[구 SA-07] High resolution spectroscopic study of the peculiar globular cluster M22 (NGC 6656)

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We present the high-resolution spectroscopic study of the red-giant branch (RGB) stars in the peculiar globular cluster M22 (NGC 6656). We obtained high-resolution spectra of 55 RGB stars using the CTIO 4-m telescope and the HYDRA multi-object spectrograph. By employing an improved LTE analysis method, we measured accurate elemental abundances. In this talk, we will discuss the differences in the chemical composition between the two stellar populations in the context of the formation of M22.

[구 SA-08] A Chemical Abundance Study of 47 Tuc based on HYDRA spectroscopy

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현재까지의 구상성단들에 대한 측/분광학적 관측 결과들은 우리은하 내 대부분의 구상성단들이 다중항성종족을 갖고 있다는 것을 보여준다. 구상성단 형성에 대한 이러한 패러다임의 변화는 우리은하 뿐만 아니라 외부은하 형성에 기여하는 building block이 무엇인지 밝히게 될 것이다. 특히 금속이 풍부한 47 Tuc (NGC104)은 무거운 구상성단들의 화학적 진화를 조사하기에 이상적인 천체이다. 우리는 CTIO 4-m 망원경과 다중천체분광기인 HYDRA를 사용하여 획득한 47 Tuc의 적색거성에 대한 분광자료들의 LTE 분석을 수행하였다. 이 측정 결과로부터 구상성단 47 Tuc의 화학조성의 특징과, 더 나아가, 형성에 관해 논의하고자 한다.

실험천체물리

[구 LA-01] Laboratory Astrophysics using High Energy/Power Lasers

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With the advent of high energy/power lasers, extreme conditions, such as those found in astrophysical environments, can be reproduced in laboratory. The scaling between laboratory and astrophysical environments, especially for viscosity and resistivity that govern dissipation processes, is not perfect. Yet, the similarity is close enough to make laboratory experiments relevant for astrophysics. The results have been encouraging, in the sense of suggesting the possibility of exploring fundamental physical processes at play in astrophysical phenomena. In this talk, I will review a few successfully performed and ongoing experiments, such as those for turbulence and magnetic field generation in fluid regime and collisionless shock wave in plasma regime.

[초 LA-02] Laboratory Astrophysics using Intense X-ray from Free Electron Lasers

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The laboratory astrophysics is a new emerging field of basic sciences, and has tremendous discovery potentials. The laboratory astrophysics investigates the basic physical phenomena in the astrophysical objects in controlled and reproducible manners, which has become possible only recently due to the newly-established intense photon and ion beam facilities worldwide. In this presentation, we will introduce several promising ideas for laboratory astrophysics programs that might be readily incorporated in the Pohang Accelerator Laboratory X-ray Free Electron Laser (PAL-XFEL). For example, precise spectroscopic measurements using Electron Beam Ion Trap (EBIT) and intense X-ray photons from the PAL-XFEL can be performed to explore the fundamental processes in high energy X-ray phenomena in the visible universe. Besides, in many violent astrophysical events, the energy density of matter becomes so high that the traditional plasma physics description becomes inapplicable. Generation of such high-energy density states can be also be achieved by using the intense photon beams available from the PAL-XFEL.

[구 LA-03] Computational Astrophysics: Connecting Laboratory Experiments to Observations

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In the history of astronomy, observed data were interpreted very frequently based upon data measured at laboratories. For example, all the spectroscopic observations were understood via spectroscopic measurements on nuclei, atoms, and molecules. Recently, computational astrophysics plays a role of bridging experimental data to observations, in particular via numerical modeling of complex astronomical phenomena. This presentation focuses on computational nuclear astrophysics that connects experimental data on nuclei to high-energy observation data obtained by X-ray and gamma-ray telescopes. As an example case, X-ray burst will be discussed. In this phenomenon, observed X-ray light curves and spectra can be modeled by stellar evolution calculations that take nuclear reactions of rare isotopes as input information. This presentation also works as an introduction to the following presentation that will provide more detailed discussion on the experimental aspect of X-ray burst.

[초 LA-04] Understanding Explosive Stellar Events Using Rare Isotope Beams

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Nuclear reactions in explosive stars such as novae, X-ray bursts, and supernovae are responsible for producing many of the elements that make up our world. Exotic nuclei not normally found on earth can play an important role in these events due to the extreme conditions that occur in the explosion. A frontier area of research involves utilizing beams of radioactive nuclei to improve our understanding of these explosions and the implications on cosmic element production. At the future radioactive ion beam facility of Korea, RAON, we will measure astrophysically important reactions using exotic beams to probe the details of cosmic events. Details of RAON and possible day-1 experiments at the facility will be presented.

TOWARD NEXT GENERATION CORONAGRAPH

[구 TG-01] TOWARD NEXT GENERATION SOLAR CORONAGRAPH: DEVELOPMENT OF COMPACT DIAGNOSTIC CORONAGRAPH ON ISS

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The Korea Astronomy and Space Science Institute plans to develop a coronagraph in collaboration with National Aeronautics and Space Administrative (NASA) and install it on the International Space Station (ISS). The coronagraph is an externally occulted one stage coronagraph with a field of view from 2.5 to 15 solar radii. The observation wavelength is approximately 400 nm where strong Fraunhofer absorption lines from the photosphere are scattered by coronal electrons. Photometric filter observation around this band enables the estimation of 2D electron temperature and electron velocity distribution in the corona. Together with the high time cadence (< 12 min) of corona images to determine the geometric and kinematic parameters of coronal mass ejections, the coronagraph will yield the spatial distribution of electron density by measuring the polarized brightness. For the purpose of technical demonstration, we intend to observe the total solar eclipse in 2017 August for the filter system and to perform a stratospheric balloon experiment in 2019 for the engineering model of the coronagraph. The coronagraph is planned to be installed on the ISS in 2021 for addressing a number of questions (e.g. coronal heating and solar wind acceleration) that are both fundamental and practically important in the physics of the solar corona and of the heliosphere.

[구 TG-02] Development of DIagnostic Coronagraph Experiment (DICE) for Total Solar Eclipse

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Korea Astronomy and Space Science Institute (KASI) is developing a coronagraph in collaboration with National Aeronautics and Space