

We present a recent progress on calibration of stellar isochrones based on a set of high-resolution spectra for 170 G- and K-type dwarfs in the solar neighborhood. We compare observed magnitudes of these stars in a number of broad passbands [UB(B_T)V(V_T)RIJHK] with model magnitudes generated using ATLAS9 synthetic library at the previously derived set of spectroscopic parameters. We find systematic offsets in colors from these passbands, which are mainly revealed as a function of effective temperature of stars. In order to remove these systematic color mismatches, we derive correction functions and apply them to the model spectra.

[포 IM-12] Abundant Methanol Ices toward a Massive Young Stellar Object in the Galactic Center

Deokkeun An¹, Kris Sellgren², A. C. Adwin Boogert³, Solange V. Ramirez⁴, Tae-Soo Pyo⁵
¹Ewha Womans University, ²The Ohio State University, ³USRA-SOFIA Science Center, ⁴Caltech/NExScl, ⁵NAOJ/Subaru

Methanol (CH₃OH) is a key species in the formation of complex organic molecules. We report the first detection of solid CH₃OH in a line of sight toward the Galactic center (GC) region, based on L-band spectra taken with the Subaru telescope, aided by L'-band imaging data and moderate-resolution spectra from NASA/IRTF. It is found toward a background star, ~8000 AU in projected distance from a newly discovered massive young stellar object (YSO). This YSO also exhibits a strong CO₂ ice absorption band at ~15 μm in Spitzer/IRS data, which has a prominent long-wavelength wing. It confirms that a high CH₃OH abundance is responsible for the broad 15 μm CO₂ ice absorption towards massive YSOs in the GC. Clearly, CH₃OH formation in ices is efficient in the GC region, as it is in star-forming regions in the Galactic disk. We discuss implications of our result on the astrochemical processes in the hostile GC molecular clouds.

[포 IM-13] FIRST NEAR-INFRARED CIRCULAR POLARIZATION SURVEY

Jungmi Kwon¹, Motohide Tamura², James H. Hough³ and SIRPOL Team
¹Institute of Space & Astronautical Science, Japan Aerospace Exploration Agency, ²The University of Tokyo / Astrobiology Center of

NINS / Exoplanet Project Office of National Astronomical Observatory of Japan, ³University of Hertfordshire

Polarimetry is an important tool for studying the physical processes in the interstellar medium, including star-forming regions. Polarimetry of young stellar objects and their circumstellar structures provides invaluable information about distributions of matter and configurations of magnetic fields in their environments. However, only a few near-infrared circular polarization (CP) observations were reported so far (before our survey). A systematic near-infrared CP survey has been firstly conducted in various star-forming regions, covering high-mass, intermediate-mass, and low-mass young stellar objects. All the observations were made using the SIRPOL imaging polarimeter on the Infrared Survey Facility (IRSF) 1.4 m telescope at the South African Astronomical Observatory (SAAO). In this presentation, we present the first CP survey results. The polarization patterns, extents, and maximum degrees of circular and linear polarizations are used to determine the prevalence and origin of CP in the star-forming regions. Our results are explained with a combination of circumstellar scattering and dichroic extinction mechanism generating the high degrees of CP in star-forming regions. The universality of the large and extended CPs in star-forming regions can also be linked with the origin of homochirality of life.

항성 및 항성계

[포 ST-01] A MONTE CARLO STUDY OF FLUX RATIOS OF RAMAN SCATTERED O VI FEATURES AT 6825 Å AND 7082 Å IN SYMBIOTIC STARS

Young-Min Lee, Seok-Jun Chang, Jeong-Eun Heo, Chae-Lin Hong and Hee-won Lee
 Department of Physics and Astronomy, Sejong University, Seoul, Korea

A symbiotic star is a wide binary system consisting of a hot white dwarf and a mass losing giant, where the giant loses its material in the form of a slow stellar wind resulting in accretion onto the white dwarf through gravitational capture. Symbiotic stars are known to exhibit unique spectral features at 6825 and 7082, which are formed from O VI 1032 and 1038 through Raman

scattering with atomic hydrogen. In this Monte Carlo study we investigate the flux ratio of 6825 and 7082 in a neutral region with a geometric shape of a slab, cylinder and sphere. By varying the amount of neutral hydrogen parametrized by the column density along a specified direction, we compute and compare the flux ratio of Raman scattered O VI 6825 and 7082. In the column density around 1020 cm^{-2} , flux ratio changes in a complicated way, rapidly decreasing from the optically thin limit to unity the optically thick limit as the column density increases. It is also notable that when the neutral region is of a slab shape with the O VI source outside the slab, the optically thick limit is less than unity, implying a significant fraction of O VI photons escape through Rayleigh scattering near the boundary. We compare our high resolution CFHT data of HM Sge and AG Dra with the data simulated with finite cylinder models confirming that 'S' type symbiotic tend to be characterized by thicker HI region that 'D' type counterparts. It is expected that this study will be useful in interpretation of the clear disparity of Raman O VI 6825 and 7082 profiles, which will shed much light on the kinematics and the asymmetric distribution of O VI material around the hot white dwarf.

[포 ST-02] Preliminary Result of Exoplanet Transit Observation by NYSC 1m Telescope

Wonseok Kang¹, Taewoo Kim¹, Sun-gill Kwon¹, Sang-Gak Lee¹, Tobias C. Hinse²
¹National Youth Space Center, ²Korea Astronomy and Space Science Institute

During the year 2016 the newly installed NYSC (National Youth Science Center) 1m optical telescope was officially commissioned. Calls for future observational programmes were announced. During test observations we carried out an observational project aimed at follow-up observations of transiting extrasolar planets. To predict future transits we developed the "TransitSearch" code implemented in Python utilizing transit information from the Open Exoplanet Catalogue. During three nights in April and June 2016 we observed planetary transits of HAT-P-3b and TrES-3b. Preliminary light curves of the transit events are presented alongside with best-fit models. From this experience we plan to improve the optical alignment and photometric performance by operating the 1m NYSC telescope in a strongly out-of-focus mode for transit observations.

[포 ST-03] High resolution spectroscopic observation study on six FU Orionis type stars

Hyung-Il Oh¹, Tae Seog Yoon¹, Hyun-Il Sung^{1, 2}
¹Department of Astronomy and Atmospheric Sciences, Kyungpook National University
²Korea Astronomy and Space Science Institute

FU Orionis 형 별들은 폭발 현상(outburst)을 일으키며 급작스럽게 변광 하는 전주계열(PMS) 변광성의 한 류(class)이다. 원형(prototype)인 FU Oriions를 비롯하여 이와 비슷한 분광 특성을 갖는 이 그룹은 FUors로 알려져 왔다. 이와 같은 유형의 별들이라도 주변 환경 및 원반의 활동에 따라서 광학 분광선들의 모양이나 특징은 다르게 나타난다. 2013년 2월부터 2016년 3월까지 보현산 천문대의 BOES 분광기로 6개의 FUors (FU Ori, V1057 Cyg, V1515 Cyg, HBC 722, V582 Aur, 2MASS J06593158-0405277)에 대한 고분산 스펙트럼을 얻었다. 발머선을 포함한 여러 파장대의 선들을 비교 분석 하였으며 주요 분광선의 변화 양상을 나타내고 그 변화 원인을 유추하고자 한다.

[포 ST-04] Relations between Gaussian width of Power Excess and Other Global Seismic Properties of Solar-like Stars from Main-sequence to Subgiant

Ki-Beom Kim^{1,2}, Heon-Young Chang^{1,2}
¹Department of Astronomy and Atmospheric Sciences, Kyungpook National University, Daegu, Korea, ²Research and Training Team for Future Creative Astrophysicists and Cosmologists (BK21 Plus Program), Kyungpook National University, Daegu, Korea

The Kepler space mission provides quantitative and qualitative photometric time series of oscillating stars. It is possible to examine statistical study with seismic properties of solar-like stars. Global seismic properties - large frequency separation ($\Delta\nu$), frequency of maximum power (ν_{\max}) and amplitude of Gaussian envelope (A) widely have been used to determine empirical scaling relations for inferring the stellar physical quantities - mass, age and temperature. We aim to confirm whether width of Gaussian envelope on power excess ($\delta\nu_{\text{env}}$) can be used with parameter of scaling relation before redgiant phase using Kepler data. Therefore we analyze the characteristics of $\delta\nu_{\text{env}}$ of 129 solar-like stars from main-sequence to subgiant. We have demonstrated that $\delta\nu_{\text{env}}$ has highly correlations with global parameters - $\Delta\nu$ and ν_{\max} . We have also found the break of $\delta\nu_{\text{env}}$ - $\Delta\nu$ and ν_{\max} relations.