cavity is one of realistic solutions for QND measurement and experimental results show that its cutting-edge performance is sufficient to apply to the current gravitational wave detectors. A 300m filter cavity is under construction at adv-LIGO. KAGRA (gravitational wave detector in Japan) has also started international collaboration to build a filter cavity. Recently we joined the filter cavity project for KAGRA. Current status of squeezing and filter cavity research at KASI and details of the KAGRA filter cavity project will be presented.

[구 AT-04] Development of Transformable Reflective Telescope Kit Using Aluminum Profile and Isogrid Struture

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본 발표에서는 Transformable Reflective Telescope (TRT kit)의 새로운 버전을 소개한다. TRT kit는 기본형인 뉴턴식 반사망원경에서 부경 교체를 통해 카세그레인식, 그레고리식으로 간단하게 변형 할 수 있는 광학 실험장치이다. 본 장치는 주로 망원경 교육이나 광학계 개발에필요한 실험에 활용된다. 모듈화 설계를 통해서 여러 종류의 광학계를 쉽게 탈착하여 다양한 실험을 할 수 있다. 광기계부는 정밀하게 제작된 알루미늄 프로파일과 Isogrid구조를 채택하여 경량화 구조로 설계되었다. 이러한 경량부품들을 통해 이전 버전보다 50~70%의 중량 감소율을 달성하였다. 유한요소해석 결과 경량화된 뉴턴식 TRT kit는 이전 버전과 비교해서 자체 하중에 의한 최대 구조 변형이 0.11mm에서 0.023mm로 감소하였다. 부경 지지대 설계에는 자체 하중으로 인한 변형을 최소화하기 위해 트러스 (Truss) 구조가 도입되었다. 부경부의 자체 하중으로 인한 변형은 기존의 80μm에서 21μm로 감소하였다. 또한, 십자 레이저 정렬 장치가 추가되어 뉴턴식과 카세그레인식에서 공차 1.5' 이내로 광학계 정렬이 가능하다.

[구 AT-05] Realities of Gemini Band3 Program

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We, on behalf of Korean Gemini Office (KGO), present the comprehensive knowledge on the Gemini Band 3 program and introduce KGO's activities to promote research of Korean community utilizing Band 3 programs. We first describe the role and realities of Band 3 programs in comparison with Band 1 and 2. Then, we will provide useful suggestions for preparing Band 3 programs and introduce a few selected cases that successfully use the Band 3 time. In addition to Band 3, we will briefly summarize other proposal opportunities including the Fast Turnaround and Poor Weather Proposals.

[구 AT-06] Optomechanical Design and Structural Analysis of Linear Astigmatism Free - Three Mirror System Telescope for CubeSat and Unmanned Aerial Vehicle

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We are developing an optomechanical design of infrared telescope for the CubeSat and Unmanned Aerial Vehicle (UAV) which adapts the Linear Astigmatism Free- Three Mirror System in the confocal off-axis condition. The small entrance pupil (diameter of 40 mm) and the fast telescope (f-number of 1.9) can survey large areas. The telescope structure consists of three mirror modules and a sensor module, which are assembled on the base frame. The mirror structure has duplex layers to minimize a surface deformation and physical size of a mirror mount. All the optomechanical parts and three freeform mirrors are made from the same material, i.e., aluminum 6061-T6. The Coefficient of Thermal Expansion matching single material structure makes the imaging performance to be independent of the thermal expansion. We investigated structural characteristics against external loads through Finite Element Analysis. We confirmed the mirror surface distortion by the gravity and screw tightening, and the overall contraction/expansion following the external temperature environment change (from -30°C to +30°C).

[구 AT-07] Optomechanical Design and Structure Analysis of Prototype Siderostat for Testing Local Volume Mapper Telescope Control System

Sunwoo Lee[1], Jimin Han[1], Hojae Ahn[1], Changgon Kim[1], Mingyeong Yang[1], Tae-geun Ji[1], Sumin Lee[1],

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The Local Volume Mapper (LVM), for the Sloan Digital Sky Survey V, consists of four 16 cm telescopes with three fiber spectrographs in the Las Campanas Observatory in Chile. With the fixed telescopes on optical tables, the Alt-Alt mounted siderostats point and guide targets during spectrograph exposures. We are developing the integrated LVM instrument control software. Considering international travel restrictions caused by the COVID-19 pandemic in 2021, we decided to make a simplified version of siderostat to test the LVM telescope control system in Korea. The prototype siderostat consists of two aluminum flat mirrors, optomechanical housing structures made by aluminum profiles, and the Planewave L-350 mount. We designed the optical mirrors and the optomechanical structure of the siderostat. From structural analysis at various pointing cases, we estimated the tilt misalignments of mirrors within 4 arcsec, which would affect the telescope pointing errors.

[구 AT-08] Preliminary design of control software for SDSS-V Local Volume Mapper Instrument

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The Local Volume Mapper(LVM) project in the fifth iteration of the Sloan Digital Sky Survey (SDSS-V) will produce large integral-field spectroscopic survey data to understand the physical conditions of the interstellar medium in the Milky Way, the Magellanic Clouds, and other local-volume galaxies. We are developing the LVM Instrument control software. The architecture design of the software follows a hierarchical structure in which the high-level software packages interact with the low-level and mid-level software and hardware components. We adopt the spiral software development model in which the software evolves by iteration of sequential processes, i.e., software requirement analysis, design, code generation, and testing. This spiral model ensures that even after being commissioned, the software can be revised according to new operational requirements. We designed the software by using the Unified Modeling Language, which can visualize functional interactions in structure diagrams. We plan to use the SDSS software framework CLU for the interaction between components, based on the RabbitMQ that implemented the Advanced Message Queuing Protocol (AMQP).

고천문/ 교육홍보

[구 HE-01] Solar motion described in the Richan lizhi(日躔曆指), the Rìchan lifa(日躔曆法) and the Richan biao(日躔表) of the Kangxi reign treatises on Calendrical Astronomy, Lixiang kaocheng (曆象考成) (《역상고성》의 <일전역지>, <일전역법>, <일전표>에 기록된 태양의 운동)

Seung-Urn choe[1,2], Min-Jeong Kang[3], Seulki Kim[1], Sukjoo Kim[4], Wonmo Suh[5], Jinhyon Lee[6], Yong Bok