obtained by FIMS/SPEAR and GALEX. From this, we find the scattering properties of interstellar dust in our Galaxy and suggest the intensity of extragalactic background light (EBL) at FUV wavelength. The best-fit values of the scattering properties of interstellar dust are albedo = $0.38^{-0.04}_{+0.04}$, g-factor = $0.55^{-0.15}_{+0.10}$, and EBL = 138^{-23}_{+21} CU for the allsky which are consistent well with the Milky Way dust model of Draine and direct measurements of Gardner et al., respectively. At the high Galactic latitude of |b|>10°, the observation is well fitted with the model of lower albedo = $0.35^{-0.04}_{+0.06}$ and g-factor = $0.50^{-0.20}_{+0.15}$. On the contrary, the scattering properties of interstellar dust show higher albedo = $0.43^{-0.02}_{+0.02}$ and g-factor = $0.65^{-0.15}_{+0.05}$ near the Galactic plane of |b|<10°. In the present simulation, recent three-dimensional distribution maps of interstellar dust in our Galaxy, stellar distances in the catalog of GAIA DR2, and FUV fluxes and/or spectral types in the TD-1 and Hipparcos star catalogs were used.

우주론

[포 CD-01] Cosmology in University of Seoul

Hyeonmo Koo[1], Seyeon Hwang[1], Hannah Jhee[1], Young Ju[1], Sumi Kim[1], Sangnam Park[1], Hyunmi Song[2], Cristiano Sabiu[1], Rory Smith[3], Sungwook E. Hong[3], Jaewon Lee[4], Dongsu Bak[1], and Inkyu Park[1]
[1]Department of Physics, University of Seoul, Seoul 02504, Republic of Korea
[2]Department of Astronomy, Yonsei University, Seoul , Republic of Korea
[3]Korea Astronomy and Space Science Institute, Daejeon 34055, Republic of Korea
[4]Department of , Jungwon University, Chungbuk 28024, Republic of Korea

At the University of Seoul, we are investigating the following topics in cosmology: comparing traditional clustering algorithms to our new Mulguishin algorithms, analysis of 2-body Fuzzy Dark Matter 2-body collision, 2- and 3-point clustering statistics and its dependency on the cosmological model, and dynamics of dark-matter halos around the large-scale filamentary structures. In the following sections we present a brief introduction to our studies.

[포 CD-02] The clumping factor of the IGM at the epoch of reionization in the SPHINX simulations

Taehwa Yoo[1], Taysun Kimm[1], the SPHINX collaboration
[1]Department of Astronomy, Yonsei University

The clumping factor of the inter-galactic medium (IGM) is one of the most important quantities that determine the process of cosmic reionization. However, theoretical attempts to make predictions about the clumping factor have been hampered by finite resolutions of the simulations, because small-scale structures in the IGM were under-resolved. We use high-resolution (~10 pc), cosmological radiation-hydrodynamic simulations, SPHINX, to estimate the clumping factor in the IGM. We find that the global clumping factors (CHII>3) are higher than previously estimated (CHII=3), indicating that resolving the small structures is indeed crucial to accurately model the reionization history of the Universe. We also discuss the local clumping factors, which should be useful to make predictions about the local ionization histories with analytic methods.

천문우주관측기술

[포 AT-01] Preliminary Optical and Opto-mechanical Design of Solar Telescope on Super Eye Bridge Program

Yunjong Kim[1], Jihun Kim[1], Il Kweon Moon[2], Jaegun Yoo[3], Youra Jun[1], Seonghwan Choi[1], Jeong-Yeol Han[1], Kwanghui Jeong[3]
[1]Korea Astronomy and Space Science Institute,
[2]Korea Research Institute of Standards and Science
[3]Antbridge Inc.

극한환경에서 작동 가능한 고분해능, 고정밀 대형 광학계 관측 플랫폼 시제품 (Super Eye Bridge) 인 태양 망원경 개발을 위한 광학 및 광기계 설계를 수행하였다. 차폐가 없으며 고속 팁-틸트 기능을 부여하여 이미지를 보정하고, 태양열로 인한 열적 성능저하를 방지하는 가능을 구현할 수 있도록 광학설계를 진행하였다. 광기계 설계는 극한 환경에 적용이 가능한 반사경의 경량화 및 지지 구조의 최적화를 진행하였으며 제작성을 고려한 SiC 신소재를 사용하고, 정렬을 위한 부반사경 조절부를 채용하였다. 본 연구에서는 SEB 태양망원경의 광학 및 광기계 설계 결과를 발표할 것이다.

[포 AT-02] Formation CubeSat Constellation, SNIPE mission

Jaejin Lee and SNIPE Team
Korea Astronomy and Space Science Institute

This presentation introduces Korea's SNIPE

(Small scale magNespheric and Ionospheric Plasma Experiment) mission, formation flying CubeSat constellation. Observing particles and waves on a single satellite suffers from inherent space-time ambiguity. To observe spatial and temporal variations of the micro-scale plasma structures on the topside ionosphere, four 6U CubeSats (~ 10 kg) will be launched into a polar orbit of the altitude of ~500 km in 2021. The distances of each satellite will be controlled from 10 km to more than 100 km by formation flying algorithm. The SNIPE mission is equipped with identical scientific instruments, solid-state telescope, magnetometer, and Langmuir probe. All the payloads have a high temporal resolution (sampling rates of about 10 Hz). Iridium modules provide an opportunity to upload changes in operational modes when geomagnetic storms occur. SNIPE's observations of the dimensions, occurrence rates, amplitudes, and spatiotemporal evolution of polar cap patches, field-aligned currents (FAC), radiation belt microbursts, and equatorial and mid-latitude plasma blobs and bubbles will determine their significance to the solar wind-magnetosphere-ionosphere interaction and quantify their impact on space weather.

[포 AT-03] Status and Plan of KMTNet Operation

Chung-Uk Lee, Seung-Lee Kim, Dong-Joo Lee, Sang-Mok Cha, Yongseok Lee, Dong-Jin Kim, Hong Soo Park, Seung-Cheol Bang, Hyunwoo Kang, Sungwook E. Hong, Jae-Woo Kim
Korea Astronomy and Space Science Institute

외계행성 탐색시스템 2020년 운영현황과 2021년 계획을 보고한다. 2020년은 코로나-19 팬데믹으로 인해 칠레와 남아공 관측소에서는 3월 중순부터 관측이 중단된 바 있으나, 연말부터 재가동을 시작하여 2021년 현재 3개 관측소가 모두 정상가동하고 있다. 2020년 관측장비 가동율은 99.3% 이었다. 천문박명시간 기준으로 5877.2 시간이 할당되었고, 이중 4069.7 시간 동안 관측이 이루어져 관측율은 75.2% 이었다. 이 발표에서는 2020년 날씨통계 및 주요 관측 장비의 성능 개선과 함께 2021년 관측 및 시스템 개선 계획을 소개한다.

[포 AT-04] KPDS user interface and science data transfer sequence for scientists and public users in Korea Lunar Exploration Program

Joo Hyeon Kim
Korea Aerospace Research Institute

현재 우리나라는 달탐사 개발 사업을 통하여 2022년 8월 발사를 목표로 달 궤도선인 KPLO와 과학임무 및 기술검증 임무를 수행하게 될 임무 탑재체, 임무 수행을 위한 각종 소프트웨어의 개발, 궤도/궤적의 설계 등 일련의 개발 과정을 순조롭게 수행하고 있다. 또한 달 궤도선인 KPLO와 이들 탑재체에 대한 운영과 관제를 수행하는 KPLO 심우주 지상국도 일정에 따라 개발 막바지에 접어들고 있다. 특히 KPLO 심우주 지상국에는 우리나라 대학과 정부출연연구소에 의해서 개발되는 과학탑재체 4기가 달 궤도에서 과학임무를 수행하여 얻게되는 달 탐사 과학자료, 즉, 과학임무자료를 달 탐사에 직접 참여하는 과학자들뿐만 아니라 일반인들도 교육 및 연구에 활용할 수 있도록 달 탐사 과학자료의 저장, 공개, 관리를 위한 Archive system인 KARI Planetary Data System(KPDS)도 함께 개발되고 있다. KPDS는 전문 연구자와 일반인들이 별도의 교육없이 인터넷을 통하여 쉽게 접속하여 KPLO의 과학탑재체가 획득한 달 탐사 과학자료를 검색하여 내려받아 사용할 수 있도록 서비스를 제공할 예정이다. 본 논문에서는 과학탑재체 개발기관 소속의 연구자가 달 탐사 과학자료에 대한 검보정 처리와 과학적 분석을 수행하기 위해서 텔레메트리 형태의 원본형태의 과학자료를 KPDS로부터 다운로드 받는 과정과 검보정 처리가 된 과학자료를 일반 사용자들이 내려 받아 사용할 수 있도록 과학자료가 공개되기까지 일련의 과정을 설명하고, 연구자 및 일반사용자가 직접 접하게 되는 KPDS의 주요한 사용자 환경에 대해서 설명한다.

태양/태양계

[포 SS-01] Triggering processes of two different eruptive events in active region 11283 using observation-based models

Jihye Kang[1], Satoshi Inoue[2], and Yong-Jae Moon[1]
[1]Department of Astronomy and Space Science, Kyung Hee University, [2]Department of Physics, New Jersey Institute of Technology, University Heights

An investigation of flare-producing magnetic structure is important for studying an initiation of eruptive events. In this study we select two different eruptive events, M5.3 and X1.2 flares in active region (AR) 11283. Both events occur in the same AR, but brightenings of flare ribbons, seen in EUV images, are different shapes. In order to understand triggering process of eruptive flares, we reconstruct coronal magnetic fields using two observation-based models: a nonlinear force-free field (NLFFF) extrapolation model and a magnetohydodynamic (MHD) one. The NLFFFs show that sheared arcades and overlying fan-spine configurations are found in both cases, but the distributions of magnetic twist are weaker before the M5.3 flare than before the X1.2 flare. The MHD model is to explore the temporal evolution of coronal magnetic structures by considering the NLFFF with an anomalous resistivity as an initial condition. We discuss possible processes of two