Abstracts (Oral)

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Day 1 (November 14)

Presenter: Masashi Omiya (NAOJ)

Title

East-Asian collaboration to search for planets around giant stars

Abstract

We have been carrying out an international collaboration to search for planets around giant stars in East-Asia (East-Asian Planet Search Network, EAPS-Net) . The collaboration aims to detect extrasolar planets around giant stars by the radial velocity technique and clarify the planet formation scenario around intermediate-mass stars. In the East-Asian collaboration, in order to perform a large survey project we have conducted joint planet search programs using 2-m class telescopes in China, Korea, and Japan (east Asia). So for, we have detected more than 40 planetary companions around intermediate-mass giant stars more massive than Sun in the project and found several characteristic properties in the planetary systems around intermediate-mass stars. In my talk, I report some planets newly found by a Korean-Japanese planet search program in the framework of the EAPS-Net and their unique properties. Moreover, I would like to describe future stages of our collaboration using new instruments dedicated for planet search projects.

Presenter: John Livingston (University of Tokyo)

Title

200 planets and candidates from K2's second year

Abstract

We present $\sim$ two hundred candidates and planets discovered by the NASA K2 mission during its second year. We statistically validate a large fraction of these systems based on our analysis of the K2 photometry, as well as intensive follow-up stellar spectroscopy and high resolution imaging, which also provide precise physical parameters for most systems. Of particular interest are planets with bright host stars amenable to characterization, multi-planet systems, and small planets receiving Earth-like irradiation. By performing follow-up transit photometry from space with Spitzer, and from the ground with MuSCAT, we also refine the ephemerides of these interesting systems, which helps ensure the feasibility of future atmospheric studies with JWST.

Presenter: NGUYEN Thi Phuong (Vietnam National Satellite Center)

Title

GG Tau A: gas and dust inside the cavity, rings and gaps

Abstract

Exoplanet observations reveal that planets can form and survive around binary systems either in circumbinary or circumstellar orbits. GG Tau A, a young hierarchical triplet TTauri system, (Aa-Ab1/b2) with separations between of 35 and 4.5 au for Aa/Ab and Ab1/Ab2 respectively, has been extensively studied. Recent analyses from CO isotopologues reveal that there may be a planet embryo in the circumbinary disk while inside the cavity the CO gas is resolved in several fragments. The kinematics of the system is mostly Keplerian but departs from it inside the central cavity. New cycle 3 ALMA observations (ALMA# 2015.1.00224.S) at higher spatial resolution (0.15 arcsec) bring significant improvements to earlier studies and reveal apparent "ring-gap" features in several tracers such as 12CO(3-2), 13CO(3-2), C18O(3-2) and CS(7-6). The morphology and kinematics of the system as the physical properties of the outer disk as the CO clumps inside the cavity unveiled by these new observations will be presented.

Presenter: Kohei Ichikawa (Columbia University/NAOJ)

Title

Is there a maximum mass for supermassive black holes?

Abstract

Recent quasar surveys have revealed that supermassive black holes (SMBHs) rarely exceed a mass of $M_{BH} \sim$ a few $\times 10^{10}$ M_{sun} during the entire cosmic history. It has been argued that quenching of the BH growth is caused by a transition of a nuclear accretion disk into an advection-dominated accretion flow, with which strong outflows and/or jets are likely to be associated. We investigate the relationship between the maximum mass of SMBHs and the radio-loudness of quasars with a well-defined sample of $\sim 10^5$ quasars at a redshift range of $0 < z < 2$, obtained from the Sloan Digital Sky Surveys DR7 catalog. We find that the number fraction of the radio-loud (RL) quasars increases above a threshold of $M_{BH} \simeq 2 \times 10^9$ M_{sun}, independent of their redshifts. Moreover, the number fraction of RL quasars with lower Eddington ratios (out of all RL quasars), indicating lower accretion rates, increases above the critical BH mass. These observational trends can be natural consequences of the proposed scenario of suppressing BH growth around the apparent maximum mass of $\sim 10^{10}$ M_{sun}. The ongoing VLA Sky Survey in radio will allow us to estimate of the exact number fraction of RL quasars more precisely, which gives further insight into the quenching processes for BH growth.

Presenter: Andreas Schulze (NAOJ)

Title

New constraints on the black hole spin in radio-loud quasars

Abstract

One of the major unsolved questions on the understanding of the AGN population is the origin of the dichotomy between radio-quiet and radio-loud quasars. The most promising explanation is provided by the spin paradigm, which suggests radio-loud quasars to have higher black hole spin. However, the measurement of black hole spin remains extremely challenging. We here present results comparing the mean radiative efficiencies of carefully matched samples of radio-loud and radio-quiet SDSS quasars at $0.3< z <0.8$. We find evidence for systematically larger radiative efficiencies by a factor >1.5 in the radio-loud sample, suggesting that the radio-loud quasar population has on average higher black hole spin that the radio-quiet population. This provides strong observational support for the black hole spin paradigm.

Presenter: Minbae Kim (Kyung Hee university)

Title

The effect of bar-driven gas inflow on the AGN triggering in SDSS late-type galaxies

Abstract

We explore the role of bars in AGN activities using a volume-limited face-on disc galaxy sample with $M_{\rm r} < -19.5$ and $0.02 < z < 0.055$ selected from SDSS DR7. In this study, we investigate how the fraction of galaxies having strong bar is related to the amount of cold gas at galactic center ($\sim$1 kpc scale) required for triggering AGN activity. To understand how directly the bar presence is related to triggering AGN activity, we measure a relative probability defined as the ratio of the probability of AGN triggering in barred galaxies to the probability of the AGN triggering in a comparison, non-barred galaxies, for fixed central SFR (central gas fuel) and velocity dispersion of galaxies (black hole mass). We find that bars are one of the mechanisms that trigger AGN, and the effect is pronounced in less massive and lasts even in galaxies with little central gas. We also suggest a concentrated bulge as a morphology that contributes to the AGN triggering although the effect is not as great as bars.

Presenter: Yu-Ting Wu (NAOJ/ASIAA)

Title

Time-dependent Pattern Speeds in Barred Galaxies

Abstract

In galactic dynamics, bars are usually assumed to be rigid rotating structures with constant pattern speed. We check these common assumptions with high quality N-body simulations of double bar galaxy models. We investigate the characteristics of bars, including the size, strength and instantaneous pattern speed with three distinct methods, and show that bars are actually flexible and substantially time-dependent structures due to the gravitational interaction with nearby structures, such as spirals, which rotate at distinct speeds. We find that the characteristics of the inner bar are mainly affected according to the phase angle between the inner and outer bars. On the other hand, in the case of the outer bar, its characteristics are substantially influenced by the adjacent spiral structure.

Presenter: Hoai Thi Do (Vietnam National Satellite Center)

Title

Study of the circumstellar envelopes of evolved stars

Abstract

We present observations made at the ALMA and IRAM Plateau de Bure interferometers of the CO emission at millimetre/sub-millimetre wavelengths of evolved stars. We model in space the morphology and kinematics of the gas envelopes using simplifying hypotheses such as rotation invariance about an axis. Examples are presented that illustrate the main results.

Presenter: Lixin Dai (Niels Bohr Institute)

Title

Probing super-Eddington accretion with tidal disruption events

Abstract

A star wandering too close to a massive black hole can be torn apart by the tidal force of the black hole. Such a tidal disruption event (TDE) illuminates a massive black hole for about a year. In the first few months, stellar material can be supplied to the black hole at a rate greatly exceeding the Eddington accretion rate. Therefore, TDEs can give us a chance to peek into super-Eddington accretion, which has important implications for black hole growth and galaxy evolution in the early universe. In this talk, I will first give a summary of the observational status of tidal disruption events (TDEs). Then I will introduce the basics of TDE physics and present our theoretical calculations on what are the key parameters leading to super-Eddington TDEs. Lastly, I will talk about our 3D general relativistic radiation magnetohydrodynamics simulations of super-Eddington accretion disks in the context of TDEs. The results of these simulations provide us answers to some puzzles posed by TDE observations, and can be applied to study other super-Eddington astrophysical systems.

Presenter: Sarah Ann Bird (Shanghai Astronomical Observatory)

Title

VELOCITY DISPERSION AND MASS PROFILES OF THE MILKY WAY'S HALO

Abstract

We analyze the line-of-sight velocities of several thousand halo K-giant stars from the third data release of the spectral survey LAMOST. We make use of a new method to estimate the enclosed dark halo mass of the Milky Way within 100 kpc from the Galactic Center using the velocities and distances of these K giants. We derive estimates for the virial radius and concentration parameter from our mass profile, as well as estimate the circular (rotational) velocity curve out to 100 kpc. Tens of thousands of such stars are expected to become available to this analysis by the end of the five year survey. We find a nearly constant line-of-sight velocity dispersion profile, no large dips or peaks, in a Galactocentric radial range of 10 to 30 kpc, where such dips have been seen in other surveys.

Presenter: Youngsoo Jo (Korea Advanced Institute of Science and Technology)

Title

Far-ultraviolet fluorescent molecular hydrogen emission map of the Milky Way Galaxy

Abstract

We present the far-ultraviolet (FUV) fluorescent molecular hydrogen (H_2) emission map of the Milky Way Galaxy obtained with FIMS/SPEAR covering 76% of the sky. The extinction-corrected intensity of the fluorescent H_2 emission has a strong linear correlation with the well-known tracers of the cold interstellar medium (ISM), including color excess E(B-V), neutral hydrogen column density N(H I), and H_α emission. The all-sky H_2 column density map was also obtained using a simple photodissociation region model and interstellar radiation fields derived from UV star catalogs. We estimated the fraction of H_2 (f_{H2}) and the gas-to-dust ratio (GDR) of the diffuse ISM. The f_{H2} gradually increases from <1% at optically thin regions where E(B-V) < 0.1 to $\sim$50% for E(B-V) = 3. The estimated GDR is 5.1×10^{21} atoms cm^{-2} mag^{-1}, in agreement with the standard value of 5.8×10^{21} atoms cm^{-2} mag^{-1}.

Presenter: Yuna Grace Kwon (Seoul National University)

Title

Optical and Near-Infrared Polarimetry in Cometary Science

Abstract

Comets are fossilized remnants of the formation epoch of the solar system (approximately 4.6 Gyr ago), and most likely contain pristine ice and dust particles deep inside their bodies. When they start to approach the Sun, however, inside volatiles sublimate dragging dust particles outward. Such dust particles scatter sunlight mainly in the wavelengths between 0.7–2.3 μm. In this regard, linear polarization of such cometary dust particles can be a useful tool to constrain the physical properties, such as sizes, compositions, and porosities. Here, we present our studies of optical and near-infrared polarimetry to decipher the primitive information using ground-based telescopes that constitute a portion of the Optical and Infrared Synergetic Telescopes for Education and Research (OISTER) network in Japan. We will report and discuss our observational results in terms of evolutionary effects in this presentation.

Presenter: Jeong-Eun Heo (Sejong University)

Title

MIKE Observations and Raman-scattering by Atomic Hydrogen in the Symbiotic Nova RR Telescopii

Abstract

We present a high-resolution optical spectrum of the symbiotic nova RR Tel obtained with MIKE at Magellan-Clay telescope. RR Tel is believed to be a wide binary system of a hot white dwarf and a Mira with an orbital period of a few decades, where the white dwarf is accreting through gravitational capture of some fraction of material shed by the Mira. We find broad emission features formed through Raman-scattering of far-UV O VI 1032, 1038, C II 1036, 1037 and He II 1025, 972, 949 Åby neutral hydrogen. In particular, Raman O VI features exhibit clear double-peaked profile indicative of an accretion flow with a characteristic speed $\sim$ 40 km/s. In contrast, Raman C II features have a simple Gaussian profile of speed $\sim$ 20 km/s that is considerably smaller than O VI. We perform a profile analysis of the Raman O VI and C II features by assuming that O VI emission traces the accretion flow around the white dwarf with a representative scale of 1 AU whereas C II is formed in a much more extended region encompassing the two stars. An additional photoionization calculation using 'CLOUDY' is presented, which appears consistent with our emission model based on our profile analysis.

Presenter: Satoshi TAKESHIGE (Kyoto University)

Title

Cooling effects of an optically-thin synchrotron radiation during the Petschek-type magnetic reconnection process

Abstract

In recent studies, relativistic magnetic reconnection processes are investigated by relativistic resistive magnetohydrodynamic (RRMHD) simulations. In the classical reconnection model, the inflow magnetic energies are converted to the outflow thermal and kinetic energies of outflow plasmas. For relativistic plasmas in a strong magnetic field, the synchrotron radiation has an important role for cooling plasmas. In our study, we investigated effects of the radiation cooling in the Petscheck type reconnection process, using RRMHD simulations. In our simulations, for simplicity, we assumed an optically-thin radiation and introduced a radiation cooling rate as source term. As a result, we found that the reconnection outflow is more compressed and collimated.

Presenter: Dongyao ZHAO (KIAA Peking University)

Title

Exploring the Evolution of Brightest Cluster Galaxies since $z \sim 2$

Abstract

BCG evolution is important for understanding the galaxy assembly history. My research has accomplished to provide new insights into it since $z \sim 2$. First my study worked on BCGs at $z \leq 1$ by comparing properties between cD galaxies and elliptical BCGs. I demonstrated that cDs are structural different from elliptical BCGs, mainly due to their unique envelopes. Moreover, cDs are larger and more massive than elliptical BCGs, and prefer denser regions and more massive haloes. Then I extended statistical study of BCG evolution up to $z \sim 2$. I developed a new method based on ranking approach to select $z \sim 2$ BCG progenitors. I found clear growths of BCGs in size and stellar mass since $z \sim 2$. Moreover, BCG progenitors are mainly late-type galaxies with disturbed morphologies and higher SFR, while local BCGs are quiescent smooth early-type galaxies. I demonstrated that at $1 < z < 2$ SF and merging contribute equally to BCG growth. However, merging plays a dominant role at $z \leq 1$. My research completed an overall scenario for BCG evolution since $z \sim 2$: over z=1–2, BCGs grow through both merging and SF, which have equal contribution. After $z \leq 1$, dry mergers became dominant for BCG assembly, triggering the formation of cD envelopes and driving transformation of elliptical BCGs into cDs.

Presenter: Tao Wang (University of Tokyo/NAOJ)

Title

Massive galaxy (trans)formation in the most distant X-ray cluster at z=2.51

Abstract

Local galaxy clusters are exclusively dominated by massive, early-type galaxies (ETGs) in their cores. While galaxy archaeology studies indicate that these ETGs are formed via intense starbursts on short time-scales, direct observational evidence of this rapid formation of ETGs has been lacking. In this talk, I will present star formation and gas properties of a statistical sample of massive galaxies in the most distant X-ray cluster discovered so far (z=2.51). Our unprecedented data from HST, ALMA, and IRAM-NOEMA observations reveals that these massive galaxies tend to have higher star formation efficiency and shorter gas depletion time ($\sim$0.3 Gyr) compared to field galaxies at the same redshift. This provides one of the first observational evidence of the rapid formation of massive ETGs in galaxy clusters, providing new insights into the environmental dependence of massive galaxy formation and evolution.

Presenter: Yu-Yen Chang (ASIAA)

Title

Structures of Submillimeter Galaxies by deep SCUBA-2 survey at z=1-3

Abstract

It has been discussed that bright submillimeter galaxies (SMGs) appear to have disturbed morphologies due to its short-lived nature. Recently, a deep 450 um survey (STUDIES) of JCMT large program allows us to explore intermediate bright SMGs. We investigate morphology of these SMGs at z=1-3 by HST/WFC3 H-band observation in the COSMOS-CANDELS region. We found that bright SMGs (>7mJy) has a high fraction of disturbed features, which is consistent with previous findings. However, intermediate bright SMGs (<7mJy) shows insignificant difference from normal galaxies at the same stellar mass and redshift bin. Our results imply that intermediate bright SMGs can be similar to normal star-forming galaxies, and quenching process by major merger may only related to bright SMGs.

Presenter: Chen-Fatt Lim (Academia Sinica Institute of Astronomy and Astrophysics (ASIAA) & National Taiwan University (NTU))

Title

SCUBA-2 Ultra Deep Imaging EAO Survey (STUDIES): Number Counts and Counterpart Properties

Abstract

We present an ultra deep 450μm cosmological survey, SCUBA-2 Ultra Deep Imaging EAO Survey (STUDIES). STUDIES is a JCMT Large Program, conducted with SCUBA-2 from December 2015. The goal is to understand the evolution of faint far-infrared sources that comprise the bulk of the cosmic star formation at $z \sim$ 1 to 3. The STUDIES image is taken within the deep extragalactic CANDELS-COSMOS survey footprint under the best submillimeter weather on Maunakea. The total observing time of the observations will be 330 hours. With the first-year data ($\sim$137 hours), we reach a sensitivity of $\sim$ 0.91 mJy rms in the deepest region in our map and cover an area of $\sim$ 150 arcmin2. A total of 98 and 141 sources are identified at 4σ and 3.5σ, respectively. We also performed simulations of the 450μm image to derive the intrinsic source counts. Thanks to the smaller beam size of JCMT at 450μm ($\sim$7"), we can identify the multi-wavelength counterparts to the 450μm sources, and conduct SED fitting on the counterparts to estimate their photometric redshifts, infrared luminosities/star formation rates, dust temperature, and stellar masses. We present the number counts, counterparts, and the multi-wavelength properties of our 450μm sample.

Day 2 (November 15)

Presenter: Nao Suzuki (Kavli IPMU / Univ of Tokyo)

Title

A Brief History and Future Prospects of Dark Energy

Abstract

It was in 1997, the discovery of "dark energy" was reported at a group meeting in Berkeley but everyone was very skeptical. I will introduce how the discovery was made and some of the behind-the-scene stories I learned from the supernova cosmology project team. After 20 years of discovery, we still do not know the nature of dark energy. I will introduce and discuss ongoing supernova survey with Hyper-Suprime Cam on Subaru Telescope and Hubble Space Telescope as well as future projects.

Presenter: Kenneth Wong (National Astronomical Observatory of Japan)

Title

Cosmology from Gravitational Lens Time Delays

Abstract

Strong gravitational lens systems with time delays between the multiple images are a powerful probe of cosmology and astrophysics. In particular, the time-delay distance from such a system is primarily sensitive to the Hubble constant (H0) that is key to probing dark energy, neutrino physics, and the spatial curvature of the Universe, as well as discovering new physics. The H0 Lenses In COSMOGRAIL's Wellspring (H0LiCOW) project aims to measure H0 to ¡3.5

Presenter: Miftahul Hilmi (Institute for Cosmic Ray Research, the University of Tokyo)

Title

Calculation of the Lyman-Continuum Photons Production Efficiency ξ ion of $z \sim 3.8 - 4.7$ Galaxies Based on the IRAC Hα Fluxes

Abstract

Cosmic reionization is the transition of neutral hydrogen in the IGM into the ionized state that we observed today. This physical process is driven by Lyman-Continuum photons. Some uncertainties remain regarding the cosmic reionization, i.e. how was the mechanism and which source drives the reionization. In order to investigate the reionization sources, we need information about ionizing photons emissivity, which can be determined by three parameters: the Lyman-Continuum photon production efficiency ξion, escape fraction fesc, and UV luminosity density ρUV. In this work, we derive the first parameter in a similar way as Bouwens et al. 2016. We use 259 spectroscopically confirmed dropout galaxies identified in the $\sim$ 100deg2 Subaru HSC Survey (Ono et al. 2017) and select the data with $z \sim$3.8–5.0, where the Hα emission line falls into the Spitzer/IRAC channel 1 band (3.6 μm). We use the $\sim$ 30deg2 Spitzer data, which is $\sim 40\times$ larger than previous studies. We derive the Hα fluxes using the SED fitting method (Smit et al. 2016) and estimate the value of log ξion $= 25.14 \pm 0.08$. Based on the obtained ξion, we discuss what is the main contributor for the cosmic reionization.

Presenter: Ryota Kawamata (The University of Tokyo)

Title

Size–luminosity relations and UV luminosity functions at z =6–9 simultaneously derived from the complete Hubble Frontier Fields data

Abstract

We construct z=6-7, 8, and 9 faint LBG samples with accurate size measurements by profile fittings with the glafic software from the complete Hubble Frontier Fields data. These are the largest samples hitherto and reach down to the faint ends of recently obtained deep luminosity functions. We find incompleteness effects that faint larger galaxies are overlooked are not ignorable and make the modal size 1.6 times smaller at M_{UV} = -16. We aim to simultaneously derive the size–luminosity (RL) relations and UV luminosity functions (LF) with the completeness correction using the correct statistics. Thus, we conduct the maximum-likelihood estimations of the two-dimensional distributions on the RL plane. At z=6-7, we find a steep slope of the RL relation of beta=0.46±0.1, despite the completeness correction. This value is notably steeper than beta=0.25+0.15-0.14 at z=5 by Huang et al. This steepness can be reproduced only by a simple analytical model, in which smaller galaxies contain a smaller fraction of specific angular momentum. Moreover, we find a shallow faint-end slope of the LF, alpha=-1.86+0.17-0.18, which strongly correlates with the slope of the RL relation.

Presenter: Alessandro Sonnenfeld (Kavli IPMU)

Title

Revisiting the stellar IMF - dark matter halo degeneracy in strong lens galaxies

Abstract

Accurately determining the dark matter distribution in galaxies is crucial for testing galaxy formation and cosmological models. One of the challenges we encounter when measuring dark matter masses in galaxies is accounting for the contribution of the baryons to the total mass. This problem is particularly important in the centers of massive galaxies, where stars dominate the mass budget, and where converting from light to mass is made difficult by uncertainties in the stellar initial mass function (IMF). The degeneracy between the dark matter density profile and the stellar IMF can be partially broken by combining strong gravitational lensing, at few kpc scales, with weak lensing at larger scales. By jointly analyzing a sample of 60 strong lenses from the SLACS survey and 4,000 massive galaxies with weak lensing data from CS82 we are able to simultaneously constrain the halo mass and stellar IMF normalization of massive galaxies. We find that in order to fit both datasets with the same model, the data requires the presence of steep mass-to-light ratio gradients, which can be interpreted as gradients in the stellar IMF.

Presenter: Kuan-Chou Hou (ASIAA/NTU)

Title

Cosmological simulation with dust evolution

Abstract

Dust enrichment is one of the most important aspects in galaxy evolution. The evolution of dust is tightly coupled with the nonlinear evolution of the ISM including star formation and stellar feedback, which drive the chemical enrichment in a galaxy. Numerical hydrodynamical simulation provides a powerful approach to studies of such nonlinear processes.

In this work, we present a cosmological simulation using smoothed particle hydrodynamics (SPH) with dust evolution. We consider dust production in stellar ejecta, destruction in supernova shocks, dust growth by accretion and coagulation, and dust disruption by shattering for the processes driving the dust evolution. We also treat the evolution of grain sizes distribution by representing the entire grain radius range by small (< 0.03 μm) and large (> 0.03 μm) grains.

We show that our cosmological simulation allows us to examine the dust mass function and to analyze the dust abundance and dust properties in galaxies statistically. The redshift evolutions of dust in galaxies are also examinable in the cosmological simulation. Based on that, we could make some important predictions on the dust content in high-redshift galaxies to be tested by ALMA observations.

Presenter: Peter Scicluna (ASIAA)

Title

The Nearby Evolved Stars Survey: The Gas and Dust return to the Galactic ISM

Abstract

The terminal mass-loss of low- and intermediate-mass stars on the AGB dominates the return of mass to the local ISM. The Nearby Evolved Stars Survey (NESS) is a project to observe the continuum and CO line emission from a volume-limited (d<2kpc) sample of 300 mass-losing AGB stars; our purpose is to systematically derive the present-day gas and dust mass-loss rates and the mass-loss history of these objects, and is made possible by Gaia. We have a large coherent observing strategy across multiple observatories, including a JCMT large program. This will allow us, for the first time, to determine the total gas mass return to the Solar Neighborhood, providing key constraints on AGB mass loss. The data will provide the first direct measurement of a global dust-to-gas ratio for stellar ejecta, and improve on existing determinations of the Galactic dust production rate. The statistical power of the survey will provide unique insights into mass return over a large parameter space. The NESS project is a growing collaboration of the East Asian evolved stars community in Taiwan, China, Japan, and Korea, as well as collaborators in Europe and North America.

Presenter: Xiaohu Li (NAOC & ASIAA)

Title

A Special Molecular Factory in Space

Abstract

Understanding the origin and evolution of circumstellar and interstellar molecules is key to understanding the molecular universe and has become a fundamental goal of modern astrophysics. To date, at least 50% of the interstellar species (in total around 200) were detected in the circumstellar envelopes (CSEs) of the Asymptotic Giant Branch (AGB) stars, which are true "molecular factorie" in space. For long, The chemistry in the CSEs of S-type AGB stars, which have a C/O ratio approximately unity and therefore exhibit dual chemical features of both C-rich (C/O >1) and O-rich (C/O <1) stars, were poorly investigated. Recently, we have successfully conducted several observations towards the intrinsic S-type star Chi Cyg, via the James Clerk Maxwell Telescope, the ALMA Prototype 12-meter Telescope in Arizona Radio Observatory, the 10-meter Submillimeter Telescope, and the Submillimeter Array. We found that the CSE of Chi Cyg is the most special molecular factory to date. In this talk, I will introduce our discoveries.

Presenter: Hyeseung Lee (chungnam national university)

Title

statistical study of turbulence from polarized synchrotron emission

Abstract

When turbulent motions perturb magnetic field lines and produce magnetic fluctuations, the perturbations leave imprints of turbulence statistics on magnetic field. Observation of synchrotron radiation is one of the easiest ways to study turbulent magnetic field. Therefore, we study statistical properties of synchrotron polarization emitted from media with MHD turbulence. First, we obtain the spatial spectrum and its derivative with respect to wavelength of synchrotron polarization arising from both synchrotron radiation and Faraday rotation. Second, we study quadrupole ratio to quantitatively describe the degree of anisotropy introduced by magnetic field at multi-wavelengths. In this study, we demonstrate that the spectrum and quadrupole ratio of synchrotron polarization can be very informative tools to get detailed information about the statistical properties of MHD turbulence from radio observations of diffuse synchrotron polarization.

Presenter: Tomoyasu Hayakawa (Department of astronomy, Kyoto University)

Title

Supernovae Associated with Gamma-Ray Bursts: Disk Wind in the Collapsar Model

Abstract

Since the first discovery on 1998, about twenty cases have been established for a very energetic supernova associated with a Gamma-Ray Burst (GRB-SN). They show diversities in their properties, origins of which are still under debate. A leading model for GRB-SNe is the so-called collapsar model, i.e., a core collapse of highly rotating massive stars, in which a highly-collimated relativistic jet would produce a GRB and a strong accretion-disk wind may trigger an SN. However, no self-consistent model has been developed which account for the mutual interaction between the collapsing envelope and the outflows. In this study, we have constructed a simple collapsar model including the disk, the black hole and the envelope, taking into account the transport of mass and angular momentum between these components and the action the outflows would have on the collapsing envelope. We have found that the geometry of the disk wind is a key to launch a GRB-SN. To explain main features of the GRB-SNe, the collimation is necessary not only for the jet but also for the disk wind. We show that some observational correlations are explained by our models, controlled mainly by the difference in the angular momentum within the progenitor star.

Presenter: Ryan, Wai Yan Leung (The University of Hong Kong)

Title

High Resolution Radio Imaging of the Pulsar Wind Nebula MSH 15-52

Abstract

Pulsar winds are relativistic charged particles accelerated by the extremely strong magnetic field of rotation-powered pulsars. In a young pulsar, these particles are moving much faster than the surrounding cold ejecta in an expanding supernova remnant (SNR). Upon colliding with the ejecta, the pulsar winds are shocked and radiate broadband synchroton and inverse-Compton radiations. The resulting structures are collectively known as pulsar wind nebulae (PWNe).

We present a high-resolution radio imaging study of the PWN MSH 15-52 with new Australia Telescope Compact Array observations at 3 cm and 6 cm. The system is powered by a young , energetic, and high magnetic field radio pulsar B1509-58. Previous X-ray studies found a complex morphology for the PWN: the overall shape resembles a hand, extending over 10 pc with small-scale features including a one-sided jet, pair of arc, filaments, and compact emission knots in the associated HII region RCW 89.

Our new radio images show very different morphology than the X-ray counterpart. No radio emission was detected at the X-ray jet position, instead, we found enhanced emission in a sheath surrounding the jet. We also discovered additional small-scale features including a polarized linear filament next to the pulsar. Our polarization measurements show that the intrinsic orientation of magnetic field aligns with the sheath and wraps around the edge of the jet.

Presenter: Shih-Ping Lai (National Tsing Hua University)

Title

Observations of magnetic fields in star-forming regions

Abstract

I can briefly review the main techniques and recent progress of observations of magnetic fields in molecular clouds.

Presenter: Hao-Yuan Duan (National Tsing Hua University)

Title

Searching the First Hydrostatic Cores in the Perseus Molecular Cloud

Abstract

First Hydrostatic Cores (FHCs) are the transient phase between prestellar cores and Class 0 protostars. Therefore, FHCs are best targets for understanding the earliest stage of star formation. Several FHCs candidates were suggested, but none of them have been confirmed. Recently, some potential candidates of FHCs have been suggested based on the low temperature from the SED fitting (10K-30K); however, theoretical models predicted that FHCs can be heated over 100K. The low temperature of FHCs derived from observation may be due to the mixing of the unresolved FHCs and the cold envelope. In this project, we produce synthesis images using CASA based on a simple self-similar collapse density model. We match the simulated images of First Core candidates in Perseus Molecular Cloud to the SMA and VLA observational results. Our simulations show that with both VLA and ALMA observations, we can decouple the FHC component from envelope with reasonable observing time. The identification of FHCs will make great strides in our understanding of star formation.

Presenter: Yoshiki Toba (ASIAA)

Title

Ionized Gas Outflows in Infrared-bright Dust-obscured Galaxies (DOGs) at $0 < z < 1$

Abstract

We present the ionized gas properties of infrared (IR)-bright dust-obscured galaxies (DOGs) that show an extreme optical/IR color, (i - [22])$_{\rm AB} > 7.0$, selected with the Sloan Digital Sky Survey (SDSS) and Wide-field Infrared Survey Explorer (WISE). For 36 IR-bright DOGs that show [OIII]5007 emission in the SDSS spectra, we performed a detailed spectral analysis to investigate their ionized gas properties. In particular, we measured the velocity offset (the velocity with respect to the systemic velocity measured from the stellar absorption lines) and the velocity dispersion of the [OIII] line. We found that the derived velocity offset and dispersion of most IR-bright DOGs are larger than those of Seyfert 2 galaxies (Sy2s) at $z < 0.3$, meaning that the IR-bright DOGs show relatively strong outflows compared to Sy2s. This can be explained by the difference of IR luminosity contributed from active galactic nucleus, $L_{\rm IR}$ (AGN), because we found that (i) $L_{\rm IR}$ (AGN) correlates with the velocity offset and dispersion of [OIII] and (ii) our IR-bright DOGs sample has larger $L_{\rm IR}$ (AGN) than Sy2s. Nevertheless, the fact that 28/36 (78 %) IR-bright DOGs have a large (> 300 km/s) velocity dispersion, which is a larger fraction compared to other AGN populations, suggests that IR-bright DOGs are good laboratories to investigate AGN feedback. The velocity offset and dispersion of [OIII] and [NeIII]3869 are larger than those of [OII]3727, which indicates that the highly ionized gas tends to show more stronger outflows (Toba et al. 2017, ApJ, submitted).

Presenter: Dohyeong Kim (Seoul National University)

Title

What Makes Red Quasars Red?

Abstract

Red quasars are very red in optical through NIR (e.g., r'-K > 5 mag and J-K > 1.3 mag in Urrutia et al. 2009). The red colors are possibly due to the dust extinction in their host galaxies, and which are expected in a scenario where red quasars are an intermediate population between merger-driven star-forming galaxies and normal unobscured type 1 quasars. However, the red colors can be explained by alternative mechanisms of (i) an intrinsically red continuum, (ii) an unusual high covering factor of the hot dust component (CF_HD), and (iii) a moderate viewing angle, somewhere between type 1 and type 2 quasars. In order to study the origin of the red colors of red quasars, we use optical to NIR spectra of 20 red quasars at $z \sim$0.3 and 0.7. The LPb/LHb ratios of red quasars are 10 times higher than unobscured type 1 quasars. Moreover, the LPb/LHb ratios of 55% red quasars cannot be matched by any physical conditions without adopting the concept of the dust extinction. The CF_HD of red quasars are similar to that of unobscured type 1 quasars. Furthermore, we find that the Eddington ratios of red quasars are significantly higher than those of unobscured type 1 quasars. Consequently, these results strongly suggest the red colors of red quasars arise from the dust extinction in their host galaxies, as suggested in the merger-driven galaxy evolution scenario.

Day 3 (November 16)

Presenter: Woong-Tae Kim (Seoul National University)

Title

Nuclear Structures and Gas Accretion to Supermassive Black Holes in Disk Galaxies.

Abstract

Disk galaxies, especially barred-spiral galaxies, abound with rings and spirals in the nuclear regions. Nuclear rings exhibit star formation at a rate varying widely in the range of 0.1–10 Msun per year, although what forms them remains uncertain. Nuclear spirals existing even in weakly barred galaxies are thought to channel gas inflows to supermassive black holes residing at the centers. We use high-resolution hydrodynamic simulations to study the formation of nuclear rings and spirals in barred galaxies. We show that nuclear rings form due to a centrifugal barrier rather than resonances, and that star formation rates therein depend on the mass inflow rates driven by the bar potential. We also show that nuclear spirals become nonlinear and shocked even for a very weak potential due to a geometric effect. The shape of the spirals and shocks depends rather sensitively on the background shear. The induced mass inflow rates are enough to power black hole accretion in various types of Seyfert galaxies.

Presenter: Scarlet Saez Elgueta (The University of Tokyo)

Title

Near infrared approach to the Line Asymmetry of Cepheids

Abstract

The Baade - Wesselink (BW) method used for determining distance to Cepheids is limited by the existence of the projection factor, p, which is a numerical factor needed to convert the radial velocity variations derived from spectral line profiles into photospheric pulsation velocity so that Vpuls= p Vrad. The asymmetry of the spectral line profile is affected by phenomena related to the Cepheid's atmosphere such as velocity gradients, photospheric pulsation velocity (Vpuls), limb darkening, turbulence and rotation. They can be all merged into the projection factor, p, therefore line asymmetry should be understood as a source of information of all the phenomena involved in the Cepheid's pulsation. This asymmetry depends on how radial velocities are derived, i.e., either by bi-gaussian, line minimum or centroid methods. Each of them yielding to different values of p and hence different distances. One key idea of the BW is that angular and linear diameters must correspond to the same layer in the star to provide a correct estimate of the distance. Previous works have combined IR interferometry with optical spectroscopy. My work aims to overcome that difficulty by using high resolution IR spectroscopy provided by WINERED for galactic Cepheids observed in the past years.

Presenter: Chien-Hsiu Lee (Subaru Telescope, NAOJ)

Title

Time-domain studies of M31

Abstract

M31, our closest neighboring galaxy, is a stepping stone to studies of stellar evolution, star formation, galaxy evolution, and cosmology. However, due to the difficulties of performing photometry in such crowded fields and the lack of wide cameras to encompass the entire galaxy, there has not been a complete census of the stellar contents of M31. The advent of wide-field camera provides us a unique opportunity to have a complete view of our neighboring galaxy, enabling an inventory of its variable content. I will present a review of recent progresses of wide-field, high cadence surveys of M31, covering different population of variables and transients. I will also outline future studies enabled by ongoing and upcoming facilities.

Presenter: Atsushi Tanimoto (Kyoto University)

Title

Suzaku Observations of Compton-thick Active Galactic Nuclei Selected by Swift/BAT Survey

Abstract

We present a uniform broadband X-ray (0.5–100 keV) spectral analysis of 12 Swift/Burst Alert Telescope (BAT) selected Compton-thick ($\log(NH/cm^2) > 24$) Active Galactic Nuclei (CTAGNs) observed with Suzaku. We fit the Suzaku and Swift/BAT spectra with an AGN torus model by Ikeda et al. (2009). The main results are as follows. (1) Most of CTAGNs show small scattering fractions ($<0.5\%$) implying a buried AGN nature. (2) Unabsorbed reflection components are commonly observed, suggesting that the tori are clumpy. (3) Comparison with the results obtained for Compton-thin AGNs (Kawamuro et al. 2016) suggests that the properties of these CTAGNs can be understood as a smooth extension from Compton-thin AGNs with heavier obscuration.

Presenter: Tien-Hao Hsieh (ASIAA)

Title

Probing Episodic Accretion in Very Low Luminosity Objects

Abstract

The bolometric luminosity of protostars is observed to be much lower than expected from calculations under an assumption of constant mass accretion rates. Very Low Luminosity Objects (VeLLOs) present further puzzling properties that exacerbate this luminosity problem. Episodic accretion has been proposed as a solution, whereby a protostar is at a quiescent accretion phase for most of the time and has occasional accretion bursts delivering mass onto the protostar. Due to the predicted interval between accretion bursts ($\sim$ 5,000–50,000 yr), it is difficult to directly measure the variation in accretion rates. We present ALMA observations of N2H+ and CO isotopologues to probe the episodic accre- tion process toward eight VeLLOs using the CO snow line as a chemical signature. During the accretion burst, the increasing luminosity elevates the gas and dust temperature, evaporating CO to a much larger radius than that of the quiescent phase. The gaseous CO destroys N2H+, pushing the perceived line further out. Because CO takes $\sim$ 10,000 yr to freeze-out onto the dust grains at the densities in the envelope, it allows us to probe a recent accretion burst by comparing the observed CO sublimation radius to the expected radius from the current luminosity ($<$ 200 au for our target VeLLOs with Lbol $<$ 0.45Lsun). As a result, out of the eight VeLLOs, five show evidence for the occurrence of a past burst, one has no recent accretion burst, and two are ambiguous. This fraction (63% to 86%) of VeLLOs with accretion burst signatures is similar or slighter larger than that of Class 0/I young stellar objects from the literature, which inferred similar or shorter interval between bursts in the episodic accretion process in these objects.

Day 4 (November 17)

Presenter: Jifeng Liu (National Astronomical Observatory of China)

Title

Multi-wavelength studies of stars in light of LAMOST

Abstract

LAMOST provides an unprecedently large sample of stars with spectra, hence accurate spectral classification and stellar parameters. This enables studies of statistical behaviors of different stars, and also searches of exotic objects that deviate from the group statistics. We have combined LAMOST with multi-wavelength database to study stellar statistics and special objects, and here we report our preliminary results.

Presenter: Haruka Kusakabe (The University of Tokyo)

Title

Star Formation Activity of Lyα emitters at $z \sim 2$

Abstract

Lyα emitters (LAEs) are one of the representative population of high-redshift low-mass galaxies, which are "building blocks" of present-day galaxies. Stellar population properties and dark matter halo mass are key to tracing the mass growth history of galaxies and constraining physical processes which control star formation. However, even at $z \sim 2$, previous work on stellar and dark matter halo properties of LAEs suffer from statistical errors and cosmic variance due to their small sample size 250 and small survey area $\sim$0.3 deg^2 (Guaita et al. 2010; 2011). In this work, we obtain $\sim$1250 LAEs at $z \sim 2$ in four survey fields over 1 deg^2 (Nakajima et al. 2012). Their average dark matter halo mass and stellar mass are estimated to be $4.0^{+5.1}_{-2.9} \times 10^{10}$ Msun ($b = 1.22^{+0.16}_{-0.18}$) and $1.0 \pm 0.3 \times 10^9$ Msun derived from clustering analysis and SED fitting, respectively. Our LAEs lie slightly above an extrapolation of the average SHMR relation and have slightly high baryon (i.e., gas) conversion efficiencies, though they are SFMS galaxies. We will discuss physical origin of these LAEs.

Presenter: Ting-Wen Lan (Kavli IPMU, University of Tokyo)

Title

The physical properties of the cool circumgalactic gas probed by the Sloan Digital Sky Survey

Abstract

Gas around galaxies, the circumgalactic medium (CGM), contains signatures of galactic feedback and gas accretion, which are key mechanisms driving the evolution of galaxies. To better understand the mechanisms, one can investigate the physical properties of the CGM via its absorption features imprinted in the spectra of background objects. In this talk, I will show that we can probe the physical properties of the cool CGM by making use of 100,000 metal absorption line systems detected in the background quasar spectra from the Sloan Digital Sky Survey. Our results reveal a new and puzzling picture of the CGM: it consists of millions of small dense clouds with metallicity evolving significantly with redshifts and reaching the solar value at redshift 1. These results support the hypothesis that the gas clouds are originated from galaxies. Finally, I will show that the physical properties of the CGM are strong constraints on the models of galaxy evolution.

Presenter: Taiki Kawamuro (NAOJ)

Title

AGN nuclear structure studied by X-ray spectral analysis, and the relevance to the surrounding ionized gas

Abstract

We systematically analyzed 0.5–150 keV X-ray spectra of local ($z < 0.1$) 45 obscured ($22 \leq \log N_{\rm H} < 24$) AGNs observed with Suzaku and Swift/BAT (TK+16). Our sample is from the least biased Swift/BAT 70-month survey. We find that the [OIV] 25.89 um line to X-ray luminosity ratio is smaller in AGNs with lower soft X-ray scattering fractions ($f_{\rm scat}$). This suggests that it is difficult for AGNs buried in a torus to ionize the surrouding material.

Our NuSTAR, Chandra, and Gemini/GMOS observations of two local ($z \sim 0.3$) AGNs (SDSS J0113 and SDSS J1155; TK+17 submitted) may support the result. The X-ray spectra of SDSS J0113 reveal a highly obscured ($\log N_{\rm H} = 23.8$) AGN with a low scattered fraction ($\lesssim 10\%$), likely buried in a torus with a narrow ionization cone. Our Gemini/GMOS spectroscopy consistently proves the collimated bipolar ionized gas. Conversely, SDSS J1155 shows a weakly obscured AGN with $\log N_{\rm H} = 22.8$ and $f_{\rm scat} \sim 1.2\%$, and the uniformly extended [OIII] emission.

Presenter: Cristian Eduard Rusu (Subaru Telescope)

Title

Subaru Telescope adaptive optics observations of gravitationally lensed quasars

Abstract

We conducted an adaptive optics observation campaign of 25 gravitationally lensed quasars from SDSS. I will briefly describe our analysis technique and selected results. These include characterizing for the first time quasar host galaxies without an a-priori known point-spread function; demonstrating that for galaxies with an ellipticity of the mass profile ¿ 0.25, the mass profile is less elliptical that the light profile; and the discovery of a three-image, "natural coronagraph" lensed quasar. Details can be found in Rusu et al. 2016, MNRAS, 458, 2.

Presenter: Yongjung Kim (Seoul National University)

Title

Survey of High-redshift Quasars with IMS

Abstract

Over the last decade, hundreds of quasars have been discovered at high redshift. However, most of them are biased toward luminous ones (M1450 <-24 mag), implying that such a biased quasar sample, which cannot represent the entire population of high-redshift quasars, is not enough to understand the properties of quasars in the early universe. Based on the Infrared Medium-deep Survey (IMS), a moderately wide (120 square degree) deep (J$\sim$23 AB mag) near-infrared (NIR) imaging survey, we have discovered more than 200 candidates for faint quasars with the archive optical imaging data. The faint quasar candidates have been narrowed down to tens of highly promising ones by the medium band observations with SQUEAN. Until now, about 10 faint quasars at z $\sim$5 and 6 have been spectroscopically identified. The discovery of these quasars suggests that the number of faint quasars may not be high enough to fully account for the cosmic reionization. Furthermore, we obtain a deep NIR spectrum of one of the faint quasars for the first time. This shows a very interesting result about its black hole mass and accretion rate compared to the luminous ones.

Abstracts (Poster)

Presenter: Abdul Jawad (COMSATS Institute of Information Technology Lahore Pakistan)

Title

Thermal Fluctuations of Well-Known Black holes Via Entropy Corrections

Abstract

We investigate the thermal fluctuations of well-known black holes via entropy corrections. For this purpose, versatile study is being made by developing various thermodynamic quantities such as entropy, specific heats, pressure, Gibb's and Helmhotz free energies in the present frameworks. We also discuss the stability of black holes through ratio of heat capacities (γ), grand canonical and canonical ensembles. We also investigate the phase transition for the present black holes.

Presenter: Chien-Chang Feng (Department of Astronomy, Graduate School of Science, The University of Tokyo.)

Title

Weak Supernovae Induced by the Gravitational Energy Loss in the Black Hole Formation

Abstract

Simulations regarding weak explosion induced by gravitational mass loss is presented, as well as the comparison with current observation of failed supernovae. While a massive non-rotating star collapsing into a black hole, an explosion that is much weaker than a normal core collapse supernova will form instead of just nothing. While the shock passing through the hydrogen envelope, energy of the shock transferred onto optical observable by hydrogen recombination. The properties of the shock and the mass, radius determine the brightness and duration of the light curves of the explosion.

Several progenitor models with different masses are tested as well as different values of reduced gravitational mass. The formation of the shock and the radiation transfer are perfumed with FLASH and SNEC. The results show that massive progenitor tends to result in more powerful explosions but the outburst durations are shorter and vice versa. But for the explosion light curve, more energy gives a brighter light curve but shorten the duration. The mass and the radius of the outer hydrogen envelope also change the light curve. These could be valuable when constrain the properties of observed failed nova.

Presenter: Chin-Ping Hu (The University of Hong Kong)

Title

The Spectral Evolution of a Transient Ultraluminous X-ray Source CXOU J235808.7-323403

Abstract

We report a systematic analysis of the timing and spectral behavior of CXOU J235808.7-323403 (hereafter P9), a transient ultraluminous X-ray source located in NGC 7793. Before 2014, the spectra of P9 obtained by Chandra and XMM-Newton were well described by either a power law with a photon index of 2.2 or a multi-color disk blackbody with an inner radius of 50 km and an inner disk temperature of 0.7-0.9 keV. The corresponding luminosity varied between 1E38 and 7E38 erg/s, well below the Eddington limit of a stellar-mass black hole. These behaviors imply that P9 was a canonical black hole X-ray binary (BHXB) in the high/soft state. After 2014, the luminosity of P9 varied between 1E39 and 6E39 erg/s. We suggest that P9 showed an ultraluminous outburst, which provided an important connection between the canonical BHXB and ultraluminous X-ray sources. The spectral evolution of the ultraluminous outburst can be explained by super-Eddington models. When the luminosity is slightly above the Eddington limit, the spectrum can be described as a standard disk with a radius of 360 km plus a power-law tail with a photon index of 1.6, indicating the presence of a Comptonized corona near the black hole. On the other hand, the spectrum can be well fit with an advection-dominated disk where the radial temperature profile is power-law distributed with an index of p=0.6 and an inner temperature of 2 keV, suggesting the formation of a geometrically thick disk when the luminosity was near maximum.

Presenter: Fayin Wang (Nanjing University)

Title

Self-organized criticality in Astrophysics

Abstract

In this talk, I will present some recent progress on self-organized criticality in astronomy.

Presenter: Hideaki Fujiwara (Subaru Telescope, National Astronomical Observatory of Japan)

Title

Seasonal variation of radial brightness contrast of Saturn's rings viewed in mid-infrared by Subaru/COMICS

Abstract

To investigate the mid-infrared (MIR) characteristics of Saturn's rings, we collected and analyzed MIR high spatial resolution images of Saturn's rings obtained in January 2008 and April 2005 with COMICS mounted on Subaru Telescope, and investigated the spatial variation in the surface brightness of the rings in multiple bands in the MIR. We also composed the spectral energy distributions (SEDs) of the C, B, and A rings and the Cassini Division, and estimated the temperatures of the rings from the SEDs assuming the optical depths. We find that the C ring and the Cassini Division were warmer than the B and A rings in 2008, which could be accounted for by their lower albedos, lower optical depths, and smaller self-shadowing effect. We also find that the C ring and the Cassini Division were considerably brighter than the B and A rings in the MIR in 2008 and the radial contrast of the ring brightness is the inverse of that in 2005, which is interpreted as a result of a seasonal effect with changing elevations of the sun and observer above the ring plane.

Presenter: Hidekazu Hanayama (Ishigakijima Astronomical Observatory, NAOJ)

Title

Ishigakijima Astronomical Observatory and Murikabushi 105cm Telescope

Abstract

The Ishigakijima Astronomical Observatory (IAO) is one of the research institutes of National Astronomical Observatory of Japan (NAOJ) located in the southwest corner of Japan. The location is appropriate for the observation of objects near the ecliptic and celestial equator. The Murikabushi 105-cm telescope is the largest telescope in the Kyushu & Okinawa area. On the Cassegrain focus, MITSuME (Multicolor Imaging Telescopes for Survey and Monstrous Explosions) three-color simultaneous imaging system is mounted. Observations of transient objects such as gamma-ray burst afterglows are performed with the domestic and international collaborations. Furthermore, observations of Solar System Objects are powerfully performed taking advantage of the location. In this meeting, we talk about the observatory and telescope, and report the observational results in recent years.

Presenter: Hoai Thi Do (Vietnam National Satellite Center)

Title

Study of the circumstellar envelopes of evolved stars

Abstract

We present observations made at the ALMA and IRAM Plateau de Bure interferometers of the CO emission at millimetre/sub-millimetre wavelengths of evolved stars. We model in space the morphology and kinematics of the gas envelopes using simplifying hypotheses such as rotation invariance about an axis. Examples are presented that illustrate the main results.

Presenter: Iulia Teodora Simion (Shanghai Astronomical Observatory, CAS)

Title

The metallicity gradients of the Milky Way discs with APOGEE and LAMOST

Abstract

I use a model for stellar labels identification based on Support Vector Regression named SLAM, to derive improved stellar parameters for the LAMOST targets. SLAM is trained on the higher resolution (R = 22,500) APOGEE DR14 spectroscopic survey to derive parameters for the lower resolution (R = 1,800) LAMOST DR4 survey. The SLAM results outperform the LAMOST pipeline results enabling us to build the largest catalogue of Red Giant Branch stars with 6 labels (log(g), Teff, [Fe/H], [alpha/M], [C/M] and [N/M]) by combining the two catalogues. I derive ages for the stars using the C/M and N/M abundances (Martig et al. 2016) and study their metallicity distribution in the Galactic Disc.

Presenter: Jerome Pitogo de Leon (U. of Tokyo)

Title
Follow up transit observation of HAT-P-44 using MuSCAT

Abstract
TBA

Presenter: Jia-Wei Wang (National Tsing Hua University)

Title

Gas Kinematics within IC5146 filaments: Does Magnetic Fields Regulate the Gas Dynamics

Abstract

Magnetic fields (B-field) have long been considered as the key components that regulate star formation. Polarization observations reveal that the B-field at 100–1 pc scale is often ordered and dynamically important (e.g. Heiles 2000). On the other hand, interferometric observations show that B-fields are often randomly aligned with gas flows at ∼1000 AU scale (Hull et al. 2014). It is unclear how the role of B-field changes at the intermediate scale. To reveal the gas kinematic within the filamentary cloud IC5146 at ∼0.1–0.03 pc scale, we performed JCMT 13CO (3-2) line observations toward the Hub-Filament System (HFS) and also use the previous 13CO (3-2) observations toward the Main Filament region done by Graham (2008). The orientations of the velocity gradient traced by 13CO (3-2) derived at different scales are compared to our optical/infrared polarization measurements to investigate how the B-field impact the gas kinematics at ∼0.1–0.03 pc scale. Our results show that the velocity gradient within Main Filament is aligned with B-field at 0.1 pc scale, but turn to be randomly oriented at 0.03 pc scale. In contrast, the velocity gradient in the HFS is randomly aligned with B-field at 0.1–0.03 pc scale, probably dominated by the gravity.

Presenter: Jincheng Guo (Peking University)

Title

Metallicity Gradient of The Milky Way disk revealed by FGK dwarfs from LAMOST DR4

Abstract

By carefully selecting effective temperature, surface gravity and other parameters obtained from LAMOST DR4 spectra, we constructed a sample of nearly 1.5 million FGK dwarf disk stars. First we divided this sample into Thin disk and Thick disk based on [Fe/H] and [Alpha/Fe]. Then we studied the radial, vertical metallicity gradient and metallicity trend in the rotational direction for thin disk and thick disk, respectively.

Presenter: Kiran Adhikari (Golden Gate International College/ NPSA-Nepal Physics Students Association)

Title

THEORETICAL STUDY OF MAGNETIC FIELD GENERATION DUE TO PONDEROMOTIVE FORCE IN PLASMA

Abstract

In this dissertation work the phenomenon of ponderomotive force and laser interaction in plasma have been studied. For this, we start from the general expression for the force density (i.e the equation of the motion) of plasma in the electromagnetic field have been derived on the basis of Maxwell equation. The equation of the motion is deduced not only from the ponderomotive force but also from the theory of two fluid model. We take $\nu = 0$ (collisionless plasma) because the relation of the equation which is valid when the fast oscillation properties are neglected .

The complete equation of the motion can be deduced from the basic equation of the continuum mechanics in relativistic formulation used in the well known theory of radiation frequencies. In the presence of intense laser light, plasma particle are entrained by the fields of light and hence induced current, which in turn generate magnetic field. The recent work shows that larger order of mega gauss magnetic field is governed by scale length and intensity of light used. From this work we had seen that ponderomotive force arise due to the interaction of drifting electrons produced by the electric vector of the wave with magnetic vector B of the wave and due to the gradient of the drift velocity. For the theoretical calculation of B field in plasma we have taken exponential variation in electron density along the axial direction and the Gaussian pulse which has intensity distribution along the radial direction only.

Presenter: Kohei Mizukubo (Kagoshima University)

Title

Astrometry of the Galactic star-forming region IRAS 05358+3543 with VERA

Abstract

We performed astrometric observations of IRAS 05358+3543 with VERA (VLBI Exploration of Radio Astrometry) at 22 GHz utilizing its H2O maser emission. The annual parallax was determined to be 1.155±0.068 mas, corresponding to a distance of 0.86±0.05 kpc. On the other hand, the previous astrometry with the Very Long Baseline Array (VLBA) yielded an alternative distance of 1.68 kpc utilising the 6.7 GHz methanol maser transition. This paper contribution aims to resolve the ambiguity between the VERA and VLBA estimates of the trigonometric distance.

Presenter: Kris Akira Stern (The University of Hong Kong (HKU))

Title
TBC

Abstract
TBC

Presenter: Li Wen Liao (National Tsing Hua University)

Title

Reveiling the Compact Molecular Jets in the NGC 2023 MM1 Outflows

Abstract

NGC 2023 MM1, a class 0 protostar in Orion (d $\sim$ 460 pc), with $L \sim 7\ L_{\odot}$ drives a large bipolar outflow in the CO (3-2) emission previously observed with JCMT. Using the SMA, we resolved three continuum sources with an angular resolution of 3". We also derived masses of 4.3 $M_{\odot}$, 0.7$M_{\odot}$ and 0.4 $M_{\odot}$ for MM1, MM2 and MM3, respectively. With an angular resolution of 4" and a spectral resolution of 1.2 km/s, we discover the compact jet components in both the CO (2-1) and SiO (5-4) emissions. In the CO (2-1) emission, we show a bipolar outflow with clear cavity in low velocity gas. Both the CO (2-1) and the SiO (5-4) emissions show large velocity distributions in their PV-diagram. We also resolved the SiO (5-4) jets and CO (2-1) outflows into knotty structures. We further studied the kinematic of the innermost knots of SiO (5-4) jets and found some indications of jet rotation.

Presenter: Madoka Ohyama (Kagoshima University)

Title

Astrometric observations of protoplanetary nebula OH231.8+4.2 with VERA

Abstract

We report the results of annual parallax measurement of H2O masers associate with OH231.8+4.2. This source is a protoplanetary nebula, located adjacent to the open cluster M46. In the large scale, fast bipolar outflows with velocity of 200-400km/s was found in 6"×57" scale (Morris et al. 1987, Snchez et al. 2015). The central star is a Mira-like variable AGB star showing H2O and SiO maser emission (Desmurs et al. 2007). However, there is still uncertinly in the distance of OH231.8+4.2. To inspect accurate physical parameter, it is necessary to obtain highly-precise distance.

Using Japanese VLBI array "VERA", we have observed H2O maser in OH231.8+4.2 for 3 years with 1 month interval. An annual parallax of π=0.61±0.03 mas was determined and it gives a corresponding distance of D=1.65(+0.08/ − 0.07)kpc. In addition, proper motion of OH231.8+4.2 was determined to be μ=(-4.54±0.18, -0.92±0.18)mas/yr. H2O maser spots were distributed within 80 mas square, corresponding to 140 au at source distance. We subtracted the average motion from some maser spots, and estimated their relative motion. This motion represents bipolar outflow from the central star with velocity of about 10km/s. We found that this velocity was quite slower than that was found in the large scale outflows.

Presenter: Mikito Kohno (Nagoya University)

Title

FOREST Unbiased Galactic plane Imaging survey with the Nobeyama 45-m telescope (FUGIN) : Molecular clouds toward W33 ; possible evidence for cloud-cloud collision triggering O star formation

Abstract

We observed molecular clouds in W33 high-mass star-forming region associated with compact and extended HII regions using the NANTEN2 and Nobeyama 45-m telescopes in the J=1-0 transitions of 12CO, 13CO, and C18O as a part of the FUGIN (FOREST Unbiased Galactic plane Imaging survey with the Nobeyama 45-m telescope) legacy survey. We detected three velocity components at 35 km/s, 45 km/s, and 58 km/s. The 35 km/s and 58 km/s clouds are likely to be physically associated with W33 because of the enhanced 12CO J= 3-2 to J=1-0 intensity ratio as R(3-2/1-0) $>$ 0.8 due to the ultraviolet irradiation by OB stars, and morphological correspondence between the distributions of molecular gas and the infrared and radio continuum emissions excited by high-mass stars. The two clouds show complementary distributions around the extended HII region (G012.745-00.153). The velocity separation is too large to be gravitationally bound, and yet not explained by expanding motion by stellar feedback. We discuss that cloud-cloud collision scenario likely explains the high-mass star formation in W33

Presenter: Minhee Hyun (Seoul National University)

Title

Newly discovered large-scale structures in ELAIS-N1 field

Abstract

Large-scale structure (LSS) is a useful cosmic laboratory to study the cosmic structure evolution and the effect of environment on galaxies, one of the hot issues of modern astronomy. In this talk, we will present the newly discovered galaxy clusters at $z \gtrsim 1$ and a LSS spanning over 100 Mpc at $z \sim 0.9$ in ELAIS-N1 field which is one of the Infrared Medium-deep Survey(IMS) fields. With multi-wavelength data from the Pan-STARRS (g, r, i, z, y bands), HSC (g, r, i, z, Y bands), CFHT (z band), IMS (J band), UKIDSS DXS (J and K bands) and SWIRE (4 IRAC bands), we found new galaxy cluster candidates at $0.2 < z < 1.6$. Among them, we discovered unusual and interesting galaxy cluster candidates showing high star formation activity at $z \gtrsim 1$. These cluster candidates show distinct galaxy population from the local counterparts. Furthermore, a LSS spanning over 100 Mpc in co-moving scale around the confirmed supercluster of Swinbank et al. (2007) was revealed at $z \sim 0.9$. Interestingly, the newly discovered structure is more massive and larger than the Swinbank supercluster.

Presenter: Na-Eun Shin (Seoul National University)

Title

Spectrum analysis and comparison between isolated galaxies and high- density environment galaxies

Abstract

This study compares the age distribution of stars in different environments. Heavy and bright elliptical galaxies are classified into high-density galaxies in the center of galaxy clusters and isolated galaxies outside of the galaxy clusters. In the Sloan Digital Sky Survey Data Release 7 data, that indexes related to the shape of the galaxy and the environment of the galaxy are calculated, two groups are classified according to an absolute magnitude and the surrounding galaxy density. The classified isolated galaxies are compared with two isolated galaxy catalogs (M. Argudo et al. (2015), Khim et al. (2016)). The STARLIGHT program, which analyzes the galaxy spectrum, was used to analyze the spectra of isolated galaxies and galaxies in high-density environments. This investigated the age distribution of stars in each galaxy. As a result, the more isolated the galaxy is, the higher the rate of stars with the age between $10^{8.5}$yr to $10^{9.5}$yr. It means that the isolated galaxies have a higher proportion of young stars than the galaxies in the high-density environment due to the merging of galaxies with the star formation. Also, for the isolated galaxies, the evolution slowly occurs during the merging process.

Presenter: Ngan Kim Nguyen (Hokkaido University)

Title

The impact of galactic environment on star-forming clouds

Abstract

We explore the effect of different galactic environments on the properties of star-forming clouds through variations in the background potential in a set of isolated galaxy simulations. Rising, falling and flat rotation curves expected in halo dominated, disc dominated and Milky Way-like galaxies were considered, with and without an additional two-arm spiral potential. The evolution of each disc displayed notable differences that are attributed to different regimes of stability, determined by shear and gravitational collapse. The properties of a typical cloud were unaffected by the changes in rotation curve, but the production of small and large cloud associations were strongly dependent on this environment. This suggests that while differing rotation curves can influence where clouds are initially formed, the average bulk properties are effectively independent of the global environment. The addition of a spiral perturbation made the greatest difference to cloud properties, successfully sweeping the gas into larger, seemingly unbound, extended structures and creating large arm - interarm contrasts.

Presenter: Pou-Ieng Cheong (NTHU)

Title

ALMA Observations of Spiral Accretion Flows Towards Extremely Young Protostars

Abstract

Studying the accretion flows toward extremely young protostars is an important step for understanding how the protostars and the protoplanetary disks are assembled in the early stage of star formation. The accretion flows are commonly seen in the MHD numerical simulations; however, it is rarely observed toward young protostars. Here we present our ALMA observations of the accretion flows around the extremely young protostar VLA1623A with a Keplerian disk likely just formed (Murillo, Lai, et al. 2013). "Dendrogram" algorithm (Goodman et al. 2009) are used to identify the accretion flows, and we find the three brightest "branches" and their associated "leaves" likely correspond to the spiral structure flowing toward the central young cluster. We further compare the three accretion flows in the position-position-velocity cube to the CMU model (Ulrich 1976; Cassen & Moosman 1981) which describe the velocity structure of the gas accreting to the central protostar with constant angular momentum. We find that our identified branch structures well match with the CMU model.

Presenter: Sheng-Jun Lin (National Tsing Hua University)

Title

Dating a prestellar core: L1512

Abstract

We estimate the age of a prestellar core, L1512, in the Taurus molecular cloud with H2D+ (110-111) and multiple transitions of N2H+, N2D+ and DCO+ using GBT, JCMT, and IRAM 30 m telescope. L1512 is chosen because it is globular-shaped and relatively isolated in the Taurus molecular cloud, providing an ideal environment for studying the target properties. Prestellar cores are the sites for future star and planet formation. Although we know the gravitational collapse plays a main role during the star formation, it is not yet well understood how the detailed formation process depends on the physical and chemical properties. One key factor hindering our understanding is that it is quite difficult to determine the age of the prestellar cores. In order to estimate the age of the prestellar cores, we have developed two techniques: either measure the deuteration ratio profile of a H-carrier (best species is N2H+) or measure the depletion profile of CO, both across the core. With the help of chemico-dynamical models, we can compare the observations to an evolutionary model for both methods and constrain the age of the cores.

Presenter: SUNGYONG HWANG (Seoul national university)

Title
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Abstract
TBA

Presenter: Taichi Uyama (the University of Tokyo)

Title

Search for Exoplanets around Young Stellar Objects

Abstract

Young Stellar Objects (YSOs) often have protoplanetary disks where planets are being formed. Some protoplanetary disks have been reported to have asymmetric features that imply planet formation. Detecting/constraining protoplanets can help discuss planet formation mechanism. Here we will introduce near-infrared direct imaging observations and present our results and discussions.

Presenter: Taku Okamura (University of Tokyo)

Title

Angular momentum evolution of disk galaxies at high redshift

Abstract

The stellar disk size of a galaxy depends on the fraction of the dark halo mass (Mdh) settled as disk stellar mass (M*), m* equiv M*/Mdh, and the fraction of the dark halo angular momentum (Jdh) transferred to the stellar disk angular momentum (J*), j* equiv J*/Jdh. Since m* and j* are determined in a different manner by a series of star-formation related mechanisms such as inflows and feedbacks, measuring m* and j* at high redshifts is essential to understand the formation history of disk galaxies. We use the 3D-HST GOODS-S, COSMOS, and AEGIS imaging data and photo-z catalogs to examine m* and j* for star-forming galaxies at $z \sim 2$, 3, and 4 when disks are actively forming. We find that the j*/m* ratio is $\sim$0.77+-0.06 for all three redshifts over the entire mass range examined, $8 * 10^{10} <$ Mdh/h^{-1} Msun $< 2 * 10^{12}$, with a possible ($<$30%) decrease with mass. This high ratio is close to those of local disk galaxies, implying a nearly constant j*/m* over the past 12 Gyr, but a factor of a few higher than predicted (at $z \sim 2$) by recent theoretical galaxy formation simulations.

Presenter: Tamaoki Shohei (Nagoya City University)

Title

Near-IR imaging polarimetry toward RCW 106

Abstract

We carried out near-IR imaging polarimetry toward RCW 106 with the IRSF 1.4m telescope at SAAO and the imaging polarimetry SIRPOL on 2017 March and May. We have observed 24 fields and mostly covered the southern part of the giant molecular cloud associated with RCW 106, which is located at a distance 3.6 kpc and is elongated approximately North-South direction with a size of 70x15 pc. Our preliminary analysis indicates that the global magnetic field seems to run along the cloud elongation, unlike many filamentary clouds that are often reported to have their elongations perpendicular to the magnetic fields. Near the central part of RCW 106, the magnetic field appears to be influenced by the expansion of this HII region. Here, we present our preliminary results by comparing with the archival molecular line and far- to mid-IR data.

Presenter: Tamir Baatarjav (Graduate student in the Space Science Laboratory)

Title

Astronomical heritage activity in Mongolia

Abstract

Understanding the relation between human and nature is important for protection environment. Since the sky belongs to us all and forms a whole with the environment perceived by human. As Mongolia is one of the country with natural heritage. This abstract about activities which have done in Mongolia for astronomical heritage. Through these activities we tried to improve universe awareness for public. Especially nomadic people participated in these activities.We would like to share our activities and experience astronomical heritage in different region.

Presenter: Teppei Minoda (Nagoya University)

Title

Thermal Sunyaev-Zel'dovich effect in the intergalactic medium with primordial magnetic fields

Abstract

According to many previous observations, magnetic fields are found on various astronomical objects in the universe, from asteroids to clusters of galaxies. One possible origin of these cosmic magnetic fields is the magnetogenesis in the primordial universe. Magnetic fields generated by such a cosmological mechanism are called primordial magnetic fields (PMFs), and are considered to affect the evolution of matter density fluctuations due to the Lorentz force and the thermal history of the IGM gas due to the so-called ambipolar diffusion. Hence the information of PMFs is expected to be imprinted on the anisotropies of the cosmic microwave background through the thermal Sunyaev-Zel'dovich (tSZ) effect in the IGM. In this talk, given an initial power spectrum of PMFs, we show dynamical and thermal evolutions of the IGM with PMFs, and compute the resultant tSZ angular power spectrum. As a result, we find that the tSZ angular power spectrum induced by the PMFs becomes more remarkable on small scales than that by galaxy clusters even with PMFs below the current cosmological constraint (Minoda et al., 2017, arXiv:1705.10054). The measurement of the tSZ angular power spectrum on small scales can provide the stringent constraint on PMFs.

Presenter: Toshiyuki TANAKA (Cosmology Group, Graduate School of Science, Nagoya University)

Title

21-cm Signal Originating within The Vicinity of The First Stars

Abstract

The first stars are the first luminous objects in the universe, which marked the end of the dark ages. They are thought to have affected following structure formation. However, their properties have not been clarified very much, and there are still many theoretical models. Some characteristics, for example mass spectrum, can be investigated through observations of 21-cm line emitted from the vicinity of the first stars. The signals would be detected by forthcoming radio interferometers such as the Square Kilometre Array (SKA). In order to extract information regarding the properties, we need knowledge of the relation between the properties and the emerging 21-cm signals.

In this work, we conduct radiative hydrodynamics simulations, in which radiative feedback on gas dynamics and gas density profile are appropriately considered, to elucidate dependences of the emerging signals on the stellar mass and redshift. In this talk, we will discuss the impact of the radiative feedback on the signal and its detectability with the SKA. We will also discuss expected signals around remnants of the first stars.

Presenter: Tzu-Hsiang Chao (NTU Institute of Astrophysics)

Title

3D-Shearing-Box Simulation with Adaptive Mesh Refinement and GPU Acceleration.

Abstract

In this work, we describe the implementation of the shearing box approximation with the GAMER (GPU-Accelerated Adaptive MEsh Refinement) MHD (Magnetohydrodynamics) code for studies of accretion disks . The CPU (Central Process Units)-GPU (Graphic Process Units) hybrid computation, a major feature of GAMER, can ideally make performances more than ten times faster than CPUs-based computation. Since MRI (Magnetorotational Instability) in the weakly magnetize disk is highly dependent on the resolution of simulations, the key feature we introduce here is the realization of the AMR (Adaptive Mesh Refinement) scheme in a shearing box. The AMR scheme can efficiently enhance the resolution on crucial structures in small regions while not to increase the computation cost. Two techniques introduced in the Athena code (James M. Stone, 2010), the Crank-Nicholson update for the energy conservation of pure HYDRO cases and the orbital advection (FARGO) for more efficient and accurate calculation, are also implemented in my code. Difficulties and resolution of implementing the above two techniques to fit the AMR scheme and GPU structure will be discussed. Results compared with previous works and performance tests are also presented.

Presenter: Urago Riku (Kagoshima University)

Title

The spiral arm structures of the Milky Way galaxy revealed using the longer period Mira variables

Abstract

Mira variables with long pulsation periods (log P $>$ 2.7) are thought to be a young ($\sim$100Myr) population and could be good tracers of the spiral arm structures of our galaxy. We have monitored the long period Mira candidates selected from the IIIa, IIIb regions in the IRAS 2-colors diagram in the near-infrared K band since 2004. We determined the pulsation periods and amplitudes and the mean magnitudes of 138 Miras. We also obtained the distance to them using the Period-Luminosity relation (PLR) of Miras. The K band PLR has the large scatter at the longer period (log P $>$ 2.4) due to the circumstellar extinction and we constructed the 3.4um PLR using the WISE 3.4um data, which has tighter correlation than the K band. We compared their galactic face-on positions to the arm structures in the literatures and suggest that the longer period Mira variables trace the arm structures.

Presenter: Wen-Ping Lo (Institute of Astronomy & Astrophysics, Academia Sinica/National Taiwan University)

Title

Constraints on the Mass Accretion Rate of Cygnus A with Sub-millimeter Array

Abstract

How the mass accretion rate of SuperMassive Black Holes (SMBHs) is related to the gas feeding from the larger spatial scales, and how it is related to the energetic jet/outflow activities, are fundamental questions for the understandings of the active galactic nuclei (AGN). Faraday Rotation Measure (RM), the tracer of electron column density and magnetic field strength along the line of sight, is one of the powerful method to constrain the mass accretion rate at the vicinity of SMBH. We present the polarimetric results on the core emissions of Cygnus A utilizing Sub Millimeter Array (SMA) at millimeter wavelengths and derive the constraints on the Faraday rotation measure. There is no statistically significant detection of the polarized emissions from Cygnus A. Low fractional polarization at 230 GHz is presumably due to variating Faraday RM screen since the high percentage of polarization (12 %) have been detected with mid-Infrared observations. With the scenarios of beam and bandwidth depolarizations from the accretion flow, the mass accretion rate and the accretion power can be constrained, and convection-dominated accretion flow solution can be ruled out.

Presenter: Yao Lu (Purple Mountain Observatory, Chinese Academy of Sciences)

Title

SPACE DEBRIS DETECTION AND CHARACTERIZATION USING CNEOST SURVEY DATABASE

Abstract

The China Near Earth Object Survey Telescope (CNEOST), located at the Xuyi station of the Purple Mountain Observatory, was built with the first aim to detect Near Earth Asteroids and Comets, equipped with a 1.20 meter primary mirror and a 1.04 meter corrector and a 10K × 10K CCD camera corresponding 1.94°×1.94° FOV. A sky survey has been carried out since 2009, in which 60 seconds exposures was adopted mostly. Inevitably, space debris streaks would appear on these images, therefore an experiment of space debris detection and characterization has been conducted utilizing CNEOST survey database.

In this preliminary work, only near GEO objects are considered. Firstly, a morphological algorithm has been developed to detect the possible debris streaks on pre-processed images. Then candidate streaks are extracted and examined by several criteria such as streak profile i.e. streaks length and orientation of near GEO objects should be close to 15 arc-minutes along east-west direction within 60 seconds exposures. Finally some analysis have been done to characterize their rotational motion according to the light curves extracted from streaks. In a word, the utility of astronomical time-domain surveys database for space debris data mining has been demonstrated in this paper.

Presenter: Yosuke Furuya (Yamaguchi university)

Title

Investigation of radio structures of high-z quasars by VLBI observations

Abstract

The purpose of our observations is to increase the number of VLBI image of high redshift quasars. Recently, there are only 61 objects observed by VLBI at redshift $z > 3$, which is statistically insufficient for discussions of the process of AGN formation. Therefore, we observed nine quasars at redshift $z > 4$ with JVN (Japanese VLBI Network) at 8.4 GHz and attempted to obtain the VLBI images. As a result, we succeeded to obtain the VLBI images for five sources. The VLBI images show there five sources have really compact structure of less than 10 mas and high brightness temperature of more than 10^8 K. In order to increase VLBI images effectively, we will carry out two type of observations . Firstly, we will observe sources selected by new criterium with JVN. This observation will be performed to check whether there sources can be detected or not with VLBI. We expect to increase the number of sources detected by VLBI. Secondly, we will observe the sources detected by JVN observation with EAVN (East Asia VLBI Network), in order to obtain more detailed VLBI images.