AKARI (ASTRO-F)

Mission Program
Proposals Abstracts

Post-Helium (phase 3) mission

12 May 2008

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	AGNMO
Title (Full)	Infrared monitoring of Active Galactic Nulei for dust reverberatoin search

PI	Enya, Keigo E-mail: enya@ir.isas.jaxa.jp ISAS/JAXA
Co-I	Takehiko Wada, ISAS/JAXA Takao Nakagawa, ISAS/JAXA Hideo Matsuhara, ISAS/JAXA Yuzuru Yoshii, IoA/UT Yukiyasu Kobayashi, NAOJ Takeo Minezaki, IoA/UT Shintaro Koshida, UT Yu Sakata, UT Syouta Sugawara, UT Yuka Uchiich Katsuno, IoA/UT Tsutomu Aoki, Kiso Obserbatory/UT Bruce A. Peterson, MSSO/ANU

SAC Members	Y.Taniguchi
Total Number of Pointings	approved=100, allocated=96

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	AGNMO	**PI**	Enya, Keigo

Abstract:

We propose infrared monitoring of z=0.4-1.6 Active Galactic Nuclei (AGN) by AKARI. The primary purpose of this observation is the search of dust reverberation to obtain unique information to understand structure and emitting mechanism of AGN. AKARI is needed, and the most suitable telescope for this work because infrared (2-4 micron at rest frame) monitoring of AGN close to the North Ecliptic Pole(NEP) is essential. For this study, extensive pre-observation with ground based telescope has been executed from 1995. 1) Near-IR variability of 200 AGN was investigated with 1.3m telescope at ISAS/JAXA. 2) Dust reverberation has been newly found and studied in nearby AGN by multicolor monitoring in optical and near-IR by the MAGNUM telescope. 3) Pre-monitoring at optical wavelength by the MAGNUM telescope has been executed for the targets of this MP observation, and promising variability was confirmed. This study needs about 1 pointings/month for 13 objects with IRC camera with AOTZ03. Long span of the observations is important, (2-3 years or more). The results of this work will be also useful for calibration of IRC, and the determination of distance to AGN and the cosmological parameter.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	ISMGN
Title (Full)	ISM in our Galaxy and nearby galaxies

PI	Kaneda, Hidehiro E-mail: kaneda@ir.isas.jaxa.jp ISAS/JAXA
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SAC Members	Y.Nakada; T.Hasegawa
Total Number of Pointings	approved=700, allocated=700

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	ISMGN	**PI**	Kaneda, Hidehiro

Abstract:

We have performed systematic studies on the ISM in various environments of our Galaxy and nearby galaxies in the AKARI Phases 1&2. In order to extend our studies based on the results obtained in the Phases 1&2, we will propose to observe the ISM in our Galaxy and nearby galaxies in a systematic manner in the Phase 3. Considering AKARI uniqueness, we lay stress on near-IR spectroscopy that Spitzer does not possess. In particular, we propose to obtain near-IR spectral maps of our Galaxy and nearby galaxies as AKARI legacy products.

Spectroscopic observations in the 2-5um wavelength range covered by the AKARI/IRC provide many pieces of information about the properties of the ISM; ultra-small grains exhibit several spectral features at 3.3-3.5um that are crucial probes into the physical/chemical states of the dust grains and their evolution. The chemical composition of molecular species can be studied through absorption features by interstellar ice/gas such as those of CO at 4.7um, CO2 at 4.3um, and H2O around 3um. For the SNRs interacting with molecular clouds, many ro-vibrational emission lines from interstellar H2 gas heated by shock are expected to emerge in the near-IR spectral range. The near-IR spectral continuum is sometimes dominated by photospheric emission from asymptotic giant branch (AGB) stars, and thus AGB stars in the aggregate can be studied for mature systems such as elliptical galaxies. Dust continuum emission is also expected to exist in the near-IR spectrum even after subtracting the stellar background.

The observation program proposed here consists of the following three sub-programs: (1) Galactic plane survey by near-IR spectroscopy, (2) supernova remnants, and (3) nearby galaxies. Our Galaxy contains ideal targets for probing the energy flow from stars into the ISM and the life cycle of the ISM; clouds illuminated by early-type stars enable us to examine various theoretical models, while SNRs are conspicuous cases of collisional heating of the ISM and dust destruction. The environs of evolved stars and SNRs are essential as dust formation sites. External galaxies provide a much wider range of physical conditions. Our sample of about 80 nearby galaxies includes various ranges in ISM environments and star formation rate. A membership of this program includes several members of the Korean team; the SNR survey is one of the key observations for collaborative research with the Korean team.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	QSONG
Title (Full)	Spectroscopic Observations of QSOs with NIR Grism

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SAC Members	N.Arimoto; S.Okamura; Y.Taniguchi
Total Number of Pointings	approved=650, allocated=650

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	QSONG	**PI**	Lee, HyungMok

Abstract:

We propose to obtain NIR Grism spectra of 132 low redshift bright QSOs, and 225 high redshift QSOs at z > 3. The wavelength region between 2.5 - 5.0 micron contains a wealth of information on QSOs, but difficulties of accessing such a wavelength regime have hampered studies of spectra atthe important spectral window. At low redshift, the 2.5-5.0 micron window offers opportunities to study NIR Hydrogen lines which can give new insights into the AGN physics and also potentially provide useful AGN diagnostics for studying dust reddened systems. At high redshift, the H-alpha and H-beta lines - the popular estimators of the black hole mass - redshifts into 2.5-5.0 micron, making one to rely on much less robust mass estimators such as UV lines. By obtaining the 2.5 - 5.0 micron spectra of a carefully selected low redshift and high redshift QSOs, we will (i) assemble QSO spectra at the rarely studied wavelength regions of 2.5-5 micron; (ii) study the NIR Hydrogen lines such as Br-alpha, Br-beta, and Pa-alpha as diagnostics to understand the nature of the Supermassive Black Holes (SMBHs); (iii) examine whether there is a trace of star formation activities in their host galaxies through PAH features, and (iv) study the mass evolution of the SMBHs at high redshift to today. The spectroscopic study of hunderds of high redshift QSOs will enable us to understand the evolution and the census of SMBHs in QOSs at high redsfhit. Our study will also provide a uniform, extensive set of the rest-frame 2.5-5.0 micron spectra of QSOs for the first time, which can serve as a strong basis for the future studies of the less-extinct rest-frame NIR Hydrogen lines to understand the nature of distant QSOs.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	EGANS
Title (Full)	Evolution of Galaxies with AKARI Near-IR Spectroscopy of the SDSS selected sample

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SAC Members	N.Arimoto; S.Okamura
Total Number of Pointings	approved=200, allocated=190

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	EGANS	**PI**	Matsuhara, Hideo

Abstract:

We propose spectroscopic (NP(2-5micron) or NG(R=160 at 2.5-5micron)) study of Sloan Digital Sky Survey (SDSS) galaxies at z=0.1-0.5 which are not so local to be resolved out by AKARI's imaging capability. In total 158 targets for the FY2008, with three pointing per each. Selected targets are well-known in terms of their redshift, age, star-formation rate, and their environment (cluster member or not).

Key sciences are 1) identifying 1.6micron bump (& 2.3micron CO abs. bandhead) as a function of age, 2) correlating the optical star-formation rate and the 3.3micron PAH feature. These results will benefit to judge the nature of AKARI-unique sources discovered by the all-sky survey by their near-IR SEDs.

By using these unique spectroscopic capability of AKARI as shown above, we also aim to perform the following scientific outcome: star-formation in the brightest cluster galaxies, the nature of star-forming elliptical galaxies, the nature of passive spirals and star-forming activity is E+A galaxies.

AKARI Mission Program Proposal (1/2)	**Date:** 08/01/21
Title (Abbreviation)	CNIRB
Title (Full)	AKARI observations of cosmic near-infrared background

PI	Matsuura, Shuji E-mail: matsuura@ir.isas.jaxa.jp ISAS/JAXA
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SAC Members	Y.Taniguchi
Total Number of Pointings	approved=900, allocated=900

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	CNIRB	**PI**	Matsuura, Shuji

Abstract:

The cosmic near-infrared background (CNIRB) is the integrated flux of unresolved extragalactic objects towards the line of sight. Therefore, measurement of the CNIRB is powerful method to research into very high redshift objects. Discovery of strong excess of the CNIRB by COBE and IRTS has given great impact to observational cosmology. Only a little fraction of the CNIRB energy could be attributed to known galaxies, and the remaining "excess" energy has to be due to unknown objects. Interestingly, the CNIRB spectrum peaking at $\sim$1.2 um show good agreement with models of the first stars emitting strong Lyman-alpha at z>10, whose existence is suggested from the WMAP result of CMB anisotropy measurements. IRTS also found a characteristic angular scale of the CNIRB fluctuations at $\sim$2 deg, which corresponds to the large-scale structure at z$\sim$10, an early phase of structure formation traced by Baryons.

In order to expand the CNIRB study, we have carried out AKARI observations as a subject of the LS-NEP program. Aim of this program is measurements of the CNIRB and its fluctuations in a wide rage of angular scale, which covers the predicted peak scale of the first-star background fluctuations. Imaging with IRC allowed us to minimize the point source contribution down to much fainter flux levels than previous observations. It should be noted that AKARI has great advantage against Spitzer of the capability of absolute measurement using the cold shutter, which is essential to detect the degree-scale fluctuations.

As preliminary results of the Phase-1/2 data, we have successfully detected the fluctuation signals, which exceed instrumental noise. The detected fluctuation levels are consistent with those of IRTS and COBE results. We think it has extragalactic origin and is possibly the first-star background. However, about a half of the data were unexpectedly affected by the stray light. The affected data cannot be used for the large-scale analysis, which requires absolute measurement. Then, the largest angular scale available with the current data set is limited to 1 degree. Hence, we propose to recover the lost half area in order to extend the angular range back to the original value of $\sim$2 deg by the Phase-3 observations. In addition, we also propose confirmation of the Phase-1/2 results by using new AOT, which provides more accurate dark current estimate. The extended data set in Phase-3 should lead to much stronger conclusion on the origin of the CNIRB excess.

AKARI Mission Program Proposal (1/2)	**Date:** 08/01/21
Title (Abbreviation)	FBSEP
Title (Full)	IRC Follow-up observations of the AKARI Deep Field South (ADF-S)

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SAC Members	Y.Taniguchi
Total Number of Pointings	approved=350, allocated=339

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	FBSEP	**PI**	Matsuura, Shuji

Abstract:

We propose IRC multi-band imaging follow-up observations of the AKARI Deep Field South (ADF-S), where we have carried out a far-infrared deep survey with the AKARI/FIS.

Deep galaxy survey in the far-infrared provide us with a powerful tool to investigate the evolution of luminous infrared galaxies and the star-formation history in the Universe, since they measure thermal emission from dust heated by the UV light from massive stars. They also play an important role in tracing the large-scale structure and the cosmic infrared background measuring the clustering of luminous infrared galaxies.

For these purposes, we have carried out deep surveys at 65, 90, 140 and 160 microns with the FIS instrument onboard the AKARI satellite. In order to minimize the contamination from the Galactic cirrus emission, we selected the region near the South Ecliptic Pole where the cirrus density is the lowest in the whole sky (AKARI Deep Field South; ADF-S).

The area of the survey is $\sim$12 deg^2. We have successfully detected almost 1700 galaxies in a wide flux range from a few Jy down to $\sim$20 mJy at 90 um, and almost 300 galaxies down to $\sim$180 mJy at 140 um. Galaxy number counts are useful to constrain the evolution scenario of galaxies. Our counts from the ADF-S show a significant evolution at the faint end, which is found to be a factor of 2-3 higher than no-evolution model predictions, and suggest that currently accepted galaxy evolution models should be modified.

In order to investigate the nature of the detected galaxies such as spectral energy distributions and redshifts, we propose a multi-band near-infrared imaging observation with the IRC instrument in the AKARI warm mission term. This multi-band imaging will enable us to estimate photometric redshifts and will be the only way to identify the detected far-infrared sources. Moreover, since ADF-S is continuous and large enough to contain large scale structures at z$\sim$1, we can examine the environmental dependence of various physical properties of galaxies. Especially, we can examine how the ratio between the star-formation rate (SFR) and the stellar mass of galaxies (specific SFR) varies with different environments, because the former is traced by FIR luminosity and the latter by NIR luminosity, respectively.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21

Title (Abbreviation)	EXOPT
Title (Full)	Atmospheric Compositions and Temperature Structures of Extra Solar Planets

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SAC Members	M.Tamura; T.Mukai
Total Number of Pointings	approved=30, allocated=30

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	EXOPT	**PI**	Murakami, Hiroshi

Abstract:

We propose to reveal atmospheric compositions and temperature structures of transiting exoplanets using spectroscopic mode of IRC. Transits and 2ry Eclipses of exoplanets give unprecedented opportunity for studying exoplanets otherwise impossible to distinguish them from their host stars. Spitzer has been providing most of the data on thermal emission from the exoplanets. However, it could not provide definite spectroscopic proofs for atmospheric features. Recent models on exoplanet atmosphere predict either absorption or emission features depending on the atmospheric temperature structure. There features are most prominent at 3-4 micron where Akari IRC spectroscopic mode covers but Spitzer IRS do not. The emission/absorption or the absence of these features will give important clues on the presence of inversion layers, stratospheres, or dusty clouds. Based on Spitzer (mainly) photometric data, there are some hint for a variety of the atmospheric structures; not all of them may show similar features. We can observe seven transiting exoplanets with Akari sensitivity and may be able to reveal a diversity of atmospheres among transiting exoplanets.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	AGBGA
Title (Full)	Mass loss and stellar evolution in the AGB phase

PI	Nakada, Yoshikazu E-mail: nakada@kiso.ioa.s.u-tokyo.ac.jp University of Tokyo
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SAC Members	N.Arimoto; Y.Nakada
Total Number of Pointings	approved=500, allocated=500

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	AGBGA	**PI**	Nakada, Yoshikazu

Abstract:

We propose imaging and spectroscopic observations of evolved stars (Asymptotic Giant Branch (AGB) stars, post-AGB stars and planetary nebulae) in nearby galaxies and Galactic globular clusters. The primary aims of these observations are (1) detecting mass-losing stars in these galaxies and clusters. (2) Understanding mass-loss process of these AGB stars. (3) Investigating the influence of metallicities of galaxies on compositions of dust and molecules.

Targets of the imaging observations are 36 nearby galaxies within 1500 kpc and 54 galactic globular clusters. Furthermore, we request spectroscopic observations of stars in nearby galaxies and Galactic globular clusters in the NG and NP modes. AKARI near-infrared spectra will cover PAHs, C_2H_2, H_2O and CO bands. Particular interests will be PAHs and C_2H_2, which are likely to have metallicity dependence in their abundance. These observations will help understanding stellar evolution and chemical evolution of galaxies.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	AGNUL
Title (Full)	Revealing inner structure and energyr sources of ULIRG/AGN

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SAC Members	Y.Taniguchi
Total Number of Pointings	approved=550, allocated=500

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	AGNUL	**PI**	Nakagawa, Takao

Abstract:

We propose systematic AKARI/IRC 2-5 micron spectroscopic observations of ULIRG (Ultra Luminous Infrared Galaxies) and obscured AGNs (Activi Galactic Nucleis) to reveal (1) energy sources in ULIRGs and (2) inner structure around buried AGN. NIR 2-5 micron wavelength is a unique wavelength region which contains unique features enabling us to distinguish between a buried AGN and a extreme starburst. This has been clearly demonstrated during the phase-2 observations by the combination of AKARI, Subaru, and SPITZER observations. Phase-2 observations with IRC also showed us that some galaxies have wide CO molecule absorption. This indicated the existence very warm ($\sim$1000K) molecular clouds, which could be identified as evidence of putative molecular torus. AKARI/IRC is the only instrument which enables sensitive NIR spectroscopic observations covering 2-5 micron without the effect of the atmosphere of the earth. Our target list consists of several categories, and the combination will enable us to study the role of luminous buried AGNs as function of infrared luminosity. If previously more infrared luminous galaxies evolve into currently more massive galaxies, and if we find that luminous buried AGNs are more common in galaxies with higher infrared luminosities, then we may be able to provide the first observational support for the AGN-feedback scenario as the origin of the galaxy-downsizing. Our preliminary analysis of incomplete sample suggests that the importance of buried AGNs appears to increase with increasing infrared luminosity. It is extremely important to confirm this results, from a statistically significant number of sample, if we are to test the AGN-feedback scenario as the origin of the galaxy down-sizing phenomena.

AKARI Mission Program Proposal (1/2)	Date: 08/01/20
Title (Abbreviation)	P3LMC
Title (Full)	Observations of the Magellanic Clouds

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Co-I	Y. Ita, NAOJ H. Kaneda, ISAS/JAXA I. Sakon, University of Tokyo T. Tanabe, University of Tokyo Y. Nakada, University of Tokyo D. Kato, University of Tokyo T. Shimonishi, University of Tokyo M. Matsuura, NAOJ I. Yamamura, ISAS/JAXA Y. Doi, University of Tokyo D. Ishihara, University of Tokyo T. Wada, ISAS/JAXA Y. Ohyama, ISAS/JAXA A. Kawamura, Nagoya University M. Tamura, NAOJ T. Hasegawa, NAOJ B.-C. Koo, Seoul National University

SAC Members	M.Tamura; Y.Nakada; T.Hasegawa
Total Number of Pointings	approved=450, allocated=410

AKARI Mission Program Proposal (2/2)			Date: 08/01/20
Title	P3LMC	**PI**	Onaka, Takashi

Abstract:

We propose to make about 600 pointing observations of the Large and Small Magellanic Clouds with NP (near-infrared prism slit-less spectroscopy in 2–5 micron). We propose to observe the same region of the LMC in the phase 1 and 2, which will give a redundant dataset to the LMC survey executed in the phase 1 and 2. It will significantly improve the quality and reliability of their NP data and drastically enhance its scientific output by enabling the extraction of fainter source spectra. The LMC bar region will not be observed because of its high source confusion, and instead we propose to make observations of the SMC that has similar ecliptic longitudes in a well-arranged plan. The proposed observation will make AKARI NP data of the LMC a legacy data product. It will provide crucial information for the study of a wide range of astronomy, including star-formation, interstellar processing, mass-loss in the late stellar evolution, and the energy and mass budget of interstellar medium. It will make a huge contribution to the study of the material circulation in a galaxy, the primary science goal of the LS LMC survey.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	MSAGN
Title (Full)	MIR all-sky survey follow-up program: search for missing AGNs

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Co-I	Daisuke Ishihara(ISAS/JAXA) Keigo Enya(ISAS/JAXA) Youichi Ohyama(ISAS/JAXA) Takehiko Wada(ISAS/JAXA) Hirokazu Kataza(ISAS/JAXA) Takashi Onaka(U-Tokyo) Hideo Matsuhara(ISAS/JAXA) Takao Nakagawa(ISAS/JAXA) Issei Yamamura(ISAS/JAXA) Yoshifusa Ita(NAOJ) Satoshi Ray Takita(ISAS/JAXA) Fumihiko Usui(ISAS/JAXA) Myungshin Im(SNU) Munetaka Ueno(U-Tokyo) Hideaki Fujiwara(U-Tokyo) Sunao Hasegawa(ISAS/JAXA) Anybody who is interested in it.

SAC Members	N.Arimoto; S.Okamura; Y.Taniguchi; Y.Nakada
Total Number of Pointings	approved=250

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	MSAGN	**PI**	Oyabu, Shinki

Abstract:

This is a new proposal for a follow-up program of AKARI mid-infrared all-sky survey sources. Main purpose is to search for active galactic nuclei(AGNs) in the all sky using mid-infrared excess over 2MASS K_S-band. Our survey can find not only normal AGNs but also very dusty AGNs which are excluded by selection criteria of other AGN surveys with optical as well as X-ray, radio and near-infrared. Spitzer can perform a deep, but small field of view survey in the infrared, while IRAS made all-sky survey with shallow sensitivities in the mid- and far-infrared. Instead our AKARI mid-infrared all-sky survey brought us deeper sensitivities and higher resolution. IRC NG spectroscopy can escape from dust extinction and provide their evidence of AGNs which have broad emission lines and/or steep continuum of hot dust. If it is very dusty, there might be molecule absorptions in the spectra. The contamination of sources are star-forming galaxies with strong PAH emissions. We can confirm 3.2μm PAH emission of such galaxies from IRC NG spectra. Using their spectra, we will make new AGN sample. We are going to discuss real AGN population in near-by universe. We also note that our survey have a possibility to find quasars at $z \sim 4$ like the luminous and lensed quasar, APM 08279+5255.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	FUHYU
Title (Full)	FUHYU - WELL STUDIED FIELD MISSION PROGRAM

PI	Pearson, Chris E-mail: cpp@ir.isas.jaxa.jp RAL
Co-I	Toshinobu Takagi, ISAS Stephen Serjeant, Open University Hideo Matsuhara, ISAS/JAXA Takehiko Wada, ISAS/JAXA Hyung Mok Lee, Seoul National University Myungshin Im, Seoul National University Woong-Seob Jeong, KASI Mattia Negrello, Open University Shinki Oyabu, ISAS/JAXA K. Ohta, Kyoto University

SAC Members	N.Arimoto; S.Okamura; Y.Taniguchi
Total Number of Pointings	approved=450, allocated=393

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	FUHYU	**PI**	Pearson, Chris

Abstract:

We propose to carry out point source aperture spectroscopy of a large sample of high redshift, ultraluminous, sub-millimetre galaxies using the IRC near-infrared grism instrument on AKARI. Our targets are located in well studied fields with extensive photometry, spectroscopy and in many cases determined redshifts which will significantly aid in our analysis. Our target fields include thise already observed in AKARI IRC photometry for the same FUHYU Mission Program in Phase I & II.

The primary target of the spectroscopic observations are the Paschen alpha & Paschen beta recombination lines of Hydrogen, which will be used to estimate the extinction of the sources in our sample independent of any photometric data. The measured extinction combined with observed star-formation rates will be used to constrain contemporary models of the spectra of these galaxies and investigate the evolutionary phase of dusty starbursts linking them with the formation of present day spheroidal systems. Secondary targets for our spectroscopy would include dust features such as the 1.6 micron bump, 2.3 micron feature and the 3.3 micron Polycyclic Aromatic Hydrocarbon (PAH) emission for lower redshift sources and their relationship to the star-formation rate. Finally, any additional, possibly anomalously powerful lines, and in a handful of high redshift sources, H alpha emission.

The objective of this Mission Program is to establish the evolutionary sequence of high-z massive starbursts, which once determined will further studies into the characteristics of starbursts as a function of mass in order to reveal the physical origin of the scaling relations of elliptical galaxies, thus linking the local and high redshift Universe, via the star-forming history and formation of the largest stellar systems we see today.

Since Spitzer has no capability for spectroscopy in the near infrared region, AKARI's capability for slit spectroscopy exploits an instrumental and scientific niche of AKARI which is otherwise unachievable until JWST

AKARI Mission Program Proposal (1/2)	**Date:** 08/01/21
Title (Abbreviation)	AFSAS
Title (Full)	ASTRO-F/AKARI Studies on Star formation and Star forming regions

PI	UENO, Munetaka E-mail: m.ueno@exo-planet.org University of Tokyo
Co-I	Kitamura, Yoshimi, ISAS/JAXA Kawamura, Akiko, Nagoya University Aikawa, Yuri, Kobe University Ikeda, Norio, ISAS/JAXA Takita, Satoshi, Tokyo Institute of Technology Ishihara, Daisuke, ISAS/JAXA Kandori, Ryo, National Astronomical Observatory Sato, Yaeko, National Astronomical Observatory Fukagawa, Misato, Nagoya Tokyo Kataza, Hirokazu, ISAS/JAXA Okamoto, Yoshiko, Ibaragi University Ohnishi, Toshikazu, Nagoya University Honda, Mitsuhiko, Kanagawa University Sunada, Kazuyoshi, Nobeyama Radio Observatory, NAOJ Dobashi, Kazuhito, Tokyo Gakugei University Itoh, Yoichi, Kobe University Murakawa, Koji, Max-Planck-Gesellschaft zur Forderung der Wissenschaften Lee, Chang Won, Korea Astronomy Observatory Hong, SeungSoo, Seoul National University Koo, Bon-Chul, Seoul National University Park, Yong-Sun, Seoul National University Toth, L. Viktor, ELTE TTK White, Glenn J., Open University Abraham, Peter, Konkoly Observatory Kun, Maria, Konkoly Observatory Murakami, Hiroshi, ISAS/JAXA Tatematsu, Kenichi, National Astronomical Observatory Hasegawa, Tetsuo, National Astronomical Observatory Tamura, Motohide, National Astronomical Observatory

SAC Members	M.Tamura
Total Number of Pointings	approved=650, allocated=650

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	AFSAS	**PI**	UENO, Munetaka

Abstract:

Our main goal is to reveal the evolution of the disks in the possible planet building stage of $\sim$ 10 Myr. The target list of this study consists of T Tauri and Herbig Ae/Be stars mainly located in the Chamaeleon and Taurus regions (d = 140 pc). This study will be done in the following two steps: First, we did perform a photometric survey of the disks around the pre-main-sequence stars with the FIS and the IRC. Second, we will make spectroscopic observations over 2 - 5 micron of the disks detected at the 1-st step toward the weak-line T Tauri and Herbig Ae/Be stars with ages of $\sim$ 10 Myr.

ASTRO-F/AKARI's unique capabilities in 3 micron spectroscopies realize detailed analyzations of interstellar dust particle with icy mantle. To know the composition of icy material is essentially important to understand the chemical processes in interstellar matter, and the composition must be determined by the physical conditions such as temperature, density, and UV flux. The icy dust is also very important to control the speed of accumulations of planetesimal phase in proto-planetary disk. ASTRO-F/AKARI is the only mission which can examine a spectroscopic face of dust particle in various stage of star formation up to our solar system. The second project is a deep survey for selected regions under collaboration with tie-up observations. The formation of brown dwarfs and planetary-mass objects and their abundance, and the very low-mass end of the initial mass function, are two of the central topics for both of the low-mass star and star formation studies. The third project is a follow-up observations of Chamaeleon sky survey. Chamaeleon region is selected to be a test bench for our studies since it is situated in the excellent visibility area of ASTRO-F/AKARI. A full use of ASTRO-F/AKARI capabilities enables us to conduct an extended survey to cover from the diffuse interstellar matter up to rather evolved main sequence stars. This project is the first survey that has enough sensitivities to detect any stages of YSOs up to MS star and sufficient coverage in the sky, and which will provide us quantitative samples of stars with proto-planetary disks born in the cloud and will hopefully meet a brief phenomena with very short duration. The fourth one is a possible observation of atmosphere of an extra-solar planet

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	SOSOS
Title (Full)	Origin and Evolution of Solar System Objects

PI	UENO, Munetaka E-mail: m.ueno@exo-planet.org University of Tokyo
Co-I	Ootsubo, Takafumi, Nagoya University Ishiguro, Masateru, Seoul National University Hasegawa, Sunao, ISAS/JAXA Usui, Fumihiko, ISAS/JAXA Hong, SeungSoo, Seoul National University Pyo, JeongHyun, Seoul National University Kwon, Suk Minn, Kangwon National University Sekiguchi, Tomohiko, National Astronomical Observatory Kinoshita, Daisuke, National Central University Kawakita, Hideyo, Kyoto Sangyo University Furusho, Reiko, Waseda University Sarugaku Yuki, University of Tokyo Watanabe, Jun-ichi, National Astronomical Observatory Mueller, Thomas G., Max-Planck-Institut fuer extraterrestrische Physik Mukai, Tadashi, Kobe University

SAC Members	T.Mukai
Total Number of Pointings	approved=200, allocated=200

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	SOSOS	**PI**	UENO, Munetaka

Abstract:

Our knowledge of the origin and the evolution of the solar system comes from two sources. One is study of star formation and extra-solar planetary systems. The other is the study of the solar system itself. Different from the macroscopic view for the other planetary systems, we can obtain detailed information on the individual bodies in our solar system. The solar system we observe today is, however, a highly evolved, and it is very important to recognize which qualities reflect that often violent evolution and which truly record conditions at the time of solar system formation. Then, which solar system bodies leave a trace at early solar system? Minor bodies such as asteroids, comets, centaurs, and Trans-Neptunian objects must be remnants of planetesimals in the early solar-nebula. Meteorites which came from asteroids provide us the clock for timing and conditions in planetesimal formation by cosmochemistry and mineralogy. Minor bodies contain a relatively pristine record of the initial conditions that existed in our solar system nebula around 4.6Gy ago. To know the origin and the evolution of early solar system, it is essential to study the small solar system objects. As questions about origin and evolution of the solar system, three central questions were listed.

I. What was compositional gradient from Mercury to beyond Neptune at the time of initial protoplanetary accretion?
II. What fragments originated from the same primordial parent bodies, and what was the original distribution of those parent bodies?
III. What are early steps in planetesimals and planet formation and evolution?

Observations of ices and silicate materials are important to solve these questions. These materials have spectral features in near-infrared wavelength regions. Spectroscopic observations of AKARI/IRC are very suited for the determinations of compositions and crystallinity of these materials. Thus, we propose 'near-infrared spectroscopic survey of small solar system objects.'

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	SPICY
Title (Full)	Unbiased Slit-Less Spectroscopic Survey of Galaxies for the Phase 3

PI	Wada, Takehiko E-mail: wada@ir.isas.jaxa.jp ISAS/JAXA
Co-I	Youichi Ohyama, ISAS/JAXA Shinki Oyabu, ISAS/JAXA Kentaroh Watanabe,ISAS/JAXA Tomotsugu Goto, ISAS/JAXA Tsutomu T. Takeuchi, Nagoya-U Myungshin Im, SNU Yutaka Komiyama, NAOJ Hideo Matsuhara, ISAS/JAXA Shuji Matsuura, ISAS/JAXA Mai Shirahata, ISAS/JAXA Chirs Pearson, RAL Itsuki Sakon, U-Tokyo Toshinobu Takagi, ISAS/JAXA and the SPICY team

SAC Members	N.Arimoto; S.Okamura; Y.Taniguchi
Total Number of Pointings	approved=550, allocated=540

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	SPICY	**PI**	Wada, Takehiko

Abstract:

Using the ABSOLUTELY UNIQUE capability of AKARI's NIR slit-less spectroscopy, we propose an unbiased slit-less spectroscopic survey of galaxies. The purpose of this survey is as follows. 1) Construction of a library of accurate SED templates of galaxies. 2) Determination of the redshifts of galaxies by 3.3um PAH features and other emission lines. 3) Investigation of the PAH features along with the redshift, especially, the PAH/SFR relationship. 4) Constraints on galaxy evolution models by type dependent luminosity function classification, rather than galaxy counts. 5) Discovery of spectroscopically peculiar galaxies such as ELGs, high-z QSOs and Lya/Ha emitters at the re-ionization era. This survey will also give strong constraints on the origin of the EBL. This survey will mainly use IRC prism (NP) in the slit-less spectroscopy mode and provide us with a large number of unbiased samples of galaxies with low resolution spectrum covering wavelengths from 2.5 to 5 micron. Together with GALEX, CFHT, Uzbekistan 1m telescope, KPNO 2.2m FLAMINGO, Spizter, and AKARI photometric data, this survey will provide us with a complete correction of SEDs of local(z=0.1-0.4) star-forming galaxies with a coverage from UV to FIR wavelengths, with a spectroscopic redshift determined by the 3.3 micron PAH feature. 895 pointed observations in AOTZ4 mainly in the NEP regions are requested for this unique survey.

AKARI Mission Program Proposal (1/2)	Date: 08/01/21
Title (Abbreviation)	NIRLT
Title (Full)	Near-Infrared Spectroscopy of L and T Dwarfs

PI	Yamamura, Issei E-mail: yamamura@ir.isas.jaxa.jp ISAS/JAXA
Co-I	Takashi Tsuji, Univ. of Tokyo Tadashi Nakajima, NAOJ Toshihiko Tanabe, Univ. of Tokyo

SAC Members	Y.Nakada
Total Number of Pointings	approved=68, allocated=68

AKARI Mission Program Proposal (2/2)			Date: 08/01/21
Title	NIRLT	**PI**	Yamamura, Issei

Abstract:

Ground based observations of brown dwarfs, including L and T dwarfs are almost limited to the NIR shortward of 2.5 micron, with the exceptional case of Gl 229B. Although mid-infrared region ($>$ 5.0 micron) can be observed with Spitzer, there is no possibility of the near-infrared spectroscopy. The NIR region is especially important for brown dwarfs, because this region includes CO fundamental bands and CH4 nu3 fundamental bands. It was suggested from a very noisy spectra of Gl229B obtained with the ground-based observation that CO is over-produced by the non-equilibrium process as is known in Jupiter atmosphere. Recent analysis of the Spitzer mid-infrared data of the brown dwarfs indicates a remarkable contribution of the non-equilibrium effect such as vertical transport in the abundance of NH3. To clarify the non-equilibrium chemistry in other major molecules such as CO and CH4 is an important next step to a more realistic modeling of the atmospheres of brown dwarfs. This can also be an important preparatory step for spectroscopy and modeling of extra-solar giant planets in the near future. AKARI provides a unique and exclusive opportunity to take high-quality NIR spectra of brown dwarfs. Its data shall progress our understanding of the atmospheres of brown dwarfs significantly. We proposed a series of NIR spectroscopy of the brown dwarfs with AKARI/IRC/NIR for Phase 1 & 2 observations. Eleven stars have been observed and seven of them show spectra of good quality. The analysis is still ongoing but the first glance of the data already told us remarkable features in the spectra. Therefore, we will continue observations in Phase 3 to enlarge the sample of NIR spectra of the brown dwarfs. We also add nine M-type dwarfs to clarify the spectral sequence of ultracool dwarf stars. Ten stars from the Spitzer target are included in the current sample. In total we propose observations of 30 stars, 68 pointings all in the high-resolution spectroscopic mode of the IRC/NIR.