intrinsically carries a bias due to noise in the distance estimates. We provide convolution- and deconvolution-based algorithms capable of removing this bias -- thus able to exploit the full cosmological information -- in order to reconstruct intrinsic distributions and correlations between distance-dependent quantities. We then show some direct applications of our techniques to the VIMOS Public Extragalactic Redshift Survey (VIPERS) and the Sloan Digital Sky Survey (SDSS) datasets. Our methods impact a broader range of studies, when at least one distance-dependent quantity is involved; hence, they will be useful for upcoming large-volume surveys, some of which will only have photometric information.

태양계

[포 SS-01] A Study on Rima Hadley Region of the Moon Using Moon Mineralogy Mapper(M3) Spectra (M3 스펙트럼 데이터를 이용한 달 Rima Hadley 지역 연구)

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달의 지형 중 계곡과 같아 보이는 곳을 Rima 또는 Rille 지형이라고 부르며 국제천문연맹(IAU : International Astronomical Union)과 미국지질조사국(USGS : United States Geological Survey)에서 관리하는 행성 지명 사전(Gazetteer of Planetary Nomenclature)에 명명된 달의 Rima 지역은 111개에 이른다. 그 중 Rima Hadley 지역은 아폴로 15호가 착륙한 지점으로 잘 알려져 있다. 본 연구에서는 2008년에 발사된 Chandrayaan-1 위성의 적외선 초분광 영상 탑재체인 Moon Mineralogy Mapper(M3) 데이터를 통해 Rima Hadley 지역의 분광학적 특성을 살펴보았다. M3 데이터는 감람석(olivine)이 풍부한 지역에서는 1 um 를 중심으로 흡수선이 나타남을 보이며, (Peter J. Isaacson et al., 2011) 2.8 um 중심의 흡수선을 통해 달의 OH(hydroxyl) 분포에 대해 설명한다. (Carle M. Piters et al., 2009, Georgiana Y. Kramer et al., 2011) 본 연구에서는 Rima Hadley 지역이 1 um 파장 근처에서 강한 흡수선을 가지는 것을 볼 수 있었고, 감람석이 풍부한 지역임을 확인할 수 있었다. 이처럼 감람석이 풍부한 곳은 현무암 지역으로 과거 용암이 분출되어진 곳으로 추측 해 볼 수 있다. 본 연구를 발전시킨다면 Rima Hadley 지역의 생성과 다른 Rima 지형의 형성 과정에 대해 더욱 많은 정보를 얻을 수 있을 것으로 기대된다.

고에너지천문학/이론천문학

[발표취소] Gravitational Lensing by an Isothermal Sphere with a Supermassive Black Hole

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Gravitational lensed quasar systems are usually explained by a source quasar lensed by a galaxy that can be approximated by an isothermal sphere. But most galaxies have a supermassive black hole (SMBH) at its center. We study the lensing by an isothermal sphere with a central SMBH. The additional lensing effects of a SMBH on the number, position, and magnification of lensed images are investigated. We apply the analysis to observed lens systems including Q0957+561. We also study the lensing by an elliptical mass distribution with a SMBH.

[포 HA-02] The Relation between the Spectral Lag and the Collimation-Corrected Luminosity in Gamma-Ray Bursts

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Gamma-Ray Bursts(GRBs) are the most violent event in the universe, whose detection rate is a few in a day. The spectral lag, which is commonly observed in the observed light curves of GRBs, is a difference in arrival times of the high-energy and low-energy photons. The relation between the spectral lag and the luminosity of the observed GRBs is shown to be anti-correlated in previous studies. In reported relations to date, the isotropic luminosity has been assumed. On the other hand, GRBs are likely to emit its energy through a beamed jet. In this study, we attempt to obtain the relation between the spectral lag and the collimation-corrected luminosity. We have

calculated collimation-corrected luminosities and opening angles using the observed light curves taken from a database of Swift/BAT, XRT. We expect to increase its significance level by expanding a sample size compared with those previously analyzed.

성간물질/별생성/우리은하

[포 IM-01] Study on the global distribution of far-ultraviolet emission in our Galaxy

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FIMS/SPEAR is a dual-channel far-ultraviolet imaging spectrograph on board the Korean microsatellite STSAT-1, which was launched on 2003 September 27. The primary mission goal of FIMS was to conduct a survey of diffuse far UV emissions in our Galaxy. For this purpose, FIMS completed a survey of about 84% of the sky during its operation of a year and a half. The present study aims to analyze this survey data made in the far UV wavelengths to understand the global evolution of our Galaxy. The far UV wavelength band is known to contain important cooling lines of hot gas: hence, the study will show how the hot gas in our Galaxy, produced by stellar winds and supernova explosion, evolves globally to cool down and become mixed with ambient cooler medium. One of the main findings from previous analyses of the FIMS data is that molecular hydrogen exists ubiquitously in our Galaxy. This discovery leads to another important scientific question: how is molecular hydrogen distributed in our Galaxy and how does it affect globally the evolution of our Galaxy as a cold component? Hence, the present study will cover both the hot and cold components of the ISM, which will also provide the opportunity to investigate the interactions between the two.

[포 IM-02] SgrA* 22GHz KaVA(+TAK) observation and its Amplitude Calibration

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SgrA* located in the center of the Milky Way is of great interest to understand the physics of supermassive black hole(SMBH) and the interaction of the G2 cloud around SgrA* with the accretion flow which was expected since 2013. In order to seize this rare opportunity, KVN and VERA Array (so called, KaVA) has started an intensive monitoring program of SgrA* at 22/43 GHz where scatter broadening is reduced compared to lower frequency VLBI observations. We present the results of KaVA SgrA* observation together with Takahagi (32m) and Yamaguchi (32m) telescopes at 22 GHz on March 24, 2013. We have tested both a standard amplitude calibration methods using the Tsys and antenna gain information and a template amplitude calibration method which uses a peak of H2O maser line of nearby maser source (SgrB2), and found that the latter method is useful when an accuracy of Tsys measurement or antenna gain of a telescope is poor. In our comparison, the difference between the two methods is around 20% (~5% for the KVN and ~15% for the VERA when the elevation is above 20°). We also imaged SgrA* with a total flux of ~0.7 Jy at 22GHz, and fitted an elliptical Gaussian model which has a size of ~2.5mas for major axis and ~1.7mas for minor axis, respectively.

[포 IM-03] HCO+ Observations toward Compact Radio Continuum Sources Using the KVN 21-m Telescopes to Trace Dark Molecular Gas

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It has been known that there is “dark gas” invisible either in 21-cm HI or 2.6-mm CO emission which are general tracers of atomic and molecular gas, respectively. Many researchers consider that the dark gas is “Dark Molecular Gas (DMG)” composed of CO-free H_2 in the intermediate zone between atomic and full-fledged molecular gas and that HCO+ and OH molecules are good tracers of the DMG since they can form in much lower H_2 column densities where CO does not. We have carried out HCO+ J=1-0 absorption observations toward nine bright extragalactic radio