We present the application of the Point Spread Function (PSF) deconvolution method to the astronomical Integral Field Unit (IFU) Spectroscopy data focus on the restoration of the galaxy kinematics. We apply the Lucy-Richardson deconvolution algorithm to the 2D image at each wavelength slice. We make a set of mock IFU data which resemble the IFU observation to the model galaxies with a diverse combination of surface brightness profile, S/N, line-of-sight geometry and Line-Of-Sight Velocity Distribution (LOSVD). Using the mock IFU data, we demonstrate that the algorithm can effectively recover the stellar kinematics of the galaxy. We also show that lambda_R_e, the proxy of the spin parameter can be correctly measured from the deconvolved IFU data. Implementation of the algorithm to the actual SDSS-IV MaNGA IFU survey data exhibits the noticeable difference on the 2D LOSVD, geometry, lambda_R_e. The algorithm can be applied to any other regular-grid IFS data to extract the PSF-deconvolved spatial information.

특별세션 EHT

[구 EHT-01] Event Horizon Telescope : Earth-sized mm-VLBI array to image supermassive black holes

Jae-Young Kim
Max Planck Institute for Radio Astronomy, Auf dem Huegel 69, D-53121 Bonn, Germany

Immediate vicinity of a supermassive black hole (SMBH) is an important place to test general relativity in strong gravity regime. Also, this is a place where mass accretion and jet formation actively occurs at the centers of active galaxies. Theoretical studies predict presence of bright ring-like emission encircling an accreting SMBH with a diameter of about 5 Schwarzschild radii, and a flux depression at the center (i.e., BH shadow). Direct imaging of the BH shadow is accordingly of great importance in modern astrophysics. However, the angular sizes of the horizon-scale structures are desperately small (e.g., ~40-50 microarcseconds (uas) diameter for the nearest best candidates). This poses serious challenges to observe them directly.

Event Horizon Telescope (EHT) is a global network of sensitive radio telescopes operating at 230 GHz (1.3 mm), providing ultra-high angular resolution of 20 uas by cutting-edge very long baseline interferometry techniques. With this resolution, EHT aims to directly image the nearest SMBHs; M87 and the galactic center Sgr A* (~40-50 uas diameters). In Spring 2017, the EHT collaboration conducted a global campaign of EHT and multiwavelength observations of M87 and Sgr A*, with addition of the phased ALMA to the 1.3mm VLBI array. In this talk, I review results from past mm-VLBI and EHT observations, provide updates on the results from the 2017 campaign, and future perspectives.

[구 EHT-02] EHT data processing and BH shadow imaging techniques

Ilje Cho[1,2] on behalf of the EHT Collaboration
[1] *University of Science and Technology*
[2] *Korea Astronomy and Space Science Institute*

Event Horizon Telescope (EHT) aims to resolve the innermost region to the super massive black hole (SMBH) with its extremely high angular resolution (~20-25 uas) and enhanced sensitivity (down to 1-10 mJy) in concert with the Atacama Large Millimeter/submillimeter Array (ALMA) at 1.3 mm wavelength. This has a great importance as the first observational probe of the black hole shadow which has been theoretically predicted as a ring-like emission affected by the general relativistic effect under a strong gravitational field of SMBH.

During the 2017 April 5-11, four nights of EHT observing campaign were carried out towards its primary targets, M87 and SgrA*. To robustly ensure the data processing, independent pipelines for various radio data calibration softwares (e.g., AIPS, HOPS, CASA) have been developed and cross-compared each other. The EHT has also been developing newer interferometric imaging techniques (e.g., eht-imaging-library, SMILI, dynamical imaging), as well as using an established method (CLEAN). With these, the EHT has designed various strategies which will be adopted for convincing imaging results.

In this talk, I review how the robustness of EHT data processing and imaging will be validated so that the results can be ensured against well known uncertainties or biases in the interferometric data calibration and imaging.

[구 EHT-03] Korean activities for mm-VLBI and EHT collaboration

Taehyun Jung[1,2], Bong Won Sohn[1,2], Guangyao Zhao[1], Ilje Cho[1,2], Jae-Young Kim[3], and EHT Collaboration
[1]*Korea Astronomy and Space Science Institute,* [2]*University of Science and Technology,* [3]*Max Planck Institute for Radio Astronomy*

Very Long Baseline Interferometry (VLBI) is a special technique which can provide high angular resolutions of milliarcsecond and sub-milliarcsecond sales in radio astronomical observations. Recently, the mm/sub-mm VLBI observations becomes more widely available and related activities are increasing accordingly. In this talk, I'll introduce ongoing global mm-VLBI activities and EHT collaboration and our (Korean) contributions to them.

[구 EHT-04] Multi-frequency VLBI view of the vicinity of the nearest supermassive black hole

Guang-Yao Zhao[1] on behalf the EHT Collaboration
[1]*Korea Astronomy and Space Science Institute*

In this talk, I will briefly review the discovery and early-time interferometric observations of the Galactic Center radio source and then go through recent major updates including the improvement in the array capabilities, developments of the scattering and intrinsic structure modeling, and high-frequency astrometric observations of this source. Introduction of the 1.3 mm VLBI observations in 2017 and 2018 (e.g. array configuration and signal-to-noise ratios), as well as the related multi-wavelength campaign (including GMVA and EAVN observations), will be also presented.

특별세션 - 남북천문협력

[구 IKAC-01] Status of North Korean Science and Technology and Inter-Korean S&T Cooperation - Focusing on the activities of UKAST
(북한 과학기술과 남북과학기술협력 현황 - 통일과학기술연구회 활동을 중심으로)

Hyun-kyoo Choi[1], Insung Yim[2], Hong-Jin Yang[2]
[1]*Korea Institute of Science and Technology Information,*
[2]*Korea Astronomy and Space Science Institute*

북한은 과학기술중시정책을 추진하면서 과학기술 우대 환경을 조성하고, 전민과학기술 인재화 및 과학교육 강조 그리고 새 세기 산업혁명을 내세우며 자력갱생과 경제 발전을 위한 과학기술의 도구적 입장을 가지고 있다. 특수부문에서 강점을 가지고 있고, 기초과학 부문 및 정보기술 영역에서 성과를 보여주고 있고, 국제학술활동에도 참여하는 등 얼마간의 대외 개방성도 나타내고 있다. 핵문제 즉 비핵화의 과제가 남아 있으나 남북 정상회담과 북미정상회담을 통해 남북교류협력의 여건이 나아지고 있고, 과학기술계 정부출연연구기관 소속의 연구자들이 북한연구과 남북협력을 준비한다. 대북 재제의 여건하에서 활성화될 수는 없으나 남북 과학자간 학술대회를 개최하고, 백두산연구기지 설립으로 백두산 지진 뿐만 아니라 천문 연구와 천연물, 광물 개발 등을 제안하였다. 앞으로는 남북과학기술협력센터 설립을 검토하고 보다 다양한 남북 과학기술 협력을 위한 기반 조성을 위한 향후 계획을 논한다.

[구 IKAC-02] Cooperation in the field of Astronomy in South and North Korea (남북한 천문분야 협력 현황)

Insung Yim[1], Hong-Jin Yang[1], Youngsik Park[1], Young Chol Minh[1], Hyun-kyoo Choi[2]
[1]*Korea Astronomy and Space Science Institute,*
[2]*Korea Institute of Science and Technology Information*

한국천문연구원에서는 지난 2015년부터 남북한 천문분야 활성화 및 공동연구 기반 마련을 위한 연구를 수행하여 남북한 천문분야 협력 가능한 천문분야를 발굴하고 단계별 추진 방향을 제시하였다. 천문학은 과학기술분야 중 남북한 상호 신뢰 구축과 민족 동질성 회복에 기여할 수 있는 기초 학문으로, 과학기술계에서 남북협력 가능성이 높은 연구 분야로 평가받고 있다. 천문연은 남북 천문분야 학술 교류를 통한 남북한 천문분야 공동 발전, 남한 천문분야 기술이전을 통한 남북 균형 발전, 천문학 연구 범위 확대를 위한 남북한 협력 토대를 마련하기 위해 노력 중이다. 또한, 학술교류를 통한 공동연구 및 학술회의를 추진하고 있다. 그동안 수행했던 남북한 천문분야 협력 현황과 앞으로 방향 등에 대해 발표하고자 한다.

[구 IKAC-03] Preliminary plan for the establishment of Mt. Baekdu observatory (백두산 천문대 설립을 위한 기초 계획)

Hong-Jin Yang[1], Hong-Suh Yim[1], Do-Young Byun[1,2], Jong-Kyun Chung[1], Young-Jun Choi[1,2], Insung Yim[1]
[1]*Korea Astronomy and Space Science Institute (KASI), Korea*
[2]*University of Science and Technology (UST), Korea*

2018년 7월 국회의원회관에서 백두산과학기지 구축 방안에 대한 포럼이 있었다. 포럼에서는 천문, 화산활동, 광물자원, 천연물에 대한 주제별 발표가 있었으며, 한국천문연구원은 백두산과학기지 내 천문대 구축에 대한 기초 계획을 소개하였다. 그리고 지난 11월 한국천문연구원에서는 백두산천문대 구축에 대한 포럼을 통해 광학, 전파, 태양·우주환경 그리고 전통천문 분야에 대한 연구 계획을 소개한 바 있다. 천국천문연구원은 지난 2015년부터 남북천문분야 교류를 통한 남북한 천문분야 공동 발전을 위해 노력하고 있다. 본 발표에서는 최근 백두산과학기지와 천문대 설립을 위한 현황과 천문 분야별 연구 방향에 대해