

[구 GC-28] Beyond halo mass: the role of vorticity-rich filaments in quenching galaxy mass assembly

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We examine how the mass assembly of central galaxies depends on their location in the cosmic web. The HORIZON-AGN simulation is analysed at $z \sim 2$ using the DISPERSE code to extract multi-scale cosmic filaments. We find that the dependency of galaxy properties on large-scale environment is mostly inherited from the (large-scale) environmental dependency of their host halo mass. When adopting a residual analysis that removes the host halo mass effect, we detect a direct and non-negligible influence of cosmic filaments. Proximity to filaments enhances the build-up of stellar mass, a result in agreement with previous studies. However, our multi-scale analysis also reveals that, at the edge of filaments, star formation is suppressed. In addition, we find clues for compaction of the stellar distribution at close proximity to filaments. We suggest that gas transfer from the outside to the inside of the haloes (where galaxies reside) becomes less efficient closer to filaments, due to high angular momentum supply at the vorticity-rich edge of filaments. This quenching mechanism may partly explain the larger fraction of passive galaxies in filaments, as inferred from observations at lower redshifts.

천문우주관측기술

[구 AT-01] Status Report on All-sky Infrared Spectro-Photometric Survey Mission, SPHEREx

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Based upon the previous heritage in the complete development of the infrared imaging spectrometer, NISS (Near-infrared Imaging Spectrometer for Star formation history) onboard NEXTSat-1, we are participating in the NASA MIDEX mission (PI Institute: Caltech), the all-sky infrared spectro-photometric surveyor SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer). The SPHEREx will provide us the first all-sky infrared spectro-photometric data set to probe the origin of our Universe, to explore the origin and evolution of galaxies, and to explore whether planets around other stars could harbor life.

After the SPHEREx have passed the PDR (Preliminary Design Review) on this September, the fabrication of flight hardware will be started soon. As an international partner, KASI takes part in the hardware development, the operation and the science for the SPHEREx. Here, we report the status of the SPHEREx project and the progress in the Korean participation.

[구 AT-02] Gamma-Ray Burst Observation by SNIPE mission

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For the space weather research, KASI (Korea Astronomy and Space Science Institute) is developing the SNIPE (Small-scale magNetospheric and Ionospheric Plasma Experiment) mission, which consists of four 6U CubeSats of ~ 10 kg. Besides of space weather research, the SNIPE mission has another astrophysical objective, detecting Gamma-Ray Bursts (GRB). By cross-correlating the light curves of the detected GRBs, the fleet shall be able to determine the time difference of the arriving signal between the satellites and thus determine the position of bright short bursts with an accuracy $\sim 100'$. To demonstrate the technology of the GRB observation, CSI gamma-ray detectors combined with GPS and IRIDIUM communication modules are placed on each SNIPE CubeSat. The time of each spacecraft is synchronized and when the GRB is detected, the light curve will be transferred to the

Mission Operation Center (MOC) by IRIDIUM communication module. By measuring time difference of each GRB signals, the technology for localization of GRB will be proved. If the results show some possibilities, we can challenge the new astrophysical mission for investigating the origin of GRB.

[구 AT-03] System Requirement Review of Lunar Surface magnetometer on the CLPS program

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The Korea Astronomy and Space Science Institute is participating as a South Korean partner in the Commercial Lunar Payload Services (CLPS) of NASA. In response, the Korea Astronomy and Space Science Institute is currently conducting basic research for the development of four candidate instrument payloads. The magnetic field instrument is one of them and its scientific mission objective is the moon's surface magnetic field investigation. Therefore, the development requirement of the lunar surface magnetic field instrument were derived and the initial conceptual design was started. The magnetic field instrument has a 1.2 meter boom which has two three-axis fluxgate magnetometer sensors and one gyro sensor to get a attitude information of the boom. The concept of measuring the lunar surface magnetic field will carry out using multiple sensors by placing semiconductor type magnetic field sensors inside the electric box including boom mounted fluxgate sensors. In order to overcome the very short development period, we will use the KPLO (Korean Lunar Pathfinder Orbiter) magnetometer design and parts to improve reliabilities for this instrument. In this presentation, we introduce the instrument requirements and conceptual design for the Lunar surface magnetic field instruments.

[구 AT-04] Introduction of the UVOMPIS (UV-Optical Multiband Polarizing Imager System) onboard the CAS500-3

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500kg급 차세대중형위성은 공공분야 위성 수요에 효과적으로 대응하고, 국내 위성산업 저변 확대 및 산업체 육성을 위한 사업으로 개발되고 있다. 국내 산업체에서 개발

되는 표준 위성 플랫폼이 적용될 예정인 차세대중형위성3호는 우주과학/기술검증용 위성으로, 특히 한국형발사체에 의해 2023년 발사된다는 점이 특별하다.

본 발표에서는 차세대 중형위성 3호에 제안한 우주망원경 UVOMPIS (UV-Optical Multiband Polarizing Imager System)에 대한 개념 설계 결과 및 과학 임무에 대한 소개를 통해 국내 학계와 산업계의 협력과 관심을 유도하고자 한다.

[구 AT-05] Space Telescope Plan of KASI for the Next Decades (2030년대 우주망원경 운영을 대비한 한국천문연구원 우주망원경 기획연구 활동 소개)

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한국천문연구원은 천문우주분야의 과학임무 탑재체 개발을 주도적으로 수행해오고 있다. 과학기술위성1호 주탑재체 원자외선영상분광기 FIMS 개발, 과학기술위성3호 주탑재체 다목적외선영상시스템 MIRIS 개발, 차세대소형위성1호 주탑재체 근적외선영상분광기 NISS 개발을 수행하였고, 현재는 NASA와 국제협력으로 SPHEREx 우주망원경을 개발하고 있다.

이러한 개발 과정을 거치면서 주경 20cm 이하의 소형 탑재체 과학임무 한계와 더불어 연구 현장에서 더 큰 우주망원경의 수요가 제기되었고, 현재의 국가우주개발 중장기계획에도 2030년대 한국형 우주망원경을 포함하게 되었다. 이러한 일정에 발맞추어 한국천문연구원은 2030년대 한국형 우주망원경 독자 운영을 대비하기 위해서 2020년 1월부터 주요 사업으로 한국형 우주망원경 개발을 위한 기획연구를 시작하였다. 이 기획연구는 2년 동안 수행할 예정이며, 이 기획연구를 통해서 학계의 과학임무 요구사항을 사전에 충분히 조사하고, 국내외 산학연 전문가의 견들을 종합 수렴하여 선도적인 과학 연구를 수행할 수 있는 우주망원경의 기본 제원을 확정할 예정이다. 이 발표에서는 이러한 기획연구의 세부 활동을 공유하고 보고하고자 한다.

[구 AT-06] Ebert-Fastie spectrograph using the Transformable Reflective Telescope kit

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