Astronomy and Space science Institute

(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° - 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 ($\sigma [Fe/H] = 0.12$) 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 ± 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

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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 $R \sim 30'$ (~ 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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