Gaseous inner disks are the main controller of the final structure of planetary systems as well as the building place of planets, especially of terrestrial planets. However, the inner disk of <5AU is still difficult to be spatially resolved even at the closest star forming regions. Resolving velocity structure in the disk with high resolution infrared spectroscopic study is the best approach to study the inner disk at this moment. Here, we present the IGRINS (Immersion GRating INfrared Spectrometer) result of the Class I young stellar object, ESO Ha 279a, in the Serpens molecular cloud region. IGRINS has a resolving power of R=40,000, corresponding to the velocity resolution of 7 km/s at K-band, which is perfect to study the hot inner disk structure. We report that NaI and CO overtone emission lines are indeed good tracers of the rotating inner warm disk tracing from ~0.04 to ~7AU of this source. We also report the disk properties using other emission lines.

[구 IM-06] POLYCYCLIC AROMATIC HYDROCARBON (PAH) MOLECULES IN THE DISKS AROUND LOW MASS STARS

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We present 5-14 μm Infrared Spectrograph spectra of 14 T Tauri stars which show Polycyclic Aromatic Hydrocarbon (PAH) features and reside in 0.7 pc from θ^1 Ori C. The spectral types of nine out of 11 stars have spectral type information, with types ranging from K7-M5. These stars do not supply strong enough UV photons to excite PAH emission in their disks. Therefore, we consider the detection of PAH emission in disks around low mass stars illuminated by an external source of UV photons, namely, from Trapezium OB association, including θ^1 Ori C. The morphological features of PAH emission from most disks around K-M type host stars are unique, not belonging to any known classes of PAH features. We found that the PAH emission strengths decrease as the projected distance of the objects from θ^1 Ori C increase. We suggest future far-IR and submm/mm observations for better understanding of the characteristics and distribution of PAHs in these disks.

AGN

[구 AGN-01] First Detection of 350 Micron Polarization from 3C 279

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We report the first detection of linearly polarized emission at an observing wavelength of 350 mum from the radio-loud active galactic nucleus 3C 279. We conducted polarization observations for 3C 279 using the SHARP polarimeter in the Caltech Submillimeter Observatory on 2014 March 13 and 14. For the first time, we detected the linear polarization with the degree of polarization of 13.3% ± 3.4% (3.9sigma) and the electric vector position angle (EVPA) of 34.°7 ± 5.°6. We also observed 3C 279 simultaneously at 13, 7, and 3.5 mm in dual polarization with the Korean very long baseline interferometry (VLBI) Network on 2014 March 6 (single dish) and imaged in milliarcsecond (mas) scales at 13, 7, 3.5, and 2.3 mm on March 22 (VLBI). We found that the degree of linear polarization increases from 10% to 13% at 13 mm to 350 mum and the EVPAs at all observing frequencies are parallel within <10° to the direction of the jet at mas scale, implying that the integrated magnetic fields are perpendicular to the jet in the innermost regions. We also found that the Faraday rotation measures RM are in a range of -6.5 × 102 ~ -2.7 × 103 rad m-2 between 13 and 3.5 mm, and are scaled as a function of wavelength: | {RM}| \propto {lambda }-2.2. These results indicate that the millimeter and sub-millimeter polarization emission are generated in the compact jet within 1 mas scale and affected by a Faraday screen in or in the close proximity of the jet.

[구 AGN-02] Morphological research on radio loud AGN 4C39.25 using KaVA observation

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4C39.25 (0923+392) is a distant radio loud AGN placed at redshift 0.695. The motivation of our work is peculiar properties 4C39.25. Firstly, it has a conspicuous distinction of jet direction between kilo-parsec scale observation made by VLA (Kollgaard et al. 1990) and the parsec scale

observation by VLBA (Kellermann et al. 1998). This might indicate episodic-jet activity which recently turned on.

This object currently shows two stationary compact parsec-scale components which are bright jet component on east and less luminous core on west. Also, it is known that there have been superluminal jet components which are flowing from the core toward east, and then merging with the bright jet component (Marscher et al. 1991, Alberdi et al. 2000, Lister et al. 2013). Although 4C39.25 seems to be a blazar-like source having broad emission lines (SDSS) and superluminal motion, its property that jet component is brighter than the core is different from ordinary blazars. Furthermore, it has young radio galaxy-like properties such as non-variation in total flux (Alberdi et al. 1997, 2000, MOJAVE database) and high frequency peak at spectral energy distribution (Orienti et al 2007). Such complex properties led us to make recent observations to reveal precise properties and new changes of the source.

We used Korean VLBI Network (KVN) and VLBI Exploration of Radio Astronomy (VERA) Array (KaVA) which provide high-frequency (23GHz and 43GHz) and high spatial resolution (1.2mas and 0.6mas). Therefore, this system is suitable for morphological and physical research on parsec scale structure. We present results for several epochs observed during 2013 to 2014, mainly focusing on morphological changes of 4C39.25 using KaVA images.

[구 AGN-03] Proving the Evolution of Relativistic Jet of Radio-Loud AGN, OVV 1633+382

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It is suggested that relativistic jets associated with active galactic nuclei (AGNs) can have great impacts on the evolution of the host galaxy. However, the physical properties of AGN jets including the formation mechanism are not well known to date, and hence the AGN feedback on the host galaxy is yet poorly understood. OVV 1633+382 as a highly variable AGN source (a.k.a. blazer) with a compact core and very well developed jet components is an excellent laboratory to study the jet formation mechanism of radio-loud AGN. Near 2002, a major flare was reported at mm wavelength with a dramatic increase of the flux, which is likely to be followed by a dense and bright outflow. In order to probe the evolution of the innermost region of this radio-loud AGN, we have monitored using the Very Large Baseline Array (VLBA) and the Effelsberg 100m single-dish radio telescope in 12 epochs from 2002 and 2005. The observations were conducted at 22, 43 and 86 GHz in full polarization mode. In this work, we present the intensity and spectral index maps at 22 and 43 GHz from our monitoring observations. We probe the kinematics and geometry of individual jet components to discuss the evolution of the jet.

[구 AGN-04] Testing the Geometry of AGN Tori through the Fraction of Optically-Selected Type 1 AGNs

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According to the unified model of AGNs, type 1 and 2 AGNs are intrinsically the same objects but seem different due to an obscuring matter which can block lights from the central engine of the AGN depending on the viewing angle. The obscuring object is thought to be shaped in a toroidal form and thus the geometry of tori of AGNs is an important factor to determine the fraction of type 1 (or type 2) AGNs. Oh et al. (2015) provides a new catalog of type 1 AGNs from SDSS DR7 in the nearby universe ($z < 0.2$) and it contains nearly 50% more type 1 AGNs than previously known. Using this new catalog, we test the fraction of type 1 AGNs along the black hole mass (MBH) and the bolometric luminosity of AGNs (Lbol), which are regarded as key parameters of the AGNs. First of all, because the methods to derive the black hole mass and the bolometric luminosity bear uncertainties, we test how the different methods lead to different values of type 1 fraction. We found that the fraction of type 1 AGNs varies with both MBH and Lbol. The extensively-studied, “receding torus model” can only explain the trend along Lbol and hence fails to explain the trend. To understand the new trend, we test the geometry of the torus based on the “clumpy torus model”. We present our results on the basic properties of the torus such as a column