Astrograph (RASA 36) located at El Sause Observatory in Chile.

[포 AT-08] Design and Analysis of Collimator in Spectrophotometer for Transmission Spectroscopy of Exoplanets

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외계행성 대기 연구를 위한 투과스펙트럼 관측에 적합한 측분광기를 개발하고 있다. 이 측분광기의 광학적 특성은 380~685nm의 파장범위, FOV 10', R>~400이며, 슬릿부, collimator, VPH grism, imaging lens와 CCD로 구성되어 있는데, 보현산천문대 1.8m 망원경의 CIM (Cassegrain Interface Module)에 카트리지 방식으로 장착되어 사용한다.

그 중 doublet 렌즈 2개를 대칭으로 배치하여 초점거리 280mm가 되도록 만든 collimator는 슬릿을 통과한 f/8 입사광에서 지름 35 mm의 pupil을 만드는데, 이곳에 VPH grism을 설치하였다. collimator 렌즈는 axial spring과 radial spring으로 알루미늄 barrel에 고정하였다. 이 collimator barrel은 CIM에 쉽게 장탈착 할 수 있도록 모듈화 하였다. Collimator Barrel에 대한 구조 해석 결과, 망원경 이동에 따른 중력에 의한 변형은 충분히 작았다. Grism은 슬라이딩 형태로 장착되어 영상 확인도 가능하도록 설계하였다.

[포 AT-09] Optical Design and Tolerance Analysis for UVO-Multiband Polarizing Imager System

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UVO-Multiband Polarizing Imager System (UVOMPIS) is an ultraviolet to visible light multi-wavelength polarization/imaging system for Compact Advanced Satellite. We developed Linear Astigmatism Free-Three Mirror System (LAF-TMS) D200F2 as an optical system of UVOMPIS which has an entrance pupil diameter of 200 mm, a focal ratio of 2, a field of view of 2° × 4°. LAF-TMS is a confocal off-axis reflecting telescope system that removes linear astigmatism, and its all mirrors (M1, M2, M3) are optimized with the freeform surface to reduce high-order aberrations. Through the sensitivity analysis and Monte-Carlo simulation as the tolerance analysis, we can confirm the feasibility of the system, relatively sensitive parameters (tilt, decenter, despace, surface RMS error), and considerations for optomechanical design. From the sensitivity analysis, we can discover the relatively sensitive optical alignment parameters to a single perturbation. Further more, in the monte-carlo simulation, we investigate the minimum tolerance budget satisfying the required optical performance and whether the tolerance range is satisfied within manufacturing error.

우주론

[포 CD-01] `Mind the Mocking and don't Keep on Walking': Galaxy Mock Challenges for the Completed SDSS-IV Extended Baryon Oscillation Spectroscopic Survey

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We develop a series of N-body data challenges, functional to the final analysis of the extended Baryon Oscillation Spectroscopic Survey (eBOSS) Data Release 16 (DR16) galaxy sample, primarily based on high-fidelity catalogs constructed from the Outer Rim simulation. We generate synthetic galaxy mocks by populating Outer Rim halos with a variety of halo occupation distribution (HOD) schemes of increasing complexity, spanning different redshift intervals. We then assess the performance of three complementary redshift space distortion (RSD) models in configuration and Fourier space, adopted for the analysis of the complete DR16 eBOSS sample of Luminous Red Galaxies (LRGs). We find that all the methods are mutually consistent, with comparable systematic errors on the Alcock-Paczynski parameters and the growth of structure, and robust to different HOD prescriptions - thus validating the robustness

of the models and the pipelines used for the baryon acoustic oscillation (BAO) and full shape clustering analysis. Our study is relevant for the final eBOSS DR16 'consensus cosmology', as the systematic error budget is informed by testing the results of analyses against these high-resolution mocks. In addition, it is also useful for future large-volume surveys, since similar mock-making techniques and systematic corrections can be readily extended to model for instance the DESI galaxy sample.

[포 CD-02] Model-independent reconstruction of the equation of state of dark energy

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While Dark Energy is one of the explanations for the accelerating expansion of the Universe, its nature remains a mystery. The standard (flat) Λ CDM model is consistent with cosmological observations: type Ia Supernova, BAO, CMB, and so on. However, the analysis of observations assuming a model, model-dependent approach, is likely to bias the results towards the assumed model.

In this poster, I will introduce model-independent approach with Gaussian process and the application of Gaussian process regression to reconstruct the equation of state of dark energy.

태양/태양계

[포 SS-01] 2019 Total Solar Eclipse Expedition of KASI

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Korea Astronomy and Space Science Institute (KASI) is developing a coronagraph to measure the coronal electron density, temperature, and speed utilizing spectral change of the K-corona around 400 nm. However, near UV light is more affected by atmospheric effect on the ground than visible light. For the total solar eclipse on July 2 2019, KASI organized an expedition team to test the possibility of the similar measurement scheme in the visible light. The observation site was in Las Flores, San Juan, Argentina. We built an imaging spectrograph using micro lenslet array and grism, named Coronal Integral Field Spectrograph (CorIFS). In addition, images of white light corona, wide field background, and all sky were taken with various camera settings. We present the preliminary results of the expedition.

[포 SS-02] 30cm Wide-Field Solar Spectro-Imaging Telescope (Post SOFT)

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우주개발과 활용이 주요 화두가 된 현대에 보다 빠르고 정확한 우주환경 예보는 전략적으로 매우 중요하다. 이에 우리는 광대역태양영상분광망원경(Wide-Field Solar Spectro-Imaging Telescope, Post SOlar Flare Telescope: PSOFT)을 활용한 태양전면 영상분광감시체계를 구성하고자 한다. 전세계 세 곳에 PSOFT를 배치하여 우주환경에 중대한 영향을 주는 요소인 태양의 플레어와 홍염 분출과 같은 현상과 표면의 다양한 활동들을 실시간으로 관측 분석하고자 한다. PSOFT는 30cm 구경의 광학계에 고속영상분광기를 결합하여 태양 전면의 분광영상을 약 1초각의 영상해상도와 5분의 시간해상도로 획득한다. 태양 전면을 슬릿으로 스캔하는 방식으로 H alpha와 Ca II 854.2nm선의 분광정보를 획득하는데 틸틸트 미러를 이용하여 1차적인 시상보정과 함께 스캔모션을 함께 구현함으로써 1)광학계 구조를 단순화하고, 2) 빠른 스캔이 가능하다. PSOFT로 얻은 태양전면 채층분광영상 데이터는 정밀한 우주환경 예보에 필요한 플레어나 홍염분출의 발생초기 정보를 제공할 뿐 아니라 태양 저층대기에서 발생하는 자기재연결, 파동 등에 대한 통계적 연구자료를 제공할 것으로 기대한다.

항성/항성계/외계행성

[포 SA-01] Photoionization and Raman-scattered He II features in young planetary nebulae

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Raman-scattered He II features are known to be present in several young planetary nebulae (PNe) including NGC 7027, NGC 6302, IC 5117 and NGC 6790. These features provide a new spectroscopic window to probe both thick neutral regions and far UV regions near Lyman series. We carry out