

## 포스터 발표 초록

### 고에너지 천문학/ 이론 천문학

#### [포 HT-01] Could There Be a Unified Spectral Model for Black Holes and Neutron Stars?

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Accretion flows around black holes and neutron stars emit high energy radiation with varying spectral and timing properties. Observed timing variations, both short and long-term, point to the existence of a mechanism, dictated by the flow dynamics, and not by the stellar surface or magnetic fields, that is common in both. Spectral energy distributions of multiple sources indicate that the Comptonization process, the dominant mechanism for changing states in X-ray, takes place inside the flow that has similar physical properties in both the objects. In a series of observational and numerical studies, we enquire about the following: 1. Is there a steady state configuration for accreting matter around black holes that can explain spectral and timing properties? 2. Could a similar formalism explain spectral and timing properties of accretion around neutron stars? 3. Could there be a generalized flow configuration for accreting matter around such compact objects? Furthermore, we show that a unified spectral model can be constructed based on the generalized flow configuration, common to black holes and neutron stars.

#### [포 HT-02] Properties of polarised emission in radio relics

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Radio relics track cosmological shocks propagating through the intracluster medium. They are among the largest and most polarised sources in the radio sky reaching polarisation fractions up to ~60%. High-resolution observations in total intensity and in polarisation show complex structures on kiloparsec scales. Nevertheless, the relation between the observed features and the underlying morphology of the magnetic field is not clear. In this work we three dimensional

MHD-Lagrangian simulations to study the polarised emission produced by a shock wave that propagates through a turbulent medium that resembles the intracluster medium. We find that the synchrotron emission produced in a shocked turbulent medium can reproduce some of the observed features in radio relics. Our work confirms that radio relics can also be formed in an environment with a tangled magnetic field. We also study the effect of intrinsic Faraday Rotation and the depolarisation of the source. Finally, we show how our results depend on the angular resolution of observations.

### 고천문학/ 천문역법

#### [포 HA-01] Current status of automatic translation service by artificial intelligence specialized in Korean astronomical classics (천문 고문헌 특화 인공지능 자동번역 서비스의 현황)

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인공지능 기계학습에 의한 한문고전 자동번역기는 승정 원일기 뿐만 아니라, 한국 고문헌 중 천문 기록에 특화되어 한자로 된 천문 고전을 한글로 번역해 서비스하고 있다. 한국천문연구원은 한국지능정보사회진흥원이 주관하는 2019년도 Information and Communication Technology 기반 공공서비스 촉진사업에 한국고전번역원과 공동 참여하여 이 자동 번역기 개발을 완료한 것이다. 이 번역기의 개발 목적은 초벌 번역 수준일지라도 문장 형태의 한문을 한글로 자동 번역하는 것이며, 이 연구는 현재 번역기 운용 현황을 서비스 별로 분석하고자 한다. 자동 번역관련 서비스는 크게 3가지이다. 첫째, 누구나 웹 접속을 통해 사용 가능한 한문고전 자동번역 대국민 서비스이다. 1년간 자체 시험을 거쳐 2021년 1월 12일 시험판을 오픈하여 운용 중에 있다. 둘째, 기관별로 구축된 코퍼스와 도메인 특화된 번역 모델 등을 관리할 수 있는 한문고전 자동번역 확산 플랫폼 서비스이다. 대국민 서비스와 함께 클라우드 기반으로 서비스되며, 한국고전번역원이 관리를 담당한다. 셋째, 자동번역 Applied Programmable Interface를 활용한 한국천문연구원 내 자체 활용이 가능한 천문고전 자동번역 서비스이다. 서비스 현황 분석은 기관별 관리 서비스에 해당되는 한문고전 자동번역 확산 플랫폼에서 집계하여 제공하는 대시보드의 통계 기능을 활용한다. 각 서비스별 문장과 파일 번역 이용 건수, 번역 속도, 평균 자수 뿐만 아니라, 번역 모델 프

로필에 따른 이용률 분석이 가능하다. 이에 따른 주요 분석 중 하나인 올해 전체 번역 이용 건수는 한 해 각 기관의 평균 방문자수 대비 87% 성과 목표에 해당되는 약 38만 건에 근접할 것으로 예측된다. 이 자동 번역기는 원문 해독 시간을 단축시키는 효과와 함께 미번역 천문 고문헌의 활용성을 높여 다양한 연구에 기여할 것이다.

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## [포 HA-02] Analysis of the *Sohyeon-Donggungilgi* Records of Solar Halo Observations

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The Donggungilgi (東宮日記) is the daily records of the Siganwon (侍講院), which was a royal office in the Joseon dynasty that took charge of the education for the crown prince who dwelled in the Donggung (East Palace). This literature contains records of meteorological and astronomical observations as well as educational matters. The *Sohyeon-Donggungilgi* (昭顯東宮日記) includes records from 1625 to 1645, when Prince Sohyeon, the first son of King Injo (仁祖), was the crown prince. We investigate the records of solar halo observations in the *Sohyeon-Donggungilgi*. For consistency, we restrict our investigation to the period before the second Manchu invasion of Korea (i.e., 1625 to 1635). We extract 2,684 records and classify them into ten events according to the terms in their descriptions. The largest and smallest number of observation records are for the Hun (暈) and Geuk (戟) events (1,794 and 7 records, respectively). To verify what each event represents in modern atmospheric terms, we refer to historical documents of the Seoungwanji (書雲觀志, Treatise on the Bureau of Astronomy) and Cheonmundaeseong (天文大成, Great Achievements in Astronomy). We also calculate the solar altitude based on the observation hour and compare the descriptions to compute simulations provided by Arbeitskreis Meteore e.V.. We find that the descriptions of the Hun, Junghun (重暈), Yi (珥), and Baekhonggwani (白虹貫日) events indicate a 22° halo, 22° and 46° halos, a parhelion, and a parhelic circle, respectively. Alternatively, we estimate that the Gwan (冠), Dae (戴), Bae (背), Li (履), and Gyohun (交暈) events describe arcs tangent to a 22°

or 46° halo such as a upper or lower tangent arc, a circumzenithal arc, or a parry arc. We suggest that further studies are required for the Geuk event because the descriptions of this event differ from both documents referred to this study. In the sense that the number of observation records of the Geuk event is the smallest, however, this event may describe a rare phenomenon. We believe that this work will contribute to the study of historical records of solar or lunar halos.

## 성간물질/별생성/우리는하

## [포 IM-01] Optical spectroscopy of LMC SNRs to reveal the origin of [P II] knots

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Observational studies of supernova (SN) feedback are limited. In our galaxy, most supernova remnants (SNRs) are located in the Galactic plane, so there is contamination from foreground/background sources. SNRs located in other galaxies are too far, so we cannot study them in detail. The Large Magellanic Cloud (LMC) is a unique place to study the SN feedback due to their proximity, which makes possible to study the structure of individual SNRs in some detail together with their environment.

Recently, we carried out a systematic study of 13 LMC SNRs using [P II] (1.189  $\mu$ m) and [Fe II] (1.257  $\mu$ m) narrowband imaging with SIRIUS/IRSF, four SNRs (SN 1987A, N158A, N157B and N206), show [P II]/[Fe II] ratio much higher than the cosmic abundance. While the high ratio of SN 1987A could be due to enhanced abundance in SN ejecta, we do not have a clear explanation for the other cases.

We investigate the [P II] knots found in SNRs N206, N157B and N158A, using optical spectra obtained last November with GMOS-S mounted on Gemini-South telescope. We detected several emission lines (e.g., H I, [O I], He I, [O III], [N II] and [S II]) that are present in all three SNRs, among other lines that are only found in some of them (e.g., [Ne III], [Fe III] and [Fe II]). Various line ratios are measured from the three SNRs, which indicate that the ratios of N157B tend to differ from those of other two SNRs.

We will use the abundances of He and N (from the detection of [N II] and He I emission lines), together with velocity measurements to tell