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Director's Corner

A Year in Transition

Luis C. Ho

Director of Kavli Institute for Astronomy and Astrophysics

I arrived in Beijing on the last day of a cold December. Excited, if a bit apprehensive, I left behind a warmer, more familiar world to chase an ideal.

China today is a land of extraordinary possibilities. Opportunities abound in all sectors of society, including basic sciences such as astronomy. We have always had unparalleled human resources. Now we are fortunate to also have financial resources and a progressive government willing to invest in fundamental research. Entrusted with these resources, we have an opportunity—indeed a responsibility—to use them well to do something useful for the future. This poses a tremendous challenge for a nation of China's magnitude and complexity, not to mention its deep cultural roots. There are simply no blueprints for the infrastructure that we must build, no roadmap for the road we must travel. And, as exemplified by my own journey from California to Beijing, change never comes easily. It is natural to stick to the safe, familiar comforts of our past. Transition brings uncertainty, uneasiness, even mild turbulence. And yet, change we must. To succeed, we need to work hard, of course, but we also need to experiment with new ways of doing things, even at the expense of some self-sacrifice.

The Kavli Institute for Astronomy and Astrophysics (KIAA) was established in 2007 through the visionary leadership and generosity of Peking University and the Kavli Foundation, as an institute committed to the pursuit of academic excellence. Within the landscape of Chinese astronomy, KIAA was and continues to be a bold, new experiment. Thanks to the tireless efforts of my predecessors, KIAA already has come a long way and laid a solid foundation. Looking ahead, where should we go from here? What should we become? I truly believe that we have a very bright future. We have the capacity to elevate KIAA into an internationally competitive research institute of the highest caliber. Beyond that, during this time of historical transformation in China, we are uniquely positioned to use KIAA as a model for the greater astronomy community. To be sure, we will strive for maximum scientific excellence and productivity, but we must also aspire toward greater cooperation, camaraderie, diversity, and internationalization. Our instruments of governance, administration, and management must be efficient, transparent, rigorous, and fair. We begin first by reaching in, to ensure

that KIAA is internally sound and strong; we work closely with the Department of Astronomy (DoA) to realize a unified, cohesive astronomy force at Peking University. Equally critically, we should also reach out, across the network of domestic universities and research institutes of the Chinese Academy of Sciences (CAS). The astronomy community in China is very small, and, for historical as well as administrative reasons, it is further splintered in a most unhealthy fashion along institutional barriers, rendering it less effective than it could be. Finally, we turn our sights globally, not only regionally across East Asia, but ultimately beyond.

We are far from fully realizing any of these goals. However, during the past year, I am pleased that we have taken some small steps in the right direction:

■ We consolidated a new administrative team, consisting of Associate Director Wu Xue-Bing, Institute Manager Yao Jie, and administrative assistants Liu Lili and Zhang Shuo. We worked closely with the DoA to hire a new department secretary, Li Shuxian.

■ A large number of committees have been formed to allow everyone the opportunity to share in common responsibilities and decision-making.

■ We hold regular faculty meetings to facilitate communication and information dissemination.

■ We reconstituted a new international Science Advisory Committee, charged with guiding us on our scientific mission.

■ We initiated the process of establishing a Governing Board charged with oversight of the Institute's management.

■ We designed a new website that is actively maintained with fresh content.

■ We recruited two strong new faculty members (Linhua Jiang and Yue Shen).

■ We offered joint appointments to three additional DoA faculty members (Zuhui Fan, Fukun Liu, and Renxin Xu).

■ We established the Kavli Visiting Scholars program to bring in eminent scientists in research areas of most relevance to our science directions.

■ We created an intellectual environment that has been very attractive to a steady stream of visitors at all levels, from beginning students to senior scientists, both domestic and international.

■ We maintain a vibrant set of weekly academic activities, ranging from formal colloquia to lunch seminars, pizza and coffee science discussions.

■ We improved the intellectual as well as social atmosphere with the addition of daily afternoon coffee, Monday evening graduate student dinner talks, and Friday afternoon Happy Hour organized by the postdocs and students.

■ Overall, morale in the institute is high.

■ There has been a healthy stream of science outputs, some in high-profile journals.

■ It took some time to plan scientific conferences and workshops, but eventually we made some progress.

■ We are working closely with CAS institutes (including the National Astronomical Observatories, Shanghai Astronomical Observatory, the Institute for High-Energy Physics and Yunnan Astronomical Observatory) on a number of fronts.

■ We are establishing ties with other Kavli astrophysics institutes and their associated universities.

■ We are establishing ties with member institutes from the Thirty Meter Telescope consortium.

■ We renovated guest rooms to create new offices; other remodeling work is being planned.

Looking back, we have actually had a very busy and productive year! All of these "baby steps" need to be monitored vigilantly, nurtured continuously, and expanded judiciously. Although we still have a long way to go, I am more optimistic than ever that we will get there. I give my heartfelt thanks to my indispensable administrative team, to all the students, postdocs and faculty at KIAA and DoA whose passion for science reminds me why all of this is worthwhile, to my friends and colleagues throughout China for their encouragement, to Peking University and the Kavli Foundation for their steadfast support, and most importantly, to my family for their sacrifice and for understanding why I have embarked on this journey.

Luis C. Ho (Director, KIAA)

Chair's Perspective

Going Beyond Ourselves, Pursuing Excellence

Fukun Liu

Chair of the Department of Astronomy

When I first returned to China and began to work at Peking University, my aspiration was to become a scientist similar to my mentors abroad, as well as similar to my fellows from the same academic family, who have conducted pioneering, world-leading, or ground-breaking research. I believe that it is possible to achieve these goals, provided that we can fully integrate the general rules underlying scientific research with China's culture, social development, and the scientific and academic research activities undertaken and carried out in ways suitable for the situation pertaining to China and Peking University.

Following the transition of the administration of the Department of Astronomy in March 2014, my personal responsibilities and commitment changed. In addition to providing a historic opportunity, our joint responsibilities and mission are to build an international, first-class astronomy program at Peking University, to build international centers of excellence in student training, knowledge innovation, and international academic cooperation and exchange, with the support of the central government and the senior leadership of Peking University, which at the same time is trying to transform the University into one of the world's top universities. Building on the astronomy development plans initiated by the previous department and institute directors, we continued to strive toward our goals in 2014.

1. A Fraternal Relationship with the KIAA

Establishing fraternal solidarity and cooperation between the Department of Astronomy and the KIAA is the prerequisite for the astronomy program at Peking University to develop smoothly. It is an essential requirement both internationally and domestically, as well as for Peking University and for PKU astronomy itself. The administrative team of the Department of Astronomy and the new directors of the KIAA are fully aware of its importance. Therefore, on the basis of the original plan, we carried out a series of further coordination and integration activities, including holding a series of joint faculty meetings and inviting participation in each other's day-to-day management duties.

In 2014, Luis Ho joined the

Department of Astronomy as a joint professor, and Gregory Herczeg, Subo Dong, Linhua Jiang, Yue Shen, Ran Wang, and Kejia Lee at the KIAA were invited to undertake teaching services for the Department of Astronomy. At the same time, Xuebing Wu was appointed as associate director of the KIAA, Zuhui Fan, Renxin Xu, and Fukun Liu joined the KIAA as joint professors, and Jie Yao was jointly appointed as the person in charge of the KIAA's administrative office.

2. An International Center of Excellence in Student Training

We will build an international center of excellence in student training. Astronomy undergraduates from Peking University are widely welcomed by prestigious universities and institutes all over the world. This is a clear sign of the international and domestic recognition of Peking University's undergraduate education in astronomy. However, to build a student training base of international excellence, we still have a long way to go. We will make great improvements in the recruitment, education, training, and management of our undergraduates. We will strengthen the recruitment promotion, and attract and recruit to the PKU astronomy department talented high-school students who exhibit active thinking skills, pursue excellence, love basic science, and are fond of astronomy. We will reinforce the role of the "Astronomy Summer Camp for National Outstanding Middle School Students." We will strengthen the teaching of basic knowledge, improve our teaching efficacy, conduct teaching in small classes, and perform timely teaching reviews. We will conduct undergraduate research training on the basis of good instruction of basic knowledge, inspiring and training students in basic research skills so that they can easily adapt to the comprehensive and integrated research training they will encounter during their PhD studies.

Through the persistent efforts of the astronomy staff and students, our graduate education has made considerable progress during the past few years. The research capacity of the PhD students has increased from publishing research results in prestigious international astronomical journals to being able to publish ground-breaking research results in the top international journals; the employment goals changed from mainly aiming at the domestic job market to giving high priority to being selected for postdoctoral training at prestigious international universities and research institutes. We can do better. We will endeavor to prepare our doctoral graduates such that they will be widely welcomed by all world-renowned universities and research institutes, just like our undergraduate students.

3. An International Center of Excellence in Knowledge Innovation

We will develop an international center of excellence in knowledge innovation. A knowledge innovation ability of excellence is the core competence we should have. PKU astronomy has been committed to build a research team of senior scientists, postdocs, and PhD students who have ambitions to do original research, leading to revolutionary breakthroughs. They should be highly sensitive and have a keen perception of unknown problems, as well as the courage and ability to solve known, important problems. In the mean time, the team should have the ability to carry out research that builds on and supports the Chinese culture, social development, and academic activities in China. We will establish an academic evaluation and guidance system adapting to these goals. This is our long-term pursuit.

In 2014, we took a big step. Fukun Liu and colleagues announced in a paper in The Astrophysical Journal the discovery of a pair of supermassive black holes in the galaxy SDSS J120136.02+300305.5. This was the first pair found in an ordinary galaxy. The discovery was highly praised and promoted in several dozens of languages by nearly one hundred prestigious international academic institutes and news media, including ESA, NASA, MPIfR, INAF, Nature magazine, and Wikipedia. It was introduced and promoted by NASA in parallel with the discovery of binary neutron stars and commented on by international astronomers as "it is important because," "it is the

kind of find that really changes the way we think about the Universe and opens up whole new areas for astronomers to study," "demonstrate the important role that long-lasting space observatories have in detecting rare events that can potentially open new areas in astronomy," "help to understand the evolution of the Universe." In September, Yue Shen and Luis Ho showed in a paper in Nature that the diverse properties of quasars can be unified by the efficiency of black hole accretion and the orientation of the central engine. It solved a two-decade long mystery in quasar research. In December, Chengyuan Li and Richard de Grijs indicated in a paper in Nature that careful observations of an intermediate-age star cluster provide clear evidence against the paradigm of internal age spreads in star clusters. The results resolve nearly a decade of debate among scientists on the issue.

4. International Academic Cooperation and Exchange Center of Excellence

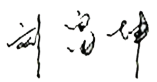
We will build an international academic cooperation and exchange center of excellence. Intensive international, national, and internal collaboration and exchange are the sources of knowledge innovation, an important way of disseminating new knowledge, and a core component of graduate student training. These are the fundamentals of constructing an international center of excellence in student training and knowledge innovation. Therefore, we further promoted and carried out a variety of academic activities in various forms and a variety of content, and at different levels. A series of bilateral or multilateral academic exchange activities have been launched between the Department of Astronomy and the KIAA at Peking University and other domestic astronomy departments and institutes. We retained and promoted academic exchange programs with many international astronomical institutions and organized a number of national and international conferences, including an International Astronomical Union-supported symposium. We will further promote and boost establishment of national and international cooperation and an exchange center of excellence.

5. Expectations for 2015

In 2014, we took a small step on a long journey. In 2015, we will continue to move forward, going beyond ourselves in pursuit of excellence! We will continue to strengthen exchanges and cooperation with the domestic and international astronomical communities, increase our active participation in major domestic and international astronomy projects, enhance the communication and collaboration with the Chinese Astronomical Society, and be a good host of the Society's 2015 annual conference.

Looking back at 2014, we are grateful for the care and support of all leaders, governors, and colleagues, and appreciate all faculty, staff, and students of the Department of Astronomy and the KIAA for your hard work and valuable contributions.

We are full of confidence for the future!



Fukun Liu

(Chair of the Department of Astronomy)

Featured Science

Study of Middle-Aged Star Clusters Finds Stars Are of the Same Age As Their Neighbors

Chengyuan Li

An examination of middle-aged star clusters reveals an unexpectedly narrow age range among their stars, suggesting that large groups of stars evolve differently than previously understood.

A close look at the night sky reveals that stars don't like to be alone; instead, they congregate in clusters, in some cases containing as many as several million stars. Until recently, the oldest of these populous star clusters were considered well understood, with the stars in a single group having formed at different times, over periods of more than 300 million years. Yet new research we recently published in the journal Nature suggests that the star formation in these clusters is more complex.

Using data from the Hubble Space Telescope, my team at the Kavli Institute for Astronomy and Astrophysics (KIAA) at Peking University and the Chinese Academy of Science's National Astronomical Observatories in Beijing has found that, in large middle-aged clusters at least, all stars appear to be of about the same age.

Stars begin their lives as billowing clouds of dust and gas. Pulled together by gravity, these clouds slowly coalesce into dense spheres that, if they grow large enough, heat up and begin to convert hydrogen into helium in their cores. This process releases energy

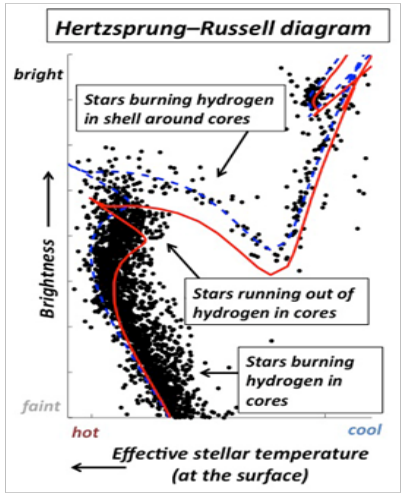
NGC 1615, a middle-age star cluster located in the Large Magellanic Cloud, contains stars that are of a more uniform age than previously believed. (Image: NASA/ESA Hubble Space Telescope/ Fabian RRRR)

and makes them shine. Billions of years later, when they reach the end of their core hydrogen supply, the stars begin to burn hydrogen in a shell around their cores and, as a result, their temperature changes.

Previous observations of massive star clusters revealed a relatively large amount of variation in temperature from stars reaching the end of their core hydrogen supply, suggesting that the stars within the clusters varied in age by as much as 300 million years or more. This has long been surprising. Young clusters are thought to quickly lose any remaining star-forming gas during the first 10 million years of their lifetimes, which would make it difficult for the stars in a single cluster to vary in age by more than about 10 million years.

Observing a middle-aged, 2 billion-year-old star cluster located in the Large Magellanic Cloud called NGC 1651, we looked for both the change in temperature that occurs when stars reach the end of their hydrogen supply – which is what previous studies had focused on – and a second change in temperature that occurs as the stars burn hydrogen in a shell around their core.

While we found the expected wide variation in temperature of stars finishing their core hydrogen reserves, we were surprised to find



Hertzsprung–Russell Diagram. Observational data (black points) reveal that models charac-terized by an age spread of about 450 million years (young model shown in blue, old model in red) can fully describe the NGC 1651 cluster stars powered by hydrogen fusion in their cores, but not the phase in which they burn hydrogen in a shell around the cores.

very little variation when looking at the brightnesses of stars of similar temperatures burning hydrogen in the shell outside the core. The lack of variation among these stars led us to conclude that the stars in this cluster must all be within just 80 million years of the same age – that's a very small age range for such an old cluster!

NGC 1651 is the best example found to date of a truly single-age stellar population. We have since identified a handful of other middle-aged clusters that appear to show similar features. Our research suggests that, for middle-aged clusters at least, today's conventional wisdom may be wrong and it might be common for all stars in a single cluster to be of approximately the same age.

A decade ago, astronomers actually thought that the stars within any cluster should all be about the same age, but that idea fell out of favor when clear evidence of the presence of stars of different ages within a single cluster was discovered, at least for the oldest and most populous clusters in our Milky Way. Based on our Nature paper, a reverse shift looks necessary. In addition to that important realization, we suggest that the wide range of brightness seen in stars reaching the end of their core hydrogen supply may actually be due to stellar rotation. That's because two stars of exactly the same age can exhibit different levels of observed temperature if they rotate at significantly different rates.

Most current models don't take stellar rotation into account. Future studies may offer even greater insight into the age of star clusters by better modeling stellar rotation rates and using those models to interpreting the variation in temperature of stars burning the last of their core hydrogen. These latest results resolve nearly a decade of debate among scientists; as such, the results were deemed 'solid and welcome' by the peer-reviewers.

Featured Science

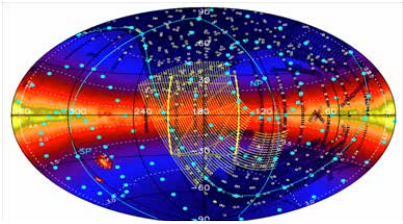
Mapping the Milky Way with LAMOST spectroscopy and SDSS photometry

Haibo Yuan

on behalf of the LSS－GAC collaboration

As our host galaxy, the Milky Way provides a unique but challenging opportunity to study galaxy formation in multi-dimensional space in great detail. However, because billions of stars are distributed across the entire sky and because of problems with dust extinction and uncertain distances, such studies have been infeasible or very limited until recently, particularly for the Galactic disk. With 4,000 fibers over a large field of view of 5 degrees in diameter, LAMOST, the Large Area Multi-Object Spectroscopic Telescope, stands alongside ESA's Gaia mission as one of the two dominant projects on which progress in understanding of our own Galaxy will rest. Following a two-year period of commissioning and a year of pilot surveys, the LAMOST regular surveys began in October 2012.

The LAMOST Spectroscopic Survey of the Galactic Anticentre (LSS－GAC), proposed and led by Prof. Xiaowei Liu at Peking University, is a core component of the LAMOST Galactic surveys. It aims to survey a significant volume of the Galactic thin and thick disks and halo over a contiguous sky area of ~3,400 square degrees centered on the Galactic anticenter, and obtain low-resolution spectra for a statistically complete sample of ~3 million stars of all types. Together with Gaia, the LSS－GAC will yield a unique data set to advance our understanding of the structure and assembly history of the Galaxy, in particular its disk(s). LSS－GAC targets are from photometric catalogs of the Xuyi Schmidt Telescope Photometric Survey of the Galactic anticenter (XSTPS－GAC), which we completed in 2011. This is the first large-scale, multi-band photometric survey ever undertaken in China. It has yielded high-quality photometry and astrometry for about 100 million stars across 7,000 square degrees. The XSTPS－GAC has also enabled us to map the 3D distribution of dust and the 2D distribution of the dust-to-gas ratio and the CO-to-H2 conversion factor in the Galactic anticenter, as well as to constrain the halo density profile.



Footprints of the LSS–GAC (central yellow bucket box), XSTPS–GAC (central yellow shaded area) and SDSS (black area) surveys in a Galactic coordinate system centered on the Galactic anticenter.

By June 2013, over 1 million spectra of good quality had been collected under the umbrella of the LSS-GAC. To derive the basic stellar atmospheric parameters, we have developed the LAMOST Stellar Parameter Pipeline at Peking University (LSP3). By combining multi-band photome-try from GALEX, XSTPS-GAC, 2MASS and WISE, and proper motions collected from various catalogs, we have further derived the extinction, distances, and orbital param-eters for about 0.75 million stars. We have achieved a high accuracy of 5 km s-1, 150 K, 0.25 dex, 0.15 dex, 0.04 mag and 10-20% for the radial velocity, effective temperature, surface gravity, metallicity, extinction, and distance, respectively, for the majority types of stars. The final products, already the largest single Galactic stellar survey (which will remain so until the first all-sky Gaia data release), will be publicly released in December 2014 as value-added catalogs, along with the LAMOST Data Release 1. From the spectra and value-added catalogs, we have already obtained a few interesting early results, including the discovery of a dual Active Galactic Nucleus, determination of the solar peculiar motion using the largest stellar sample ever, and evidence of a large fraction of massive white dwarfs in the Galaxy owing to mergers.

The availability of millions of stellar spectra and their precise atmospheric parameters will also change the way in which Galactic archaeology is done with photometric surveys. Using spectroscopically observed stars as color standards, we have developed a method that is capable of delivering a color calibration accuracy of a few mmag, which will be of considerable use to many photometric surveys. With our method, we have calibrated the Sloan Digital Sky Survey (SDSS) standard Stripe 82 to an unprecedented accuracy. Using the recalibrated data, we demonstrate that the intrinsic widths of metallicity-dependent stellar loci of main-sequence stars are zero. We have subsequently developed tools of metallicity-dependent stellar loci to deliver photometric metallicities precise to 0.1-0.15 dex, comparable to the precision achievable with low-resolution spectroscopy; discriminate between red giants and main-sequence stars based on the SDSS photometry, achieving a completeness of ~70% and an efficiency of ~80% in selecting metal-poor giant stars, which are excellent tracers to probe the Galactic halo; and determine reddening and metallicity simultaneously when combining infrared photometry, opening up possibilities for demographic studies of the Galactic disk. We have obtained accurate photometric metallicities and distances of a magnitude-limited sample of 0.5 million stars in Stripe 82, which is highly complementary to the LSS-GAC sample in terms of sky coverage. With 10,000 red giants selected from Stripe 82 up to a distance of 120 kpc, we find the first direct evidence of dual Galactic halos, which will greatly advance our understanding of the structure and assembly history of the Galactic halo(s) and put tight constraints on models of galaxy formation.

Binary systems are ubiquitous in the Galaxy and play an important role in studies of star formation and evolution. We find that main-sequence binaries can be distinguished from single stars by their small deviations from the metallicity-dependent stellar loci. By modeling the observed deviations, we propose a method to determine the binary fraction of main-sequence stars statistically. The method is neither sensitive to the period nor to the mass-ratio distributions of binaries and applicable to large survey volumes that contain different stellar populations. With stars spectroscopically observed by the SDSS and LAMOST in Stripe 82, we have derived a model-free estimate of the binary fraction of field main-sequence stars of 41% and found that the fraction decreases toward stars of higher metallicities and redder colors. The method has a wide range of applications, which will greatly improve the census of binaries.

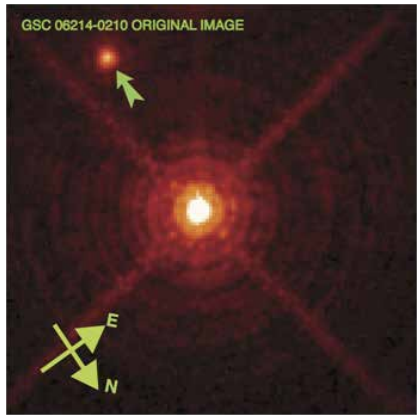
Featured Science

Catching Exoplanets in Formation

Gregory Herczeg

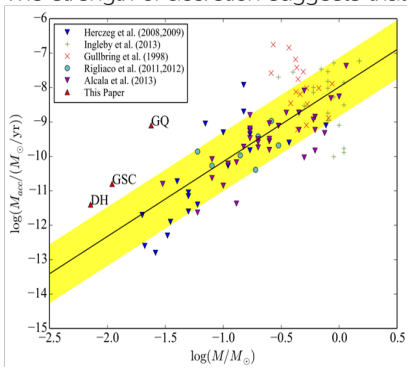
Our ancestry from the beginnings of the Universe through our own family histories has always captured our imagination. The last astrophysical step in our origins story, planet formation, has historically been inferred from a single data point, our own solar system – or before that, just from a small patch of Earth. The astounding first discovery of extra-solar planets two decades ago broke the myopia of our intense case study of one system. The thousands of planet candidates and hundreds of multiple planet systems now known reveal remarkably diverse planetary architectures. Planets are born in circumstellar disks within the first few million years of a star's lifetime. The initial conditions and environment of the protoplanetary disk apparently lead to a wide range of outcomes.

Recent advances at optical, infrared, and submillimeter wavelengths are now allowing us to study planets in formation. The presence of planets is inferred through disk structures, such as gaps and holes. In rare cases, a young planet can now be directly detected and in some cases is even caught in formation. Because of detection biases, these directly imaged young planetary-mass objects are located at several hundred astronomical units (the distance from the Earth to the Sun) from their host stars – very different than the giant planets in our own solar system. Our own giant planets are thought to form through the coalescence of a 5–10 Earth-mass core, followed by a period of gas accretion from the disk. However, at large distances from the star, the disk does not retain enough material for this process to occur.



Instead, these planets are thought to form by some other process: either formed close to the star and scattered out after interacting with other planets, by gravitational collapse of a young, very massive disk, or as the remnants of failed binary formation from turbulent fragmentation of the envelope.

An undergraduate student working at Peking University (PKU)/KIAA, Zhou Yifan (now a PhD student at Arizona), used multi-band Hubble Space Telescope/Wide Field Camera 3 imaging to watch and study the growth of these objects, which are accreting from their own circum-planetary disks. The figure on the left shows the detection in Hα of one of these planets, GSC 06214 - 00210b. Just the presence of disk accretion ruled out the scenario where the planet formed near the star and scattered to a large orbit. These objects are accreting more strongly than expected from empirical correlations of young stars and brown dwarfs, as seen in the figure below. The strength of accretion suggests that



gravitational instability is a more likely formation scenario than failed binary formation. We also found that for these very low mass objects, most of the accretion luminosity emerges in the Hα line. This finding paves the way for wider searches of extra-solar planets using new extreme-Adaptive Optics systems with Hα filters.

These groundbreaking results are still limited to a small number of known objects. Because of observational biases, these objects are located far from the central star and may bear limited resemblance to any object in our own solar system. However, these studies lay the foundations for advances expected from applying similar methods to the next generation of telescopes. Applying similar methods to Thirty Meter Telescope, Chinese astronomers will be able to study planet formation by characterizing the accretion and atmospheric properties of planets similar to those in our own solar system. The accretion studies in particular also provide the critical information on accretion histories, which determine the luminosity evolution and therefore mass estimates of young, detectable planets.

We are complementing this research at PKU by characterizing the disks around young protoplanets. The circumplanetary disks themselves may be the birth place of satellites, as expected for the creation of Jupiter's satellites. In collaboration with my group, Yao Liu at Purple Mountain Observatory led a project to measure and model disk masses around 10 Myr-old brown dwarfs. A separate collaboration is now measuring circumplanetary disk masses with ALMA, the Atacame Large Millimeter/submillimeter Array. These observations will reveal whether these planetary disks have enough mass to spawn their own mini-planetary systems. We are eagerly anticipating new ALMA data from a large survey of the Chameleon I star-forming region, which will be used by a PKU graduate student to measure, for the first time, how disk mass depends on the size of the host star.

Meanwhile, my group at PKU is also making significant progress in characterizing the properties of the host stars. Ages of young stars have been difficult to assess, with systematic errors of factors of 2 that lead to large uncertainties in timescales available for planet formation. We recently published the first in a series of papers on a new spectroscopic survey of young stars, which, when combined with improved comparisons between empirical and model predictions, will help us measure absolute ages of young stars. The improved estimates for stellar ages will also allow us to determine how the disk evolves with time, with implications for the dynamical evolution of young planets.

Featured Science

Unique Pair of Supermassive Black Holes Discovered in an Ordinary Galaxy

Fukun Liu

With my colleagues and students, we recently discovered a pair of supermassive black holes in orbit around one another. This is the first time such a pair have been found in an ordinary galaxy. We discovered them because they ripped apart a star when the European Space Agency's space observatory XMM-Newton happened to be looking in their direction. The finding also validates the our predictions from 2009 of the tidal disruption by supermassive binary black holes. Our latest results were published in the 10 May 2014 issue of The Astrophysical Journal.

Most massive galaxies in the Universe are thought to harbor at least one supermassive black hole at their center. Two supermassive black holes are the smoking gun that the galaxy has merged with another. Thus, finding binary supermassive black holes can tell astronomers about how galaxies evolved into their present-day shapes and sizes.

On 10 June 2010, a tidal disruption event was spotted by XMM-Newton in a galaxy identified by its telephone number SDSS J120136.02+300305.5, approximately 2 billion light years away. My co-author Stefanie Komossa (Max-Planck-Institut für Radioastronomie, Germany) and her colleagues were scanning the data for such events and scheduled follow-up observations just days later with XMM-Newton and NASA's Swift satellite. The galaxy was still spilling X-rays into space. It looked exactly like a tidal disruption event caused by a supermassive

Artist's impression of a binary supermassive black hole system. (Credit: ESA, C. Carreau)

black hole, but as they tracked the slowly fading emission day after day, something strange happened. The X-rays fell below detectable levels between days 27 and 48 after the discovery. Then they re-appeared and continued to follow a more expected fading rate, as if nothing had happened.

Now, thanks to our recent work, this behavior can be explained. This is exactly what one would expect from a pair of supermassive black holes orbiting one another. My group had been working on models of black hole binary systems that predicted a sudden plunge to darkness, followed by a recovery because the gravity of one of the black holes disrupted the flow of gas onto the other, temporarily depriving it of fuel to fire the X-ray flare. We found that two possible configurations could reproduce the observations of J120136. In the first, the primary black hole contained 10 million solar masses and was orbited by a black hole of about a million solar masses in an elliptical orbit.

In the second solution, the primary black hole was about a million solar masses, in a circular orbit. In both cases, the separation between the black holes was relatively small: 0.6 milliparsecs, or about 2 thousandths of a light year. This is about the width of our Solar System. Being this close, the fate of this newly discovered black hole pair is sealed. They will radiate their orbital energy away, gradually spiraling together, until in about two million years' time they will merge into a single black hole and give rise to a burst of gravitational wave radiation.

Now that we have found this first candidate for a binary black hole in a quiescent galaxy, the search is inevitably on for more. XMM-Newton will continue its slew survey. This detection will also spur interest in a network of telescopes that search the whole sky for tidal disruption events. "Once we have detected thousands of tidal disruption events, we can begin to extract reliable statistics about the rate at which galaxies merge," said my co-author Stefanie Komossa.

Peking University astronomy in the news

An article highlighting the KIAA appeared in the August 2014 issue of the Asia Pacific Physics Newsletter (APPN), a publication devoted to "reporting frontier discoveries in physics, research highlights, and news to facilitate interaction, collaboration, and cooperation among physicists in the Asia–Pacific physics community." The KIAA was featured on the cover of the newsletter.

RESEARCH INSTITUTES AND LABS

Kavli Institute for Astronomy and Astrophysics at Peking University: An International Center for Excellence in China

Luis C. Ho
Director, University Chair Professor
Kavli Institute for Astronomy and Astrophysics at Peking University
http://users.obs.carnegiescience.edu/lho/

The Kavli Foundation (http://www.kavlifoundation.org) is a US-based private philanthropic organization "dedicated to advancing science for the benefit of humanity, promoting public understanding of scientific research, and supporting scientists and their work." It supports four major areas of basic research, astrophysics, nanoscience, neuroscience, and theoretical physics, through a network of 17 institutes worldwide. Every two years, it awards the prestigious Kavli Prize to "recognize scientists for their seminal advances in astrophysics, nanoscience and neuroscience."

In the area of astrophysics, the Kavli Foundation has established research institutes at six leading universities, including Stanford, Massachusetts Institute of Technology, University of Chicago, Cambridge University, University of Tokyo, and Peking University (PKU) in China. Founded in 2006 and in full operation in 2008, the Kavli Institute for Astronomy and Astrophysics (KIAA; http://kiaa.pku.edu.cn) at PKU is designed to be an international center of excellence to promote basic astrophysical research. Its members have access to a variety of domestic and international observing facilities and computational resources. KIAA's programs are focused in four major areas of research:

- Observational cosmology, galaxy formation and evolution
- Interstellar medium, star formation, stellar and planet systems
- Gravitational physics and high-energy phenomena
- Computational astrophysics (N-body, hydrodynamics, and MHD simulations)

With English as its working language, KIAA is developing an intellectual environment for scientific exchange. In partnership with the National Astronomical Observatories and other astronomical centers and universities in China, KIAA is engaged in theoretical and observational initiatives, development and utilization of facilities, and training of students and postdocs. Currently, the institute, in conjunction with the Department of Astronomy, has a total of about 25 faculty, 12 postdoctoral fellows, 45 graduate students, and 120 undergraduates. It also regularly hosts a number of international visiting scholars.

KIAA regularly sponsors thematic workshops, conferences, and special-topic training programs. KIAA is establishing exchange and visiting programs with other Kavli institutes and a network of universities and astronomy centers worldwide. The Institute is under the leadership of its new Director, Luis C. Ho, formerly a Staff Astronomer at the Observatories of the Carnegie Institution for Science in Pasadena, California, USA. Ho was educated at Harvard University and University of California at Berkeley, and he is a world expert on supermassive black holes and active galaxies. Under his leadership, Ho wishes not only to build a first-rate astrophysics institute in China, but he is also very interested in working with other universities and institutes throughout greater Asia who share the same vision for the future.

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News items featuring individual PKU astronomy members (alphabetically)

de Grijs, Richard

Richard de Grijs featured at the press conference and formal opening ceremony of the China Science Festival, 6 May 2014; national media coverage included an article in the China Daily and at XinhuaNet (http://news.xinhuanet.com/expo/2014-05/07/c_1110584361.htm, http://news.xinhuanet.com/photo/2014-05/06/c_126469019.htm)

Richard de Grijs was also featured in a cover story of Science Weekly on "New approach to science management needed": http://www.science-weekly.cn/skhtmlnews/2014/4/2397.html (full article: http://astro-expat.info/sciencenews032014.PDF)

Ho, Luis

Wenhui News ran a news story about KIAA Director Luis Ho.

Luis Ho featured as a keynote speaker at the Pujiang Innovation Forum (Shanghai). News reports included:

http://sh.eastday.com/m/20141019/u1ai8398374.html, http://www.wzaobao.com/a/154131be26.html, and http://news.sciencenet.cn/htmlnews/2014/10/306322.shtm.

Ho, Luis and Shen, Yue:

Yue Shen and Luis Ho published a Letter in Nature; KIAA news release (10 September 2014):

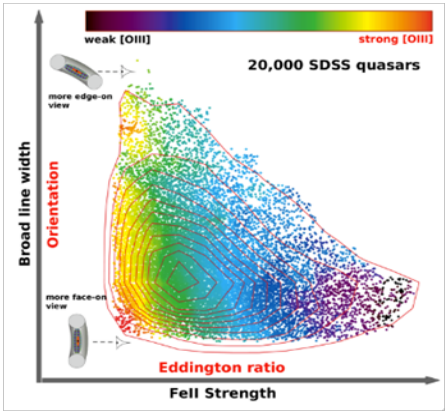
Longstanding Quasar Puzzle Solved

New KIAA faculty member Yue Shen and KIAA Director Luis Ho have solved a two-decade long mystery in quasar research. Namely, what drives the diverse properties of quasars into a well-defined main sequence, known as "Eigenvector 1" (EV1), where many physical quasar properties correlate with the strength of optical FeII strength. Shen and Ho used archival data from the Sloan Digital Sky Survey, combined with other multi-wavelength data, to show conclusively that Eddington ratio (the efficiency of black hole accretion) is the main driver of EV1. They also found that orientation plays an important role in shaping the width of the main sequence, implying a flattened structure of the broad-line region gas. Their work, published in the September 11 issue of the journal Nature, has profound implications for quasar research, and motivates theoretical studies of the inner structure of quasars to explain this simple unification scheme of quasar phenomenology with accretion and orientation.

(http://kiaa.pku.edu.cn/news/2014/longstanding-quasar-puzzle-solved)

Selected press coverage of the Shen & Ho article:

- Nature News & Views: http://www.nature.com/nature/journal/v513/n7517/full/513181a.html
- Press release for the Carnegie Institution for Science: https://carnegiescience.edu/news/mysterious_quasar_sequence_explained



The distribution of about 20,000 luminous Sloan Digital Sky Survey quasars in the two-dimensional space of broad line width versus FeII strength, color-coded by the strength of the narrow [OIII] line emission. The strong horizontal trend is the main sequence of quasars driven by the efficiency of the black hole accretion, while the vertical spread of broad line width is largely due to our viewing angle to the inner region of the quasar.

- Sky & Telescope: http://www.skyandtelescope.com/astronomy-news/quasar-main-sequence-091020142/
- Space.com: http://www.space.com/27102-bright-quasar-mystery-solved.html
- Phys.org: http://phys.org/news/2014-09-mysterious-quasar-sequence.html
- Yahoo News: http://news.yahoo.com/20-mystery-universes-brightest-objects-solved-175338861.html
- Science Daily: http://www.sciencedaily.com/releases/2014/09/140910132520.htm

Li, Chengyuan and de Grijs, Richard published a Letter in Nature

- Kavli Foundation news release (17 December 2014): http://www.kavlifoundation.org/kavli-news/surprising-theorists-stars-within-middle-aged-clusters-are-similar-age
- Peking University release: http://pkunews.pku.edu.cn/xwzh/2014-12/18/content_286580.htm
- KIAA release: http://kiaa.pku.edu.cn/news/2014/star-cluster-evolution-not-simple-thought
- NAOC release: http://www.nao.cas.cn/xwzx/gdtpxw/201412/t20141219_4279463.html

Selected press coverage:

- Phys.org: http://phys.org/news/2014-12-theorists-stars-middle-aged-clusters-similar.html
- Science Daily: http://www.sciencedaily.com/releases/2014/12/141217154027.htm
- Yahoo News: https://in.news.yahoo.com/stars-middle-aged-clusters-may-same-age-052417417.html
- Pro-Physik.de: http://www.pro-physik.de/details/news/7169191/Sterne_im_Kugelsternhaufen_NGC_1651_gleich_alt.html
- Welt der Physik: http://www.weltderphysik.de/gebiet/astro/news/2014/sterne-in-kugelsternhaufen-alle-gleich-alt/
- Business Standard: http://www.business-standard.com/article/news-ani/stars-in-middle-aged-clusters-may-be-of-same-age-114121800208_1.html
- Z News: http://zeenews.india.com/news/sci-tech/stars-in-middle-aged-clusters-may-be-of-same-age_1516693.html
- Europa Press: http://www.europapress.es/ciencia/astronomia/noticia-estrellas-cumulos-mediana-edad-formaron-mismo-tiempo-20141218132501.html

Liu, Fukun:

- Fukun Liu was interviewed by the European Space Agency (ESA), 13 March 2014: http://sci.esa.int/xmm-newton/53980-unique-pair-of-hidden-black-holes-discovered-by-xmm-newton/
- Kavli Foundation news release (24 April 2014), Unique Pair of Supermassive Black Holes Discovered in an Ordinary Galaxy: http://www.kavlifoundation.org/kavli-news/unique-pair-supermassive-black-holes-discovered-ordinary-galaxy
- ESA Research highlight: http://www.esa.int/Highlights/Week_In_Images_21_25_April_2014
- Fukun Liu was also ZME Science's Featured Scientist of the Week, 29 May 2014: http://www.zmescience.com/other/feature-post/scientist-spotlight-this-week-in-science1/
- NASA "Picture of the Week", 7 July 2014: http://heasarc.gsfc.nasa.gov/docs/objects/heapow/archive/compact_objects/binary_bh_xmm.html
- Nature research highlight: Nat. Phys., 10, 481

Selected press coverage of their binary black hole discovery:

- China Science Daily: http://news.sciencenet.cn/dz/dznews_photo.aspx?id=20144
- Sky & Telescope: http://www.skyandtelescope.com/astronomy-news/black-holes-tango-distant-

galaxy/

- Yahoo News: http://news.yahoo.com/black-hole-pair-caught-feeding-frenzy-104500065--politics.html
- Astronomy Now: http://astronomynow.com/news/n1404/22blackhole/
- Phys.org: http://phys.org/news/2014-04-unique-pair-supermassive-black-holes.html
- Austrian Tribune: http://austriantribune.com/informationen/143458-two-black-holes-orbiting-each-other-galaxy
- United Press International: http://www.upi.com/Science_News/2014/04/23/European-astronomers-spot-pair-of-supermassive-black-holes/1341398266477/#ixzz30ZxMGhrF

Uhm, Z. Lucas and Zhang, Bing:

- KIAA news release (9 April 2014):

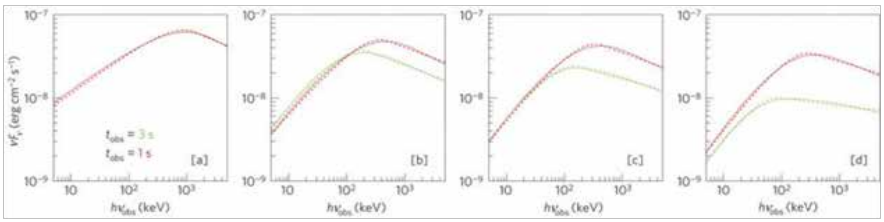
KIAA scientists unveil the radiation mechanism of gamma-ray bursts

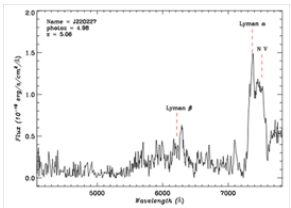
Gamma-ray bursts (GRBs) are most violent explosions in the Universe since the Big Bang. Despite many years of observations and theoretical modeling, the exact mechanism to produce intense gamma rays from these events has not yet been identified. In a paper published in Nature Physics (06 April 2014), a KIAA postdoc, Z. Lucas Uhm and his collaborator, Professor Bing Zhang, made a theoretical breakthrough in understanding GRB emission. A typical GRB spectrum peaks in the sub-MeV range. Below this peak energy, the spectral index takes a mysterious value (-1), which is too soft for a quasi-thermal emission mechanism (+0.4 to +1) and too hard for "standard" synchrotron radiation in the strong magnetic field in the emission region (-1.5). Uhm and Zhang discovered that when considering the natural effect of the GRB jet streaming away from the central engine so that the magnetic field strength in the emission region continuously decays with time, the synchrotron radiation spectrum is modified, and can nicely match the observed spectrum. As a result, they identify synchrotron radiation as the leading mechanism to power GRBs. The emission site is far from the GRB central engine, where large-scale magnetic fields are dissipated.

http://pkunews.pku.edu.cn/xwzh/2014-04/07/content_282148.htm; http://www.nature.com/nphys/journal/v10/n5/full/nphys2932.html

http://pkunews.pku.edu.cn/xxfz/2014-04/07/content_282200.htm

http://xiaobao.pku.edu.cn/media/user/2014-04-15/show2.html (p. 2)





Wu, Xue-Bing:

● NAOC News: Discovery of a quasar with a redshift greater than 5 with the 2.16m telescope at Xinglong Observatory, NAOC (国家天文台兴隆 2.16 米望远镜发现红移 5 以上类星体)

http://www.bao.ac.cn/xwzx/kydt/201412/t20141208_4271313.html

● News from The Chinese Academy of Sciences

http://www.cas.cn/syky/201412/t20141208_4271315.shtml

Wu, Yuefang:

● Yuefang Wu was interviewed by the Star Formation Newsletter, No. 254, p. 3 (13 February 2014)

Yu, Haoran:

● KIAA news release (31 July 2014):

A New Strategy to Directly Measure the Acceleration of the Universe

Future radio surveys of intergalactic hydrogen clouds could offer the first direct measurement of the Universe's acceleration. By far, the primary support for cosmic acceleration comes from supernova data, which is indirect, as it assumes the validity of Einstein's general relativity and that the Universe is homogeneous, in order to derive equations that relate distance to velocity and luminosity.

In a paper published in Physical Review Letters, CITA-KIAA Joint Postdoctoral Fellow Hao-Ran Yu and his colleagues investigated the potential of using dense hydrogen clouds for a direct acceleration measurement. These clouds, which occupy the suburbs between galaxies, are detected through their absorption of radio emission from a background quasar. Astronomers can measure the velocity of one of these clouds by observing the deviation, or redshift, of the hydrogen absorption line at a (laboratory) wavelength of 21 centimeters. Because the 21-centimeter line is narrow (compared to galaxy emission lines), it's possible to observe very small velocity changes. Yu et al. argue that upcoming wide-sky radio surveys will measure the velocity of hundreds of thousands of hydrogen clouds. If these surveys make a few adaptations, like increasing their frequency resolution, they could measure—over the course of a decade—cosmically relevant accelerations of around a few millimeter/second/year. (Michael Schirber, APS editor)

The Canadian Hydrogen Intensity Mapping Experiment (CHIME), located in a radio-quiet valley near Penticton, BC, Canada. (Image credit: Keith Vanderlinde; Dunlap Institute for Astronomy & Astrophysics, University of Toronto)

http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.113.041303

(Physical Review Letters news and commentary in physics, highlights, editor's suggestion, and featured in physics; cover page of APS, 24 July 2014)

http://kiaa.pku.edu.cn/news/2014/new-strategy-directly-measure-acceleration-universe

Scientific advances

KIAA faculty and studnts had a coffee talk with Prof. Rashid Sunyaev, managing director of the Max Planck Institute for Astrophysics

Colloquia and lunch talks

Throughout the year, Peking University astrophysicists have numerous local opportunities to exchanges ideas, report on their research progress, and learn both from each other and from visiting scientists. These range from formal occasions such as the weekly PKU astronomy colloquia and a small number of focused internal and external workshops and conferences held throughout the year, to the more informal Monday lunch talks, the Tuesday pizza lunches organized by our active postdoctoral researchers, Thursday morning astrocoffee discussions, and “Happy Hours” on Friday afternoons. For the first time in 2014, we also organized a Postdoc Science Day.

Peking University astronomy colloquia 2014

● 2 January 2014: Xiaojun Bi (Institute for High-Energy Physics, Beijing, China), Implications of the AMS-02 Results

● 9 January 2014: Andrés Jordán (Pontificia Universidad Católica de Chile, Santiago, Chile), Finding Transiting Exoplanets and Characterizing Their Atmospheres: HATSouth and ACCESS

● 16 January 2014: Weimin Yuan (National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China), New Frontiers in Wide-Field Time-Domain X-Ray Astronomy

● 20 February 2014: Richard de Grijs (KIAA-PKU, Beijing, China), Not-So-Simple Stellar Populations in Local Group Star Clusters

● 28 February 2014: Linhua Jiang (Arizona State University, USA), High-Redshift Quasars and Galaxies at the Epoch of Cosmic Reionization

● 4 March 2014: Kyoungsoo Lee (Purdue University, USA), The Varied Fates of Galaxies in the Young Universe

● 6 March 2014: Gonzalo J. Aniano Porcile (Institut d'Astrophysique Spatiale, France), All-Sky Dust Modelling with Planck, IRAS and WISE Observations

● 13 March 2014: Wei Cui (Purdue University, USA), Active Galactic Nuclei at the Highest Gamma-Ray Energies

● 20 March 2014: Gregory Herczeg (KIAA-PKU, China), Stars in Adolescence: Wild Accretion, Manic Depression, Fits of Irrational Outbursts, and Pimply Spots

● 27 March 2014: Joshua Winn (Massachusetts Institute of Technology/ Kavli Institute for Astrophysics and Space Research, Boston MA, USA), Spin–Orbit Interactions for Exoplanetary Systems

● 3 April 2014: Jilin Zhou (Nanjing University, China), Formation of Planetary Architecture and the Detection of Exoplanets from the Antarctic

● 10 April 2014: Tinggui Wang (University of Science and Technology of China, Hefei, China), Multi-Scale Outflows in Active Galactic Nuclei

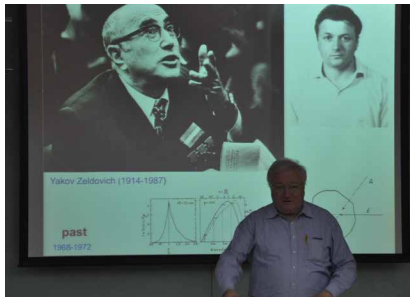
● 17 April 2014: Zhiyuan Li (Nanjing University, China), A Parsec-Scale Jet from the Galactic Center Black Hole: Interaction with Local Gas

● 24 April 2014: Steven Rieder (University of Groningen, Netherlands), The Clustered Universe

● 8 May 2014: Andrew Gould (Ohio State University, USA), Microlensing's New Frontier: Parallax

● 15 May 2014: Jun Zhang (Shanghai Jiaotong University, China), Cosmology and Its Large-Scale Probes

● 16 May 2014: Rashid Sunyaev (Max Planck Institute for Astrophysics, Garching, Germany), Unavoidable Spectral Distortions of the Cosmic Background Radiation



● 22 May 2014: Luca Casagrande (Australian National University, Canberra, Australia), Asteroseismology for Galactic Archaeology: Bridging Two Fields

● 29 May 2014: Jie Wang (National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China), Satellite Galaxies Around the Milky Way

● 12 June 2014: Hua Feng (Tsinghua University, Beijing, China), Astronomical X-ray Polarimetry: A New Window About to Open

● 19 June 2014: Xiaochun Sun (Institute for the History of Natural Sciences, Chinese Academy of Sciences, Beijing, China), An Enterprise with Two Purposes: Measurement of Longitude in 17th and 18th Century China

● 26 June 2014: Li Ji (Purple Mountain Observatory, Nanjing, China), What Can We Learn from X-Ray Spectroscopy?

● 17 July 2014: David Valls-Gabaud (Observatoire de Paris, France), The European - Chinese MESSIER Satellite: Lifting the Veil on Galaxy Formation

● 24 July 2014: Hui Li (Los Alamos National Laboratory, USA), Asymmetries in Protoplanetary Transition Disks

● 28 August 2014: George Hobbs (CSIRO, Australia), Pulsars, Gravitational Waves, Clocks, Planets, Spacecraft and Black Holes

● 11 September 2014: Martin Asplund (Australian National University, Canberra, Australia), Hunting for the First Stars

● 18 September 2014: Sandra Faber (University of California, Santa Cruz, USA), CANDELS Greatest Hits

● 25 September 2014: Shun Zhou (Institute for High-Energy Physics, Beijing, China), Neutrinos as a Cosmic Messengers

● 9 October 2014: Bi-Qing For (University of Western Australia, Perth, Australia), The Gaseous Features of the Magellanic System

● 16 October 2014: Chris Smith (Cerro Tololo Inter-American Observatory, Chile), The Future of Optical Astronomy: From Photons to Petabytes

● 6 November 2014: Zhihui Du (Tsinghua University, Beijing, China), A Parallel AMR Method for Binary Black Hole Simulation

● 17 November 2014: Kevin Bundy (Kavli IPMU, Tokyo, Japan), MaNGA: Mapping Nearby Galaxies at Apache Point Observatory - An IFU Survey of 10,000 Galaxies

● 20 November 2014: Giovanni Covone (University of Naples "Federico II," Italy), New Constraints on the Structure of Galaxy Clusters and Cosmological Parameters via Stacked Weak Lensing and Peak Statistics

● 27 November 2014: Yu (Sophia) Dai (California Institute of Technology, USA), Mid-Infrared Selected Dust-Rich Quasars: Recovering the Extended Quasar Population

● 4 December 2014: Cheng Li (Shanghai Astronomical Observatory, China), Star Formation Quenching in Low-Redshift Galaxies

● 11 December 2014: Kejia Lee (KIAA-PKU, China), The Pulsar Timing Technique and Its Applications in Gravitational Experiments

● 16 December 2014: Yingjie Peng (Kavli Institute for Cosmology, University of Cambridge, UK), From Galaxies to Halos - Reverse Engineering of the Galaxy Population

● 17 December 2014: Douglas Lin (University of California, Santa Cruz, USA), Ubiquity of Planets and Diversity of Planetary Systems: Origin and Destiny of Multiple Super Earths and Gas Giants

● 18 December 2014: Q. Daniel Wang (University of Massachusetts, Amherst, USA), A Close-Up of the Nearest Supermassive Black Hole — Sgr A*

Formal lunch talks in 2014

● 6 January 2014: Yinzhe Ma (University of British Columbia, Vancouver, Canada), How Much Cosmological Information Can Be Measured?

● 3 March 2014: Sylvain Fouquet (Observatoire de Meudon, France), The Major Merger Impact on the Evolution of the Spiral and Dwarf Galaxies

● 17 March 2014: Shangfei Liu (University of California, Santa Cruz, USA), Planetary Crash: New Insights Into Why Hot Jupiters are So Diverse

● 24 March 2014: Guo Chen (Purple Mountain Observatory, Nanjing, China), Characterizing Hot-Jupiter Atmospheres with Palomar/Hale Transit Spectroscopy

● 25 March 2014: David Koo (University of California, Santa Cruz, USA), Gas Outflows and Accretion from Distant Star Forming Galaxies

● 31 March 2014: Rhorom Priyatikanto (Bandung Institute of Technology, Indonesia), On the Lifetime of Binary Star Clusters

● 14 April 2014: Xian Chen (Max-Planck Institute for Gravitational Physics, Potsdam, Germany), Sculpting the Central Parsec of our Galaxy

● 15 April 2014: Yan-Fei Jiang (Harvard - Smithsonian Center for Astrophysics, Cambridge MA, USA), 3D Global Radiation MHD Simulations of Black Hole Accretion Disks

● 16 April 2014: Ke Wang (European Southern Observatory, Garching, Germany), How to Make Massive Stars: The First Steps

● 21 April 2014: Song Huang (Nanjing University, China), From Red Nuggets to Giant Ellipticals: Structural Evolution of Massive Galaxies

● 25 April 2014: Annapurni Subramaniam (Indian Institute of Astrophysics, Bangalore, India), Magellanic Clouds: How Much Do We Understand These Neighbouring Galaxies?

● 28 April 2014: Hagai Netzer (Tel Aviv University, Israel), The Earliest Stages of Black Hole and Stellar Mass Growth: News from the 1.2 Gyr Old Universe

● 29 April 2014: Fukun Liu (Peking University, China), Detections of Supermassive Black Hole Binaries in Galactic Nuclei

● 5 May 2014: Haoran Yu (Beijing Normal University, China), Non-Parametric Reconstruction of the Dark Energy Equation of State

● 8 May 2014: Paul O'Brien (University of Leicester, UK), Observations of Short Gamma-Ray Bursts and Future Prospects

● 9 May 2014: Reinaldo Santos-Lima (University of Sao Paulo, Brazil), The Role of Turbulent Reconnection Diffusion During Star Formation

● 12 May 2014: Juanjuan Ren (National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China), White Dwarf - Main-Sequence Binaries from LAMOST

● 16 May 2014: Zhaohuan Zhu (Princeton University, Princeton NJ, USA), Transitional Disks: Signatures of Gap Opening by Young Planets?

● 19 May 2014: Cosimo Bambi (Fudan University, Shanghai, China), Testing the Nature of Astrophysical Black Hole Candidates

● 23 May 2014: Neil Cook (University of Hertfordshire, UK), A Method for Identifying M Dwarfs with Ultra Cool Companions in 2MASS and WISE

● 26 May 2014: Sijing Shen (University of California, Santa Cruz, USA), Gas Accretion, Galactic Winds and the Circumgalactic Medium in Cosmological Galaxy Formation Simulations

● 6 June 2014: Jihye Shin (KIAA-PKU, China), Dynamical Evolution of Globular Cluster Systems and their Cosmological Origin

● 9 June 2014: Rodolfo Barniol Duran (Hebrew University of Jerusalem, Israel), Low Luminosity GRBs: A Different Class, Shock Breakout, and Afterglow

● 13 June 2014: Ruxandra Cojocaru (Universitat Politecnica de Catalunya, Barcelona, Spain), The Effects of Metallicity on the Galactic Disk White Dwarf Population

● 20 June 2014: Cheung Sze-Leung (National Astronomical Observatory of Japan, Japan), International Year of Light 2015, Public Naming of Exoplanets and the IAU Office for Astronomy Outreach

● 8 August 2014: Chao Liu (National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China), The Galactic Rotation Curve

● 15 August 2014: Daniel Huber (NASA Ames Research Center/SETI Institute, USA), Asteroseismology and Exoplanets: A Kepler Success Story

● 19 August 2014: Puragra Guhathakurta (UCO/Lick Observatory, USA), The Outskirts of Galaxies

● 22 August 2014: Elizabeth Tasker (Hokkaido University,

Japan), Do GMCs Care About Their Environment?

● 25 August 2014: Jeff Wagg (Square Kilometre Array organisation in the UK), Surveying the Evolution of Galaxies and Structure Formation with the Square Kilometre Array

● 1 September 2014: Jirong Mao (Kyushu University, Japan), Theoretical Investigation of GRB Host Galaxies

● 9 September 2014: Katrien Kolenberg (Harvard–Smithsonian Center for Astrophysics, Cambridge MA, USA; Leuven University, Belgium), RR Lyrae Stars, Cosmic Light Houses with a Twist

● 29 September 2014: Karla Alamo-Martínez (Peking University, China), Globular Cluster Systems in Extreme Environments

● 13 October 2014: Michael Kramer (Max-Planck-Institut für Radioastronomie, Bonn, Germany), Probing Theories of Gravity in the Galactic Centre

● 17 October 2014: Yen-Ting Lin (ASIAA, Taiwan), Brightest Cluster Galaxies and Cluster Galaxy Populations Across Cosmic Time

● 5 November 2014: Qiuhe Peng (Nanjing University, China), Both Possible Evidence for the Existence of a Magnetic Monopole and Failure of the Black Hole Model of the GC

● 12 November 2014: Jo Bovy (Institute for Advanced Study, Princeton NJ, USA), The Milky Way's Gravitational Potential

● 14 November 2014: Li Hui (Los Alamos National Laboratory, USA), AGN Jets and Lobes in Galaxy Clusters — Constraints on the Jet Properties and Their Feedback

● 19 November 2014: Zheng Cai (University of Arizona, USA), MApping the Most Massive Overdensity Through Hydrogen (MAMMOTH)

● 20 November 2014: Gary A. Fuller (University of Manchester, UK), Peering in to the Dark: Probing the Initial Conditions for the Formation of Stellar Clusters and Massive Stars

● 21 November 2014: Jiang-Tao Li (University of Michigan, USA), Circum-galactic Medium Around Local Spiral Galaxies — A New Window to Understand Galaxy Evolution

● 1 December 2014: Binbin Zhang (CSPAR, University of Alabama, USA), How Long Does a Burst Burst?

● 5 December 2014: Raul Michel (Instituto de Astronomía, Ensenada, Mexico), San Pedro Martir UBVRI Photometric Survey of Stellar Clusters and Associations

● 12 December 2014: Taehyun Kim (National Radio Astronomy Observatory, USA), Understanding the Evolution of Disk Galaxies Through Bars

● 15 December 2014: Minjin Kim (Korea Astronomy and Space Science Institute, Republic of Korea), Observational Evidence for the Co-evolution of Supermassive Black Holes and Host Galaxies

● 22 December 2014: Hui Dong (Instituto de Astrofísica de Andalucía–CSIC, Granada, Spain), Unveiling the Massive Stars in the Galactic Centre

Tuesday Pizza Lunch Talks, 2014

(Pizza lunch speakers are usually local scientists, unless otherwise stated.)

- 7 January 2014: Ian McNabb, A High-Resolution Spectroscopic Study of Galactic Planetary Nebulae

- 11 March 2014: Bingqiu Chen, Dust Extinction in the Milky Way

- 18 March 2014: Z. Lucas Uhm, Gamma-Ray Burst Blast Waves Encountering a Density Bump or Void

- 1 April 2014: Joshua Winn (Massachusetts Institute of Technology, USA), The Transiting Exoplanet Survey Satellite

- 8 April 2014: Hongxin Zhang, Unveiling the Origin of Ultracompact Dwarfs

- 22 April 2014: Steven Rieder (University of Groningen, Netherlands), Star Cluster Simulations: The Next Generation

- 6 May 2014: Haibo Yuan, A Spectroscopy-Based Method for Color Calibration Towards a few mmag Accuracy, Recalibration of Stripe 82, and Some Scientific Implications

- 13 May 2014: Bing Zhang, Millisecond Pulsars as the Source of Gamma-Ray Excess in the Galactic Center — No Dark Matter Needed

- 17 June 2014: Alberto Rebassa Mansergas, SDSSJ001153.08 - 064739.2, a Cataclysmic Variable with an Evolved Donor in the Period Gap

- 24 June 2014: Matthew Molloy, Resonant Clumping and Substructure in Galactic Discs

- 8 July 2014: Richard de Grijs, Historical Trends in LMC Distance Moduli: Publication Bias or Not?

- 22 July 2014: Ariane Lançon (Observatoire de Strasbourg, France), The XSL X-shooter Spectral Library Project: a Focus on Carbon Stars

- 30 September 2014: Zhaosheng Li, Constraining the Mass/Radius of Neutron Stars in Low-Mass X-Ray Binaries

- 14 October 2014: Xu Huang (Princeton University, Princeton NJ, USA), Aiming for the Next Bright Earth — Synergies of Ground- and Space-Based Transiting Planets Surveys

- 2 December 2014: Richard de Grijs, The Search for Longitude: Preliminary Insights from a 17th Century Dutch Perspective

- 9 December 2014: Fupeng Zhang, Testing the Kerr Metric of the Massive Black Hole in the Galactic Center using Stellar Orbital Motion

- 19 December 2014: Munan Gong (Princeton University, Princeton NJ, USA), Prestellar Core Formation, Evolution, and Accretion

- 23 December 2014: Ran Wang, Herschel Study of High-z Weak-Line Quasars

Peer-reviewed publications

Postdoctoral Fellow Lucas Uhml received outstanding Postdoctoral Research award, Peking University

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Awards

Wu, Xue-Bing received Wang Yangyuan-Yang Fuqing Excellent Teacher Award, Peking University

Awards (2014)

The Peking University astronomy community is forcefully making headway beyond its campus. Highlights of awards and honors received in or applicable to 2014 are included in this chapter.

de Grijs, Richard

- Visiting Academy Professorship, Royal Netherlands Academy of Arts and Sciences (KNAW); 02/2013 – 01/2014
- Nomination, Top-10 achievement in astrophysics research in China (2013)

Dong, Subo:

- Youth 1000 Talents Plan (Qin Nian Qianren), Chinese Government, Department of Organization

Ho, Luis:

- 1000 Talents Plan A (Qianren A), Chinese Government, Department of Organization

Shen, Yue:

- Youth 1000 Talents Plan (Qin Nian Qianren), Chinese Government, Department of Organization

Shin, Jihye:

- Morning Star Award, Korean Astronomical Society
- Excellence Award for Young Scientists, Korea Foundation of Women's Science and Technology Associations

Uhm, Z. Lucas:

- Outstanding Postdoctoral Researcher, Peking University (2014)

Wu, Xue-Bing:

- Wang Yangyuan – Yang Fuqing Excellent Teacher Award (王阳元 – 杨芙青优秀教师奖), Peking University

Yuan, Haibo:

- Outstanding Postdoctoral Researcher, Peking University (2013)

Grants and funding obtained

2014 KIAA-PKU Astrophysics Forum on science for the Thirty-Meter Telescope

Grants awarded in 2014

Members of the Peking University astronomy community engage in a wide variety of high-level scientific pursuits. This chapter recognizes the leading roles many of our community members play, as evidenced by competitive grant awards.

Chen, Bingqiu:

● China Postdoctoral Science Foundation, General Financial Grant 2nd Class. CNY 50,000

Based on the data observed by the LAMOST Spectroscopic Survey of the Galactic Anticenter (LSS-GAC), combined with the photometric data from a multiband CCD photometric survey of the Galactic anticenter with the Xuyi 1.04/1.20m Schmidt Telescope, as well as the 2MASS and WISE catalogs, we will study the three-dimensional dust extinction distribution covering a sky area of over 6,000 deg2 at an angular resolution of 6 arcmin and investigate the correlation between extinction and HI and CO emission at intermediate and high Galactic latitudes on small and large scales.

de Grijs, Richard:

● Deutscher Akademischer Austausch Dienst (DAAD; German Academic Exchange Service) - Research Internships in Science and Engineering (RISE) grant to appoint a German B.Sc. student to a fully funded internship of 8 weeks: € 2600

● National Natural Science Foundation of China (NSFC) - Standard grant, Not-so-simple stellar populations. CNY 900,000

Until about a decade ago, star

clusters were considered "simple" stellar populations: it was generally agreed that all member stars in a given cluster formed at approximately the same time from the same progenitor gas cloud. All stars in a cluster were therefore thought to have similar ages and the same metallicity, while the stellar masses covered a range defined by the stellar initial mass function. This situation has changed dramatically, implying that the stellar populations making up star clusters can no longer be considered simple. Yet, at the same time, they are among the brightest stellar population components and, as such, they are visible out to much greater distances than individual stars, so that understanding the complexities of star cluster composition and their evolution is imperative for understanding stellar populations and the evolution of galaxies as a whole.

● NSFC – Public Understanding of Science grant, The Human Face of Chinese Astronomy: Past, Present and Future. CNY 400,000

The early history of modern science in the far East is replete with fascinating personalities, politics and discoveries. We propose to focus on the life, achievements and influence of one pivotal Italian missionary and early astronomer to bring far-Eastern scientific achievements from the time of Galileo to Western audiences.

Dong, Subo:

● Youth 1000 Talents Plan (Qin Nian Qianren), Chinese Government, Department of Organization. CNY 3,000,000

Aims: Discovering planets outside our solar system using microlensing; studying the distribution and architectures of planetary systems found from microlensing surveys and NASA's Kepler satellite; the theory and observational implications of few-body dynamics; designing and conducting new observational tests to verify the dynamical origins of short-period planetary systems and close binary stars; studying a new major channel to produce Type Ia supernovae from direct collisions of white dwarfs; exploring time variability in large astronomical surveys to discover and study planets, stars, stellar explosions, and in particular, unexpected exotic objects.

Fan, Zuhui:

● NSFC Key Project, Weak-lensing cosmological studies with the CFHTLenS and VOICE surveys. CNY 3,200,000

Weak lensing effects have been recognized as one of the most important probes in cosmological studies, especially in understanding the nature of dark matter and dark energy. This research program will focus on weak lensing analyses with real observational data from CFHTLenS, the highest standard data of weak lensing observations to date. The specific studies include higher-order shear correlation analyses, weak lensing peak statistics, dark matter distribution of clusters of galaxies, galaxy-galaxy lensing analyses. Partially based on our previous theoretical and observational studies, we will pay particular attention to investigate different systematic effects occurred in real observational data and how they affect the extracted cosmological information. Through collaborations, we will also conduct detailed data analyses for the ongoing VOICE weak lensing survey and the subsequent cosmological studies.

Herczeg, Gregory:

● NSFC – Standard grant, The role of accretion in the formation and evolution of nearby young stars and planets. CNY 950,000

Our understanding of star and planet formation is founded upon following mass from the cloud into the star+disk system. The last step of formation is accretion from the disk onto the star. The disk–to–star accretion process determines how quickly the star gains its mass, drives powerful outflows that carry away angular momentum from the system, and produces energetic emission that leads to a complex photochemistry in the disk. This proposal requested funding to support a research program dedicated to measuring disk–star accretion from the earliest to the final stage of stellar birth to evaluate the effects of accretion history in the formation and evolution of stars and planetary mass objects. The individual projects will significantly improve our understanding of accretion physics versus evolutionary state and object mass. The results will have important implications for models of how stars and planets evolve, for interpreting large unbiased photometric monitoring campaigns from LSST, Gaia, and fields in the proposed Kepler K2 program, and are a critical complement required to exploit the power of Gaia observations to measure ages and age spreads in young clusters.

Ho, Luis:

● 1000 Talents Plan (Qianren A), Chinese Government, Department of Organization.

Aims: (i) Continue long–term effort to develop techniques to detect active galactic nuclei (AGN), develop methods to measure fundamental parameters (mass, spin, accretion rates) for supermassive black holes, delineate the demographics of black holes on all mass scales, understand the co–evolution of black holes and their host galaxies, study the physics of accretion flows and jet formation, quantify the interstellar medium (mass, temperature, spatial and kinematic distribution) of quasar host galaxies, develop methods to quantify the stellar mass, stellar population, morphology, and star–formation rate of AGN host galaxies. (ii) Initiate new effort to understand the formation and evolution of the Hubble sequence of galaxies, ranging from the most massive ellipticals and brightest cluster galaxies, to disk galaxies, bar structure, spiral features, classical and pseudobulges. (iii) Contribute to the development of astronomy in China and elevate its competitiveness in the international arena.

● NSFC – Standard grant, The Evolutionary Link Between Type 1 and Type 2 Quasars. CNY 950,000 RMB

Investigate the evolutionary link between obscured and unobscured AGN using spectra obtained from ground–based optical facilities, optical and near–infrared images obtained from the Hubble Space Telescope, and far–infrared photometry from Herschel.

● Chinese Academy of Sciences – Pilot Project B, Supermassive Black Holes. CNY 3,000,000

Develop techniques for reverberation mapping of AGN to measure the mass of central black holes and detailed structure and dynamics of the broad–line region. Study the physics of super–Eddington accretion disks and the generation of winds and outflows.

Kouwenhoven, M.B.N. (Thijs):

● University of Central Lancashire (UCLan, UK), Distinguished Visiting Professorship. GBP 2,000.

This program provides funds to enable high-profile Distinguished Visitors to make a short, targeted visit to UCLan. The aim is to promote world-leading collaborations (both new and existing) across both research and innovation and to raise the profile of the excellent research and innovation activities that UCLan currently undertakes.

Li, Lixin:

● National Basic Research Program (973 Program) of China, Ministry of Science and Technology (grant 2014CB845800), Gamma-Ray Bursts and Relevant Frontier Physics. (start date: January 2014)

The project focuses on the following key problems in GRB physics and astrophysics: central engines, prompt emissions, afterglows and jets, neutrino physics, gravitational waves, application of GRBs in cosmology.

Subprogram 5, Multi-messenger investigation. CNY 700,000

★ Member: Zhuo, Li

Subprogram 6, Gamma-ray Burst Cosmology. CNY 1,690,000

★ Members: Zhang, Bing; Li, Lixin (group leader)

Li, Zhaosheng:

● China Postdoctoral Science Foundation, General Financial Grant 2nd Class. CNY 50,000

The equation of state (EoS) of superdense matter, such as that found in neutron stars (NSs), is one of the key questions in astrophysics and nuclear physics. Generally, two categories of EoS are widely discussed, which can produce gravity-bound NSs and self-bound NSs, respectively. They are associated with distinct mass (M) - radius (R) relations. The EoSs of self-bound NSs predict $M \propto R^3$ for low-mass NSs. Moreover, the minimum mass of self-bound NSs can be as low as planet masses, while the low-mass limit of gravity-bound NSs is about 0.1 $M_\odot$. Measurements of the radii and masses of NSs, as well as searches for extremely low-mass NSs, can provide useful information to test various theoretical EoSs. We will search for low-mass NS candidates among RXTE observations, and constrain the radii of NSs to test EoSs.

Liu, Fukun:

● NSFC - Standard grant, Theory and observations of Stellar Tidal Disruptions by Supermassive Binary Black Holes. CNY 950,000

Supermassive black hole binaries (SMBHBs) are expected to form in galaxy mergers. Because observations of SMBHBs in galaxies are extremely challenging, present surveys and observations of SMBHBs in the literature focus on active galactic nuclei (AGN). Inspired by the successful detection of the first SMBHB candidate in normal galaxies with stellar tidal disruption events (TDEs) recently made by our group, we plan to investigate TDE rates as a function of the separation of the SMBHs in galaxy mergers and of the nuclear structures. By analyzing archival data of TDEs, we will also try to discover more SMBHB systems in normal galaxies and calculate the relative contributions of the SMBHB and multiple SMBH systems to the cosmic TDE events, preparing for future transient surveys with the Large Synoptic Survey Telescope, PanSTARRs, SVOM,

Einstein Probe, and MAXI and for the identification of gravitational-wave sources using eLISA and Pulsar Timing Arrays.

Peng, Eric:

● Chinese Academy of Sciences (CAS)/CONICYT (Chile), award of two Postdoctoral Fellowships. CNY 331,500

Through the CAS South America Center for Astronomy, Eric Peng was awarded funding to host two CAS/CONICYT Postdoctoral Fellows. Drs Hongxin Zhang and Karla Alamo-Mart í nez are now both China - Chile Fellows at Peking University through this funding. They will stay for six and 12 months, respectively, before moving to Chile.

Rebassa-Mansergas, Alberto:

● NSFC - Research Fund for International Young Scientists, White dwarf main sequence binaries: observational constraints on current theories of common envelope evolution. CNY 200,000.

The project aims at understanding the formation of close compact binary systems via common envelope evolution by studying white dwarf - main sequence binaries.

● Postdoctoral Science Foundation of China, Seventh special postdoctoral fund program, Birth and death of close white dwarf binaries: observational constraints from LAMOST. CNY 150,000

The project aims at evaluating the importance of the single degenerate channel towards supernovae Type Ia by studying white dwarf binaries.

Shen, Yue:

● Youth 1000 Talents Plan (Qin Nian Qianren), Chinese Government, Department of Organization. CNY 3,000,000

Yue Shen will continue to pursue his research in the field of extragalactic astronomy, focusing on supermassive black holes (SMBHs) and their relations with host galaxies. He will improve the measurements of SMBH masses in quasars and the demography and clustering properties of quasars over cosmic time.

Shin, Jihye:

● National Natural Science Foundation of China (NSFC), International Cooperation and Exchange Program. CNY 200,000

The research project aims to investigate the formation of globular clusters in the hierarchical clustering context of the "cold dark matter" cosmology using detailed numerical studies. We will also investigate the formation of exotic stellar systems that have similar properties to globular clusters, such as ultra-compact dwarf galaxies, ultra-faint dwarf galaxies, and nucleated dwarf galaxies.

Wang, Ran:

● NSFC - Director's Discretionary grant, Imaging the [C II] 158 micron fine structure line emission in the host galaxies of quasars at z~6. CNY 100,000

This grant is used in support of a program to study [C II] 158 micron line emission in z~6 quasar host galaxies. The team is making obtaining resolved observations of the [C II] 158 micron fine structure line and dust continuum emission in z~6 quasars using ALMA. The goals are to trace the distribution of star formation and measure the kinematics of the host galaxy.

● NSFC – Standard grant, Study of supermassive black hole–galaxy evolution at z~6. CNY 950,000

In order to better understand the evolutionary properties of these young quasar host galaxies at the earliest epoch, we have collected a sample of millimeter-bright quasars at z~6.In this project, the team will develop a series of programs to observe the dust and gas components in the host galaxies of these objects using the Atacama Large Millimeter/Submilli-meter Array (ALMA) and the Jansky Very Large Array (JVLA). The goals are to map the distributions of the dust, gas, and star-forming activities, probe the physical and dynamical properties of the interstellar medium in the starburst nuclear region. They will investigate the origin of the supermassive black hole–galaxy mass correlation, and search for evidence of feedback from active galactic nuclei.

Wu, Xue-Bing:

● LAMOST key program, LAMOST Quasar Survey, CNY 100,000 (supported by NAOC)

We will carry out spectroscopic identification of over 100,000 quasar candidates in the next 5 years with LAMOST. We selected these candidates based on optical/infrared photometry and photometric redshift estimates. We expect to discover more than 20,000 new quasars and construct a more complete quasar sample in combination with the Sloan Digital Sky Survey quasar survey to study the quasar luminosity function.

● National Basic Research Program (973 Program) of China, Ministry of Science and Technology (grant 2014CB845800), Spectroscopic identifications of multi-wavelength objects (group leader). CNY 1,860,000

We will carry out LAMOST spectroscopy of over 300,000 multi-wavelength objects, including 100,000 quasar candidates, 100,000 bright galaxies and 100,000 ultraviolet-bright white dwarfs and other compact objects.

● Chinese Academy of Sciences, Strategic Priority Research Program "The Emergence of Cosmological Structures", Study on the Co-evolution of Black Holes and galaxies. CNY 248,600

We will use domestic optical telescopes and optical/near-infrared telescopes abroad to discover high-redshift quasars, and do the follow-up observations with radio and (sub) millimeter telescopes. Based on these observations, we will study the co-evolution of supermassive black holes and their host galaxies at different redshifts.

Wu, Yuefang:

● NSFC Standard Grant, Starless Cores of Molecular Clouds – Study of the Early Phase of Star Formation. CNY 880,000

The initial status of star formation in molecular clouds is currently not well known. The onset of star formation is critically related to the physical and chemical conditions of the starless dense molecular cores (prestellar cores). This project will systemically study the unprecedented coldest dust clumps observed by the Planck satellite using common molecular tracers (e.g., CO), dense molecular tracers (e.g., HCO+, CS, NH3), N-bearing and deuterated species, as well as continuum emission from higher spatial-resolution observations. We aim to build the largest sample of prestellar cores and investigate

their physical conditions, kinematics and molecular abundances. We will use interferometer observations to investigate the fragmentation and accretion modes of typical prestellar cores. This project will greatly boost our understandings of the initial conditions and process of star formation.

Zhang, Bing:

● National Basic Research Program (973 Program) of China, Ministry of Science and Technology (grant 2014CB845800), Gamma-Ray Bursts and Relevant Frontier Physics. (start date: January 2014)

The project focuses on the following key problems in GRB physics and astrophysics: central engines, prompt emissions, afterglows and jets, neutrino physics, gravitational waves, application of GRBs in cosmology.

Subprogram 5, Multi-messenger investigation. CNY 700,000

★ Member: Zhuo, Li

Subprogram 6, Gamma-ray Burst Cosmology. CNY 1,690,000

★ Members: Zhang, Bing; Li, Lixin (group leader)

Zhuo, Li:

● National Basic Research Program (973 Program) of China, Ministry of Science and Technology (grant 2014CB845800), Gamma-Ray Bursts and Relevant Frontier Physics. (start date: January 2014)

The project focuses on the following key problems in GRB physics and astrophysics: central engines, prompt emissions, afterglows and jets, neutrino physics, gravitational waves, application of GRBs in cosmology.

Subprogram 5, Multi-messenger investigation. CNY 700,000

★ Member: Zuo, Li

Subprogram 6, Gamma-ray Burst Cosmology. CNY 1,690,000

★ Members: Zhang, Bing; Li, Lixin (group leader)

Yan, Huirong:

● NSFC Standard Grant, Cosmic Ray Transport and Acceleration processes and their implications. CNY 940,000

Cosmic ray (CR) transport and acceleration is essential to understand many astrophysical problems, e.g., the cosmic microwave background (CMB) foreground, ionization of molecular clouds, and all high-energy phenomena. Recent advances in magnetohydrodynamical turbulence call for revisions in the paradigm of CR transport. Built on previous achievements, we will continue our research in this field, aiming at constructing a self-consistent picture of acceleration and propagation of energetic particles. We will focus on transport and acceleration of particles in shocks and in turbulent reconnection zones, as well as their implications in the context of supernova remnants, gamma-ray bursts, etc.; propagation of CRs and ionization in dark clouds; numerical modeling of CR propagation in different environments and their applications to the CMB synchrotron foreground radiation and diffuse gamma-ray emission.

Yuan, Haibo:

● China Postdoctoral Science Special Foundation, Studies of three-dimensional Galactic extinction, extinction laws and diffuse interstellar bands with LAMOST. CNY 150,000

Constructing a three-dimensional extinction map of the Galactic plane plays an essential role in Galactic studies, particularly in achieving the main goals of the LAMOST Galactic surveys. The nature and origins of diffuse interstellar bands (DIBs) are among the most challenging problems in astronomical spectroscopy. With modern large-scale spectroscopic surveys such as SDSS and LAMOST, Galactic astronomy enters the era of millions of spectra. By combining the LAMOST spectroscopic dataset with the GALEX, SDSS, Xuyi, 2MASS and WISE photometric datasets, they will construct a three-dimensional multi-band extinction map of the Galactic plane at high spatial resolution and further study variations of extinction laws and dust properties as a function of positions and environments. They also expect to detect DIBs in hundreds of thousands of LAMOST spectra and study the demographic distribution, properties and nature of DIBs.

Zhang, Fupeng:

- China Postdoctoral Science Foundation, General Financial Grant 2nd Class. CNY 50,000

A crucial step to check whether an astrophysical massive black hole (MBH) is described by the Kerr metrics is to accurately determine the spin parameters. In this study we investigate the capabilities of future telescopes (GRAVITY, TMT, etc.) in constraining the MBH spin parameters by observing the orbital motion of stars close to the MBH in the Galactic Center. A full general relativistic method is developed to calculate the stellar orbits and light propagation. Constraints on the MBH spin parameters can be derived by adopting the Markov Chain Monte Carlo fitting technique, applied to mock observations of stellar motions.

Zhang, Huawei:

- NSFC Standard Grant, Kinematics and chemical abundance study of Galactic disk stars. CNY 980,000

The Galactic disk is an important component of the Milky Way. Its formation and evolution are important unresolved astrophysical problems. The LAMOST experiment for Galactic Understanding and Exploration (LEGUE) project will obtain a few million spectra of Galactic disk stars. Based on analysis of the spectra, effective temperatures, surface gravities, and metallicity parameters will be derived. 3D positions and velocities will be calculated from proper motions, radial velocities, and photometric/spectroscopic distance data. A comprehensive study of the metallicities, ages, and kinematics parameters of a large sample of Galactic disk stars will allow us to refine and constrain various models of Galactic disk formation and evolution.

Peking University astronomers making headway in international organizations

Luis Ho was a member of international review committee for Chinese Academy of Science

Many Peking University astrophysicists play leading roles or hold high honors in external organizations. This chapter summarizes the main highlights of their impact beyond the campus gates.

de Grijs, Richard:

- Deputy Editor, The Astrophysical Journal Letters (American Astronomical Society)
- Fellow and China representative, Institute of Physics (UK)
- Fellow, Higher Education Academy (UK)
- Vice President, International Astronomical Union (IAU) Commission 37, "Stellar Clusters and Associations"
- Founding director, East Asian regional Office of Astronomy for Development, IAU; member, Task Force on "Astronomy for Universities and Research"
- Science lead, "Physical properties of star clusters in nearby galaxies", Maunakea Spectroscopic Explorer (MSE)
- Thirty Meter Telescope (TMT) International Science Development Teams (ISDTs): Formation of Stars and Planets, Milky Way and Nearby Galaxies
- Ambassador for China, Open Researcher and Contributor ID (ORCID)
- Guest professor Shanghai Astronomical Observatory, China
- Visiting Academy Professor (held at Leiden University, Netherlands), Royal Netherlands Academy of Arts and

Sciences (KNAW): until 02/2014

Dong, Subo:

● Thirty Meter Telescope (TMT) International Science Development Team (ISDT): Exoplanets

Herczeg, Gregory:

● Thirty Meter Telescope (TMT) International Science Development Team (ISDT): Formation of Stars and Planets

Ho, Luis:

● Associate Editor, The Astrophysical Journal Letters (American Astronomical Society)

● Thirty Meter Telescope (TMT) International Science Development Team (ISDT): Supermassive Black Holes

● 1000 Talents Plan (Qianren A) Scientist

● Distinguished Professor (honorary), Nanjing University, China

● Research Fellow, National Astronomy Observatories, Chinese Academy of Sciences

● Member, China – Chile Fellowship Committee

● Member, Telescope Access Program Advisory Committee

● Member, Chinese Academy of Sciences "Pilot Project B" Science Advisory Committee

● Member, Chinese Academy of Sciences International Experts Review

Kouwenhoven, M.B.N. (Thijs):

● International advisory board, Philippine Journal for Astronomy

● International advisory board, Young Scientists Journal

● Editorial board, Star Formation Newsletter

● Distinguished Visiting Professor, University of Central Lancashire, UK

Liu, Xiaowei:

● Vice President, International Astronomical Union

Peng, Eric:

● Contact scientist for China, Maunakea Spectroscopic Explorer (MSE); Science Working Group member, MSE

● Thirty Meter Telescope (TMT) International Science Development Team (ISDT): Milky Way and Nearby Galaxies

● Telescope Access Program (TAP):

★ Co-chair, Advisory Committee

★ Chair, Time Allocation Committee (March and October 2014)

★ Coordinator, Key Project review panel (October 2014)

Spurzem, Rainer:

● Steering Committee of International Supercomputing Conferences (ISC)

Wu, Xue-Bing:

● Vice President, Beijing Astronomical Society

● Chair, LAMOST User Committee

Xu, Renxin:

● Thirty Meter Telescope (TMT) International Science Development Team (ISDT): Fundamental Physics and Cosmology

Zhang, Bing:

● Fellow, American Physics Society, elected "for his significant scientific contributions to the understanding of the physical mechanisms of high-energy astrophysical sources, especially the prompt emission and afterglows of cosmological gamma-ray bursts."

● Associate editor, Journal of High Energy Astrophysics

Conference organization, invitations, and external colloquia

Luis Ho gave the Opening Remark on 2014 KIAA-PKU Astrophysics Forum on science for the Thirty-Meter Telescope

Scientific dissemination: Conferences

Peking University astrophysicists actively engage with their respective communities through conference organization and high-profile contributions, in addition to disseminating their latest research achievements through talks at external institutes. A summary of their main achievements is included in this chapter.

12.1. Conference organization and Scientific Organizing Committee membership

20 April 2014: Gezhi Forum, School of Physics, Peking University

- SOC: Dong, Subo

The Gezhi Forum is an annual meeting for young faculty members in the School of Physics to stimulate scientific interactions.

1 – 5 May 2014: MODEST-14 – The dance of stars: dense stellar systems from infant to old, Bad Honnef, Germany

- SOC: Spurzem, Rainer

18 – 23 May 2014: From Dark Matter to

Galaxies, Xi’an, China

- SOC: Ho, Luis

25 – 29 May 2014: Statistical Challenges in 21st Century Cosmology (IAU Symposium 306), Lisbon, Portugal

- SOC: Yu, Qingjuan

11 – 13 June 2014: Cosmology Frontiers, Beijing, China

- SOC: Fan, Zuhui (chair)

Sponsored by PKU, NAOC and IHEP, and supported by NSFC key programs and CAS PilotB XDB09000000, the Cosmology Frontiers workshop was held from June 11 to 13, 2014. About ~100 participants from the Chinese astronomy and physics communities attended the workshop. In light of recent developments in the field, we had stimulating discussions about CMB physics, relating particularly to the physical processes which happened in the very early Universe. We also had a special session devoted to discussions about possible future CMB projects in China.

23 – 24 June 2014: Gamma-ray Bursts and Relevant Physical problems (973

Project meeting), KIAA Beijing, China

- SOC: Li, Li-Xin; Zhang, Bing (co-chairs)

The goal of the meeting was to invite experts in gamma-ray bursts (GRBs) and cosmology in China to review modern progress on the subject of GRB cosmology and exchange ideas about collaboration. Students also reported on their research work on GRBs and relevant fields.

1 – 3 July 2014: LAMOST User Committee meeting, National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China

- Chair: Wu, Xue-Bing

25 – 29 August 2014: The disk in relation to the formation of planets and their proto-atmospheres, International Space Science Institute (ISSI)-Beijing/ISSI joint workshop, Beijing, China

- Convener: Herczeg, Gregory

One great challenge of modern astrophysics is the understanding of the origin and formation of planets around young stars, and of the resulting diversity of planetary objects and their proto-atmospheres. It is assumed and for one part observed that planets form inside the circumstellar disks which are one of the characteristics of young stars. But a coherent global picture of how planets and their atmospheres form and evolve inside those disks is yet to emerge. The workshop revisited all available scenarios for the joint evolution of disks, planets and atmospheres in the light of the most recent observations and of available models, aiming to establish the most likely scenarios for this co-evolution and hence seeking to improve our understanding of the formation and early evolution of the different types of planets.

25 – 29 August 2014: Star Clusters and Black Holes in Galaxies Across Cosmic Time (IAU Symposium 312), Beijing, China

- SOC: Spurzem, Rainer (co-chair); Liu, Fukun (co-chair)

Black Holes, dense star clusters, and galactic nuclei are moving into the focus of cosmological galaxy formation and evolution. High-resolution observations as well as simulations, in our local environment as well as in the

distant Universe, approach the central engine and its co-evolution with the surrounding stars and gas. Black holes formed in astrophysical environments are expected to be gravitational-wave sources. China, and the National Astronomical Observatories of the Chinese Academy of Sciences, as well as Peking university, are at the forefront of these endeavors and hosted this conference.

1 - 5 September 2014: Binary Systems: Their evolution and Environments, Ulaanbaatar, Mongolia (http://mongolia.csp.escience.cn)

● SOC: de Grijs, Richard (chair); Kouwenhoven, M.B.N. (Thijs)

More than half of all stars form part of binary or higher-order multiple systems at least temporarily during their lifetimes. Yet, the highly successful field of stellar population synthesis all but ignores the presence of large fractions of stellar multiplicity. During this conference, we aimed at bringing together observers, theorists and modellers to explore the synergies among the closely related fields focusing on stellar evolution and stellar dynamics, with particular emphasis on the contributions and properties of binary and higher-order multiple systems. Although we aimed at addressing the key issues in these rapidly evolving areas from a population synthesis perspective, we paid special attention to those individual stellar species that contribute most significantly to the stellar population properties that are most uniquely related to stellar multiplicity.

Office of Astronomy for Development press release: http://http//www.astro4dev.org/blog/2014/09/19/astrophysics-conference-and-autumn-school-in-ulaanbaatar-mongolia/

6 - 16 October 2014: Turbulence: In the Sky as on the Earth, Natal, Brazil

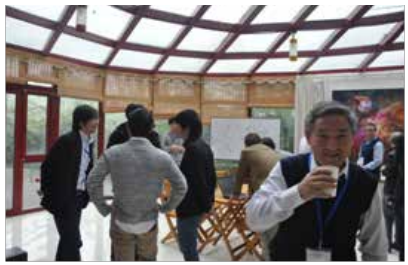
● SOC: Yan, Huirong (director)

Turbulence is of primary importance in the study of complex nonlinear multi-scale dynamics, playing a major role in problems ranging from fundamental physics issues to applied fluid mechanics. Among these, one can underline the nature of heat and mass transfer, dynamical processes in environmental science, including ocean and atmosphere dynamics, geophysics, and astrophysics. The understanding of turbulent mixing and transport of energy, mass, and momentum at different scale dynamics is, perhaps, one of the most important multi-disciplinary challenges for this 21st Century.

20 - 22 October 2014: Quarks and Compact Stars (Bilateral China - Japan meeting), Beijing, China; http://kiaa.pku.edu.cn/qcs2014/

● SOC: Xu, Renxin (chair)

Although the Standard Model of particle physics have been successfully proved to be perfect through the discovery of the Higgs boson, the nature of the strong interaction at low energies, which is essential to understand atomic nuclei and compact stars, as well as the early Universe, is still far from fully



understood. Certainly, the quark degree of freedom could not be negligible, and compact stars provide a unique testing ground to study the non-perturbative behavior of the strong interaction.

26 October 2014: Gezhi Forum, School of Physics, Peking University

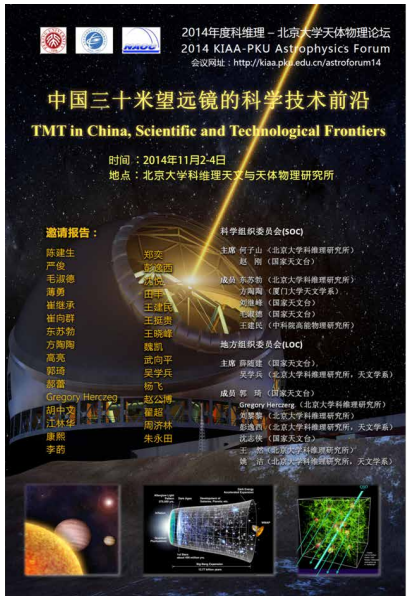
● SOC: Dong, Subo

The Gezhi Forum is an annual meeting for young faculty members in the School of Physics to stimulate scientific interactions.

2 – 4 November 2014: TMT in China: Scientific and Technological Frontiers (2014 KIAA-PKU Astrophysics Forum), Beijing, China (http://kiaa.pku.edu.cn/astroforum14/)

● SOC: Ho, Luis (chair); Dong, Subo

The Thirty Meter Telescope (TMT) is no longer a distant future. China, through the National Astronomical Observatories, Chinese Academy of Sciences, has joined the TMT as a founding partner, and ground-breaking for the TMT project began in October 2014. When completed, the TMT will be one of the most powerful telescopes in the history of astronomy, and it will be one of the greatest astronomical facilities that China will possess in the beginning of the 21st Century. It will bring unprecedented opportunity to Chinese astronomy. How to achieve scientific and technical readiness for TMT to maximize its impact is a great challenge that the Chinese astronomy community is facing.



15 November 2014: CHILI 'Cook-off' Meeting, Beijing, China.

● SOC: Ho, Luis (co-chair)

The China Lijiang IFU (CHILI) project's inaugural "cook-off" meeting was held at KIAA/PKU on November 15, 2014. This was the first time the CHILI science team members, including over 50 active scientists and engineers, met and discussed CHILI's science capabilities and execution plans. This meeting marks the start of CHILI as a scientific project. The meeting was jointly organized by the KIAA and the Shanghai Astronomical Observatory.

15 – 22 November 2014: Training workshop on gravitational N-body simulations and GPU computing, Beijing, China.

● Organisation: Kouwenhoven, M.B.N. (chair); Spurzem, Rainer; Wang, Long

The workshop consisted of several lectures by experienced researchers such as Sverre Aarseth, Rainer Spurzem, and Long Wang, but for most of the time the students worked on practical numerical problems in the field of N-body dynamics.

29 November – 1 December 2014: China – Subaru Workshop, Shanghai, China.

● SOC: Peng, Eric

2 – 5 December 2014: Swift: 10 Years of Discovery, Rome, Italy

● SOC: Zhang, Bing

Invited contributions at conferences

de Grijs, Richard:

- 6–9 January 2014: American Astronomical Society Winter Meeting 2014, Washington (DC), USA; Chambliss poster award judge, invited lecturer at a "Workshop for Journal Authors and Referees"
- 1–5 May 2014: MODEST-14 – The dance of stars: dense stellar systems from infant to old, Bad Honnef, Germany; invited talk, session chair
- 1–5 September 2014: Binary Systems: Their evolution and Environments, Ulaanbaatar, Mongolia; SOC chair, opening talk
- 14–17 November 2014: Commemorating the 300th Anniversary of the Stone Inscription 'Hai Pan Nan Tian': International Symposium on the Sino-French Geodetic Survey of the Qing Empire in the 18th Century, Sanya (Hainan), China; invited talk, session chair
- 18–19 November 2014: International Space Science Institute-Beijing Forum (Strategic planning for the future), Beijing, China; invited talk

Dong, Subo:

- 10–12 February 2014: IAS Type Ia Supernova Workshop, Princeton (NJ), USA; invited talk
- 21–25 April 2014: Rencontres du Vietnam: Exoplanetary Science 2014, Vietnam; invited review
- 18–22 August 2014: LAMOST-Kepler Workshop, Beijing, China; invited talk
- 20–23 October 2014: Transients' Unsolved Mysteries Workshop, Eilat, Israel; invited talk
- 2–4 November 2014: TMT in China: Scientific and Technological Frontiers, Beijing, China; invited talk
- 17–19 November 2014: Workshop on Exoplanetary Systems, Kunming, China; invited talk, session chair
- 29 November–1 December 2014: China-Subaru Workshop, Shanghai, China; invited talk

Fan, Zuhui:

- 20–25 October 2014: Sino-French "LIA-ORIGINS" Workshop, Beijing, China; invited talk
- 3–7 November 2014: 6th KIAS Workshop on Cosmology and Structure Formation, Seoul , Republic of Korea; invited talk

Flores Fajardo, Nahiely:

- 20–25 April 2014: Awarded an ESO grant to attend the advanced school, The interaction of Stars with the Interstellar Medium of Galaxies, Les Houches Physics School, Les Houches, France

Herczeg, Gregory:

- 13–15 May 2014: Oort Workshop on Episodic Accretion, Leiden, Netherlands; invited talk
- 25–29 August 2014: The disk in relation to the formation of planets and their proto-atmospheres, International Space Science Institute (ISSI)-Beijing/ISSI joint workshop, Beijing, China; convener, invited talk
- 2–4 November 2014: TMT in China: Scientific and Technological Frontiers, Beijing, China; invited talk

Ho, Luis:

- 17–20 January 2014: Yunnan Astronomical Observatory Annual Meeting, Pu'er, China; invited talk
- 23–25 May 2014: Southern China Technical Astronomy Development, Kunming, China; invited talk
- 18–23 May 2014: From Dark Matter to Galaxies, Xi'an, China; invited talk
- 23–27 June 2014: 8th Overseas Chinese Physics

Association meeting, Singapore; invited talk

- 25 – 29 August 2014: Star Clusters and Black Holes in Galaxies Across Cosmic Time (IAU Symposium 312), Beijing, China; invited talk
- 27 – 29 October 2014: Chinese Astronomical Society Annual Meeting, Lintong, China; invited talk
- 25 – 26 October 2014: Pujiang Innovation Forum, Shanghai, China; invited talk
- 29 November – 1 December 2014: China – Subaru Workshop, Shanghai, China; invited talk
- 8 – 10 December 2014: 4th China – Chile Astronomy Science Workshop, Guangzhou, China; invited talk

Jiang, Linhua:

- 2 – 4 November 2014: TMT in China: Scientific and Technological Frontiers, Beijing, China; invited talk

Kouwenhoven, M.B.N. (Thijs):

- 1 – 5 September 2014: Binary Systems: Their evolution and Environments, Ulaanbaatar, Mongolia; invited review, SOC member

Lee, Kejia:

- 25 – 29 August 2014: IAU Symposium 312, Black Holes and Star Clusters across Cosmic Time, Beijing, China; invited talk
- 27 – 29 October 2014: Chinese Astronomical Society Annual Academic Meeting 2014; session chair (radio astronomy)

Liu, Fukun:

- 6 – 7 May 2014: Exploring the Dynamic X-ray Universe, International Space Science Institute – Beijing, China; invited talk
- 16 – 18 May 2014, Astrophysical Black Holes Workshop, Nanjing, China; invited talk:
- 25 – 19 August 2014, IAU Symposium 312, Black Holes and Star Clusters across Cosmic Time, Beijing, China; invited talk

Peng, Eric:

- 27 – 28 April 2014: Pilot B kickoff workshop, NAOC, Beijing, China; invited talk
- 17 – 19 June 2014: The Evolution of Stellar Populations in Globular Clusters and Early-type Galaxies, Seoul, Republic of Korea; invited talk
- 25 – 29 August 2014: Star Clusters and Black Holes in Galaxies Across Cosmic Time (IAU Symposium 312), Beijing, China; review talk
- 2 – 4 November 2014: TMT in China: Scientific and Technological Frontiers, Beijing, China; invited talk
- 29 November – 1 December 2014: China – Subaru Workshop, Shanghai, China; invited talk

Shen, Yue:

- 10 – 12 March 2014: Space Telescope Science Institute Hubble Fellows Symposium 2014, Baltimore (MD), USA; invited talk
- 12 – 14 September 2014: The Inner Regions of Quasars, Austin (TX), USA; invited talk
- 2 – 4 November 2014: TMT in China: Scientific and Technological Frontiers, Beijing, China; invited talk

Spurzem, Rainer:

- 8 – 12 September 2014: Stellar N-body Dynamics at the Sexten Center for Astrophysics, Sexten, Italy; invited talk
- 15 – 17 September 2014: GPU Astrophysics and Dynamics Meeting, Rome, Italy; invited talk

Wang, Ran:

- 16 – 20 June 2014: Powerful AGN and their Host Galaxies across Cosmic Time, Port Douglas (QLD), Australia; invited talk, session chair

Wu, Xuebing:

- 2 – 4 November 2014: TMT in China: Scientific and Technological

Frontiers, Beijing, China; invited talk

● 8 – 10 December 2014: 4th China – Chile Astronomy Science Workshop, Guangzhou, China; invited talk

Xu, Renxin:

● 25 May 2014: 中国南方天文集群研究和技术发展论坛 , Kunming, China

● 17 July 2014: 中国射电天文学发展与平方公里阵列望远镜 (SKA), Beijing, China; invited talk

● 10 – 14 August 2014: PKU – CUSTIPEN (China – US Theory Institute for Physics with Exotic Nuclei) Nuclear Reaction Workshop, Beijing, China; invited talk

● 26 – 30 September 2014: Compact Stars in the QCD phase diagram (CSQCD IV), Prerow, Germany; invited talk

● 30 – 31 October 2014: Dense Matter from Chiral Effective Theory, Jilin University, China; invited talk

Xu, Siyao:

● 6 – 16 October 2014: Turbulence: In the Sky as on the Earth, Natal, Brazil; invited talk (student highlight)

Yan, Huirong:

● 6 – 16 October 2014: Turbulence: In the Sky as on the Earth, Natal, Brazil; invited talk; SOC member

● 28 July – 1 August 2014: 4th East Asian School and Workshop on Lab, Space, Astro Plasma, Harbin, China; invited talk

Zhang, Bing:

● 28 – 31 May 2014: SPCS2014 – Shanghai Particle Physics and Cosmology Symposium; invited talk

Other external and invited seminars and colloquia

de Grijs, Richard:

● February 2014: (1) Radboud University, Nijmegen, Netherlands; (2) Peking University, China

● April 2014: (1) Indiana University, Bloomington (IN), USA; (2) Center for Interdisciplinary Exploration and Research in Astrophysics, Northwestern University, Evanston (IL), USA

● May 2014: (1) National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China; (2) University of Sheffield, UK; (3) Leibniz Institute Potsdam, Germany

● July 2014: University of Hong Kong, Hong Kong SAR, China

● August 2014: National University of Mongolia, Ulaanbaatar, Mongolia

Dong, Subo:

● March 2014: Purple Mountain Observatory, Nanjing, China

● April 2014: Instituto de Astrof í sica, Pontificia Universidad Cat ó lica de Chile, Chile

● June 2014: Center for Astrophysics, Tsinghua University, Beijing, China

● December 2014: National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China

Herczeg, Gregory:

● March 2014: Peking University, China

● June 2014: Shanghai Astronomical Observatory, China

● September 2014: ETH Zurich, Switzerland

Ho, Luis:

● January 2014: (1) National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China; (2) Tsinghua University, Beijing, China

- February 2014: ASIAA/ National Taiwan University, Taipei, Taiwan
- May 2014: Nanjing University, China
- August 2014: Macau University of Science and Technology, Macau SAR, China
- October 2014: (1) Institute for Astronomy, University of Hawaii (HI), USA; (2) Shanghai Astronomical Observatory, China
- November 2014: Xiamen University, China

Kouwenhoven, M.B.N. (Thijs):

- February 2014: Rizal Technological University, Mandaluyong City, Philippines
- June 2014: The University of Central Lancashire, Preston, UK
- December 2014: National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China

Liu, Fukun:

- June 2014: National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China
- September 2014: Shanghai Astronomical Observatory, China

Meiron, Yohai:

- February 2014: Vanderbilt University, Nashville (TN), USA
- May 2014: (1) Astronomisches Rechen Institut (ARI), Heidelberg, Germany; (2) Max Planck Institute for Astronomy (MPIA), Heidelberg, Germany
- August 2014: Shanghai Astronomical Observatory, China
- October 2014: National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China

Shen, Yue:

- October 2014: University of California at Santa Barbara (CA), USA
- November 2014: University of Washington, Seattle (WA), USA

Spurzem, Rainer:

- January 2014: Max-Planck Institute for Radio Astronomy, Bonn, Germany
- April 2014: Institute for Interdisciplinary Scientific Computing, University of Heidelberg, Germany
- November 2014: Yunnan Observatories, Chinese Academy of Sciences, Kunming, China

Xu, Renxin:

- May 2014: University of Science and Technology of China, Hefei, China
- July 2014: Shandong University, Weihai, China
- November 2014: (1) Xiamen University, China; (2) University of the Chinese Academy of Sciences, Huairou, China

Wang, Ran:

- November 2014: University of Science and Technology of China, Hefei, China
- December 2014: Tsinghua University Center for Astrophysics, Beijing, China

Wu, Xue-Bing:

- October 2014: Shaanxi University of Science and Technology, Xianyang, China

Zhang, Bing:

- May 2014: (1) Purple Mountain Observatory, Nanjing, China; (2) Huazhong University of Science and Technology, Wuhan, China

Student highlights

Students, both undergraduate and graduate, are among the main assets at research-led universities like Peking University. This chapter highlights their achievements and honors those students who completed their thesis work.

Nanjing University graduate student Song Huang, jointly supervised by Luis Ho, received

his PhD degree and accepted a postdoctoral position at the Kavli Institute for the Physics and Mathematics of the Universe in Tokyo, Japan.

Li, Shuo, MSc thesis, The M82 star cluster population revisited; defended successfully on 15 May 2014. Supervisor: de Grijs, Richard

Associated peer-reviewed article:

- Li S., de Grijs R., Anders P., Li C., 2015, Star cluster disruption in the starburst galaxy Messier 82, ApJS, in press (arXiv:1411.2704)

Li, Chunyu, PhD thesis, Study on the Gravitational Lensing of Transient Sources; defended successfully on 4 June 2014. Supervisor: Li, Li-Xin

Associated peer-reviewed articles in 2014:

- Li C.-Y., Li L.-X., 2014, Constraining fast radio burst progenitors with gravitational lensing, Science China Physics, Mechanics & Astronomy, 57, 1390
- Li C.-Y., Li L.-X., 2014, Search for strong gravitational lensing effect in the current GRB data of BATSE, Science China Physics, Mechanics & Astronomy, 57, 1592

Li, Chengyuan:

- wrote an article that was accepted for publication in Nature: Li C., de Grijs R., Deng L., 2014, The exclusion of a significant range of ages in a massive star cluster, Nature, 516, 367
- Second Prize, Zhong Shengbiao Academic Forum (School of Physics, Peking University)
- Awarded an "Excellent article" award at 16th CAST (China Association of Science and Technology) annual conference for PhD candidates

Ren, Juanjuan, PhD thesis, Search for white dwarf - main sequence binaries from LAMOST Galactic survey data; defended successfully on 30 May 2014. Co-supervisor: Rebassa-Mansergas, Alberto

- Ren Juanjuan is currently employed as postdoctoral researcher associated with the Peking University Department of Astronomy in the group of Liu Xiaowei.

Zhang, Chengpeng:

- Second Lin Qiao Scholar Prize

Zhang, Tianwei:

- Best New Astronomer Prize (最佳新人奖)

- Second Lin Qiao Scholar Prize

Zuo, Wenwen, PhD thesis, Probing Quasar Central Engine with Optical Variability and Near-IR Spectroscopy; defended successfully on 24 May 2014. Supervisor: Wu, Xue-Bing

Associated peer-reviewed article in 2014:

- Zuo W.-W., Wu X.-B., Fan X.-H., Green R., Wang R., Bian F., 2014, Black Hole Mass Estimates and Rapid Growth of Supermassive Black Holes in Luminous z~3.5 Quasars, ApJ, in press (arXiv:1412.2438)

Visitors

Sandra Faber, a well-known professor from UC Santa Cruz, gave a KIAA Colloquium

Scientific visitors play an important role in the life cycles of research projects. Peking University astrophysicists have been able to attract numerous high-profile visitors to the campus, as exemplified here.

The Kavli Visiting Scholars program

The Kavli Institute for Astronomy and Astrophysics has initiated the Kavli Visiting Scholars program. The program supports astrophysicists from across the Kavli network to spend a meaningful period of time (2 to 4 weeks) in residence at the KIAA on the campus of Peking University. During the visit, the Kavli Visiting Scholar is expected to give a KIAA-PKU colloquium and encouraged to participate in various formal and informal activities to interact with members and students at the KIAA and the PKU Department of Astronomy. The Kavli Visiting Scholars program is part of an effort to stimulate scientific interactions, broaden the scientific horizons of KIAA members, and potentially foster new collaborations.

As part of the program, Kevin Bundy (Kavli at IPMU, Tokyo) and Sverre Aarseth (Cambridge) visited the KIAA in November and December 2014, respectively. Daniel Fabrycky (Chicago), Tom Abel (Stanford/KIPAC), Hsiao-Wen Chen (Chicago/KICP), Vasily Belokurov (Cambridge), Roberto Maiolino (Cambridge), Mark Vogelsberger (MIT), and Martin Haehnelt (Cambridge) will visit in 2015.

Individual visitors to the Kavli Institute for Astronomy and Astrophysics and the Department of Astronomy at Peking University, 2014.

(Research interests are indicated for those visitors who stayed for longer than one day and for collaborative purposes.)

● 6 January 2014: Yinzhe Ma (University of British Columbia, Vancouver, Canada)

★ Host: Subo Dong

● 6 – 31 January 2014: Andrés Jordán and Susana Eyheramendy (Pontificia Universidad Católica de Chile, Santiago, Chile)

★ Host: Eric Peng

★ Research interests: Jordán: Stellar populations, exoplanets; Eyheramendy: Statistical methodologies, data mining

● 18 February – 18 September 2014: Mingzhi Kong (Hebei Normal University, China)

★ Host: Luis Ho

★ Research interests: Evolution and co-evolution of different types of active galactic nuclei and galaxies

● 26 February – 1 March 2014: Linhua Jiang (Arizona State University, USA)

★ Host: Luis Ho

★ Research interests: High-redshift Universe, QSOs, galaxy formation

● 1 March – 1 June 2014: Qi Shu (Zhejiang University, China)

★ Host: Marcel Zemp

● 4 – 6 March 2014: Kyoungsoo Lee (Purdue University, USA)

★ Host: Luis Ho

★ Research interests: Galaxy formation and evolution, observational cosmology

● 5 – 7 March 2014: Gonzalo J. Aniano Porcile (Institut d'Astrophysique Spatiale, Orsay, France)

★ Host: Thijs Kouwenhoven

★ Research interests: Theoretical astrophysics, interstellar medium

● 8 March – 1 May 2014: Rhorom Priyatikanto (Bandung Institute of Technology, Indonesia)

★ Host: Thijs Kouwenhoven

★ Research interests: Dynamical evolution of star clusters

● 13 March 2014: Wei Cui (Purdue University, USA)

★ Host: Luis Ho

★ Research interests: Physical processes in black hole systems, instrumentation

● 16 March 2014: Taotao Fang (Xiamen University, China)

★ Host: Luis Ho

● 23 March – 6 April 2014: Josh Winn (Massachusetts Institute of Technology/Kavli Institute for Astrophysics and Space Research, Boston MA, USA)

★ Host: Subo Dong

★ Research interests: Stars, exoplanets, optical observations

● 25 March 2014: Sandra Faber and David Koo (University of California, Santa Cruz, USA)

★ Host: Luis Ho

★ Research interests: Faber: Formation and evolution of galaxies; Koo: Galaxy evolution, adaptive optics

● 3 April 2014: Jilin Zhou (Nanjing University, China)

★ Host: Subo Dong

● 6 – 26 April 2014: Dimitris Stamatellos (Jeremiah Horrocks Institute, University of Central Lancashire, UK)

★ Host: Thijs Kouwenhoven

★ Research interests: Star formation, exoplanets, brown dwarfs, low-mass stars, protoplanetary disks, binary stars, gravitational instabilities, computational hydrodynamics and radiative transfer

● 7 – 25 April 2014: Xian Chen (Max-Planck Institute for Gravitational Physics, Germany; Albert Einstein Institute, Germany)

★ Host: Fukun Liu

● 11 – 16 April 2014: Yan-Fei Jiang (Harvard – Smithsonian Astrophysical Observatory, Cambridge MA, USA)

★ Host: Luis Ho

★ Research interests: Radiation transfer, numerical simulations

● 17 – 18 April 2014: Miyoung Chun and Henry Yang (The Kavli Foundation, USA)

★ Host: Luis Ho

● 21 – 27 April 2014: Steven Rieder (University of Groningen, Netherlands)

★ Host: Richard de Grijs

★ Research interests: Star clusters, dark matter, N-body simulations

● 25 April 2014: Annapurni Subramaniam (Indian Institute of Astrophysics, Bangalore, India)

★ Host: Richard de Grijs

● 26 April – 12 May 2014: Andrew Gould (Ohio State University, Columbus OH, USA)

★ Host: Subo Dong

★ Research interests: Gravitational lensing, dark matter, exoplanets

● 28 April and 8 – 9 May 2014: Hagai Netzer (Tel Aviv University, Israel)

★ Host: Luis Ho

★ Research interests: Active and starburst galaxies, accretion disks, black holes, ionized plasma

● 1 – 2 May and 8 – 17 December 2014: Minjin Kim (Korea

Astronomy and Space Science Institute, Republic of Korea)

★ Host: Luis Ho

★ Research interests: Co-evolution of galaxies and black holes

● 5 May – 8 August 2014: Ruxandra Cojocaru (Universitat Politecnica de Catalunya, Barcelona, Spain)

★ Host: Alberto Rebassa Mansergas

★ Research interests: White dwarfs, Milky Way stellar populations

● 9 May 2014: Reinaldo Santos-Lima (University of Sao Paulo, Brazil)

★ Host: Huirong Yan

● 10 May 2014: Meng Su (Massachusetts Institute of Technology, Cambridge MA, USA)

★ Host: Luis Ho

● 12 May 2014: Gerhard Boerner (Max Planck Institute for Astrophysics, Garching, Germany)

★ Host: Luis Ho

● 15 May 2014: Jun Zhang (张骏; Shanghai Jiaotong University, China)

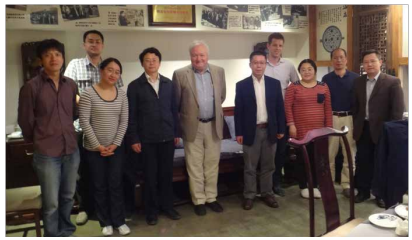
★ Host: Subo Dong

★ Research interests: Cosmology, cosmic shear, weak lensing

● 16 May 2014: Rashid Sunyaev (Max Planck Institute for Astrophysics, Garching, Germany)

★ Host: Luis Ho

★ Research interests: Cosmology, galaxy clusters, theory of accretion, X-ray astronomy



● 16 – 27 May 2014: Zhaohuan Zhu (朱照寰; Princeton University, USA)

★ Host: Subo Dong

★ Research interests: Planet and star formation

● 26 – 28 May 2014: Sijing Shen (University of California, Santa Cruz, USA)

★ Host: Luis Ho

★ Research interests: Galaxy formation and evolution, hydrodynamical simulations, interstellar and intergalactic medium, gas flows

● 20 June 2014: Cheung Sze-Leung (National Astronomical Observatory of Japan, Japan)

★ Host: Richard de Grijs

● 26 June 2014: Li Ji (Purple Mountain Observatory, Nanjing, China)

★ Host: Richard de Grijs

● 18 – 28 July 2014: Ariane Lançon (Observatoire de Strasbourg, France)

★ Host: Eric Peng

★ Research interests: Stellar populations, spectra of cool stars, infrared spectroscopy

● 25 July 2014: Richard F. Green (National Optical Astronomical Observatories, USA)

★ Host: Luis Ho

● 4 August – 28 September 2014: Hannah Zohren (University of

Bonn, Germany)

★ Host: Richard de Grijs

★ Research interests: Starburst ring clusters

● 15 August 2014: Daniel Huber (NASA Ames Research Center/SETI Institute, USA)

★ Host: Subo Dong

● 18 August – 1 September 2014: Marek Abramowicz and P. Maciej Wielgus (Gothenburg University, Sweden; Nicolaus Copernicus Astronomical Center, Poland)

★ Host: Fukun Liu

● 19 August 2014: Puragra Guhathakurta (UCO/Lick Observatory, USA)

★ Hosts: Luis Ho and Eric Peng

● 20 August 2014: Paul Ho (ASIAA, Taiwan)

★ Host: Luis Ho

● 22 August 2014: Elizabeth Tasker (Hokkaido University, Japan)

★ Host: Marcel Zemp

● 22 August 2014: Smitha Subramanian (Indian Institute of Astrophysics, Bangalore, India)

★ Host: Richard de Grijs

★ Research interests: Stellar populations in the Magellanic Clouds

● 9 – 10 September 2014: Katrien Kolenberg (Harvard – Smithsonian Center for Astrophysics, Cambridge MA, USA; Leuven University, Belgium)

★ Hosts: Richard de Grijs and Thijs Kouwenhoven

★ Research interests: Asteroseismology, RR Lyrae stars

● 14 September 2014 – 5 January 2015: Bihai Hong (Lishui University, Zhejiang, China)

★ Host: Renxin Xu

★ Research interests: Pulsars: radiation and inner structure

● 17 September 2014: Renbin Yan (University of Kentucky, USA)

★ Host: Luis Ho

● 28 September – 13 October 2014: Bi-Qing For (University of Western Australia, Perth, Australia)

★ Host: Richard de Grijs

★ Research interests: Gas in galaxies, high-velocity clouds

● 1 October 2014 – 31 March 2015: Chaoli Zhang (Leiden University, Netherlands)

★ Host: Richard de Grijs

★ Research interests: Stellar initial mass function, 47 Tucanae

● 13 October 2014: Michael Kramer (Max-Planck-Institut für Radioastronomie, Bonn, Germany) and Yu Gao (Purple Mountain Observatory, Nanjing, China)

★ Host: Luis Ho

● 15 – 18 October 2014: Yen-Ting Lin (ASIAA, Taiwan)

★ Host: Luis Ho

★ Research interests: Large-scale structure, galaxy formation and evolution, physics of galaxy clusters, cosmology from clusters, wide-field galaxy surveys

● 16 October 2014: Chris Smith (Cerro Tololo Inter-American Observatory, Chile)

★ Host: Luis Ho

● 3 November – 6 December 2014: Sverre Aarseth (University of Cambridge, UK); Kavli Scholar

★ Hosts: Thijs Kouwenhoven and Rainer Spurzem

★ Research interests: Direct N-body simulations, stellar dynamics

● 8 – 16 November 2014: Hui Li (Los Alamos National Laboratory, USA)

★ Host: Luis Ho

★ Research interests: Plasma astrophysics

● 12 November 2014: Jo Bovy (Institute for Advanced Study, Princeton NJ, USA)

★ Host: Subo Dong

● 15 November 2014: Lei Hao (Shanghai Astronomical Observatory, China)

★ Host: Luis Ho

● 15 – 19 November 2014: Kevin Bundy (Kavli IPMU, Tokyo, Japan); Kavli Scholar

★ Hosts: Luis Ho and Eric Peng

★ Research interests: Galaxy evolution, surveys

● 15 – 20 November 2014: Leonid Ossipkov (St. Petersburg State University, Russia)

★ Host: Rainer Spurzem

★ Research interests: Statistical mechanics and stellar dynamics, analytic models of galaxies, star clusters in tidal fields

● 20 – 21 November 2014: Gary Fuller (Jodrell Bank Observatory, University of Manchester, UK)

★ Host: Yuefang Wu

★ Research interests: Star formation, millimeter and submillimeter astrophysics, molecular astrophysics and astrochemistry

● 21 November 2014: Jiang-Tao Li (University of Michigan, USA)

★ Hosts: Subo Dong and Luis Ho

● 27 November 2014: Yu (Sophia) Dai (California Institute of Technology, USA)

★ Hosts: Yuefang Wu and Luis Ho

● 30 November – 5 December 2014: Ahmad Hujeirat (Interdisciplinary Center for Scientific Computing, IWR, University of Heidelberg, Germany)

★ Host: Rainer Spurzem

★ Research interests: Development of algorithms and frameworks for relativistic magnetohydrodynamic flows, galactic nuclei

● 1 – 20 December 2014: Munkhjargal Chimeddeleg (National University of Mongolia, Mongolia)

★ Host: Richard de Grijs

★ Research interests: Intermediate-age populous star clusters

● 1 – 20 December 2014: Amartuvshin Davgasumberel (National University of Mongolia, Mongolia)

★ Host: Thijs Kouwenhoven

★ Research interests: Star cluster simulations

● 3–13 December 2014: Jose Prieto (Universidad Diego Portales, Chile)

★ Host: Subo Dong

★ Research interests: Supernovae and their progenitor stars, transient and variability surveys, massive stars

● 4–5 December 2014: Cheng Li (Shanghai Astronomical Observatory, China)

★ Host: Zhou Li

★ Research interests: Galaxy evolution, Sloan Digital Sky Survey (SDSS) IV

● 5–20 December 2014: Alex Lazarian (University of Wisconsin, Madison WI, USA)

★ Host: Huirong Yan

★ Research interests: MHD theory: reconnection, dynamo theory; interstellar dust: alignment, microwave emission; interstellar turbulence: statistical studies; circumstellar regions and comets: polarization; molecular clouds: dynamics

● 8–17 December 2014: Taehyun Kim (National Radio Astronomy Observatory, USA)

★ Host: Luis Ho

★ Research interests: Formation and evolution of barred galaxies

● 11–19 December 2014: Munan Gong (Princeton University, Princeton NJ, USA)

★ Host: Eric Peng

★ Research interests: Star formation, simulations

● 14–16 December 2014: Patrick Osmer (Ohio State University, Columbus OH, USA)

★ Host: Luis Ho

★ Research interests: Quasars and host galaxies

● 15–19 December 2014: Yingjie Peng (Kavli Institute for Cosmology Cambridge, University of Cambridge, UK)

★ Host: Qingjuan Yu

● 18 December 2014: Q. Daniel Wang (University of Massachusetts, Amherst MA, USA)

★ Host: Luis Ho

● 22 December 2014: Timothy Waters (University of Nevada, Las Vegas NV, USA)

★ Host: Luis Ho

● 29 December 2014–2 January 2015: Wei Hao (Max-Planck Institute for Astrophysics, Garching, Germany)

★ Hosts: Thijs Kouwenhoven and Rainer Spurzem

★ Research interests: Numerical simulations

Wider engagement

The Astronomy Summer Camp aims to familiarize middle-school students with astronomy in general and with the research fields pursued at Peking University in particular. Another important aim is to select excellent students

Peking University astronomy summer camp

to join us, trying to cultivate their interests in exploring the Universe and trigger their enthusiasm to study astronomy and astrophysics. This activity is mainly targeted at high-school sophomores in China. Since 2008, we have successfully held six summer camps in collaboration with the National Astronomical Observatories of the Chinese Academy of Sciences (NAOC), Beijing Planetarium, and Beijing Normal University. Increasing numbers of applications are received every year. Thus, the summer camp is an important channel for PKU Astronomy to attract excellent students.

In 2014, 137 of the 381 applicants from all over the country

were selected to attend the summer camp, which was held from 15 to 18 July. Most activities were held at the KIAA. Through subject navigation, lectures, mutual activities, a visit to Xinglong Observatory, and examination, and interviews, 63 students were selected as outstanding students; they will have more opportunities to be enrolled at PKU the study astronomy. The summer camp provides an opportunity for our students to become familiar with astronomy as a science, and it offers a good platform for them to understand the Universe and to communicate with each other.

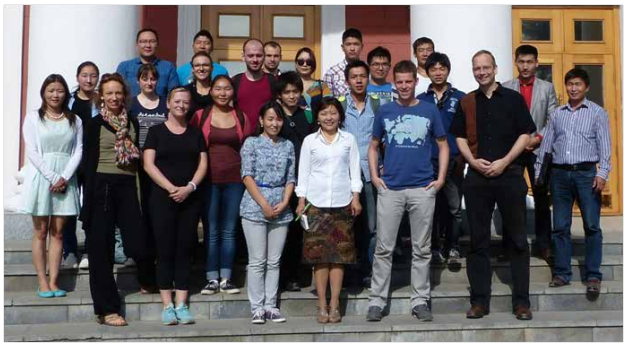
de Grijs, Richard:

● 13 May 2014: Royal Asiatic Society – Beijing Values discussion series on Science and Truth; invited panelist, alongside Rao Yi (Professor of Neurosciences, Peking University) and Zhang Shoucheng (Professor of Physics, Stanford University); moderated by John Pomfret, journalist.

● 29 – 31 August 2014: International summer school on Binary systems, their evolution and environments, National University of Mongolia, Ulaanbaatar, Mongolia; lecturer

Although Mongolian astronomy dates back thousands of years, the country has only been an interim member of the International Astronomical Union (IAU) since 2006. Astronomy is currently taught at National University of Mongolia's School of Physics and Electronics, and at the NUM–ITC–UNESCO Space Science and Remote Sensing International Laboratory in Ulaanbaatar, while research in astrophysics is carried out at the Research Center for Astronomy and Geophysics at the Mongolian Academy of Science. The small community of Mongolian astronomers is keen to develop their research abilities and exposure to attain an internationally competitive level. The East Asian Regional Office of Astronomy for Development strongly supports the Mongolian astronomical community in their efforts. As such, we organized a summer school at the National University of Mongolia, aimed at training young scientists.

● 13 September 2014: Connecting Man and



Heavens, a Brief History of Astronomy in China and the West; public Question & Answer session between de Grijs, Richard and Sun, Xiaochun (Professor of the History of Astronomy, Institute for the History of the Natural Sciences, Chinese Academy of Sciences); Beijing Planetarium

● 23 – 27 November 2014: Winter school on Observational Astronomy, Xinglong Observatory (Chinese Academy of Sciences); lecturer (3 hours)

● 26 December 2014: Workshop on Writing academic articles and the peer–review process, National Astronomical Observatories, Chinese Aacademy of Sciences; lecturer (3 hours)

Flores Fajardo, Nahiely:

● 6 November 2014: EURAXESS Science Slam, finalist

● 29 November 2014: Night of the Stars; International astronomy outreach event at Beijing Planetarium in Spanish and Chinese, organized by Flores Fajardo, Nahiely, contributions by Rebassa-Mansergas, Alberto and Zhang, Chaoli. Reached 7500 visitors.

Coordinated by KIAA faculty member Richard de Grijs and in association with the Migrant Children's Foundation, Peking University undergraduate and graduate students reach out to children in migrant communities on a monthly basis, offering one-day hands-on physics classes. (for a recent blog post, see http://www.mcfchina.org/blog/fun-science-pku-physics)

Thijs Kouwenhoven and Richard de Grijs alternate monthly to contribute feature articles to The Amateur Astronomer. Features published in 2014:

- January: The bulge of the Milky Way (de Grijs, Richard)
- February: What is the ultimate fate of the Universe? (Kouwenhoven, M.B.N.)
- March: Gaia commissioning (de Grijs, Richard)
- April: Airborne Astronomy (Kouwenhoven, M.B.N.)
- May: The mirrors and structure of the James Webb Space Telescope (de Grijs, Richard)
- June: Binary stars in modern astrophysics (Kouwenhoven, M.B.N.)
- July: Background to the BICEP2 results and the ensuing controversy (de Grijs, Richard)
- August: The origin of our Moon (Kouwenhoven, M.B.N.)
- September: Development of the Thirty Meter Telescope: opportunities for China (de Grijs, Richard)
- October: Finding features of extraterrestrial life using planetshine (Kouwenhoven, M.B.N.)
- November: Pulsars in X-rays and gamma rays (de Grijs, Richard)
- December: Water ice on Mercury (Kouwenhoven, M.B.N.)

Herczeg, Gregory:

- 19 – 22 May 2014: ESO-OPC Observing Panels Committee member
- 15 September 2014: TAP Key Program panel member
- 24 September 2014: Co-promotor for PhD student Agata Karska, MPE/Leiden Observatory
- 24 October 2014: TAP Time Allocation Committee co-chair

Ho, Luis:

- June/July 2014: University of Science and Technology of China Summer School of the Formation and Co-evolution of Galaxies and Supermassive Black Holes, Hefei; lecturer
- September 2014: Attended the award ceremony for the Kavli Prize in Oslo, Norway.
- October 2014: Attended the ground-breaking ceremony for the Thirty Meter Telescope on the Big Island in Hawaii.

Kouwenhoven, M.B.N. (Thijs):

- 29 – 31 August 2014: International summer school on Binary systems, their evolution and environments, National University of Mongolia, Ulaanbaatar, Mongolia; lecturer, organizer

Yuan, Haibo:

- 23 – 27 November 2014: Winter school on Observational Astronomy, Xinglong Observatory (Chinese Academy of Sciences); instructor, project leader

Zhang, Bing:

- 21 May 2014: Gamma-ray bursts, 2014 Nuclear Astrophysics Summer School, Shanghai Jiao Tong University, Shanghai, China; invited lecture

The PKU astronomy family

● Chen, Jiansheng, (陈 建 生): coordinator, professor, joint appointment with the PKU Department of Astronomy

★ Research interests: Wide-field astronomy, quasar surveys, large-scale structure of the Universe, galaxy formation and evolution

● de Grijs, Richard (何 锐 思): professor

★ Research interests: Star cluster formation, evolution, destruction, composition, and internal dynamics; distance scale

● Dong, Subo, (东 苏 勃): youth Qianren research professor

★ Research interests: Extrasolar planets, gravitational microlensing, dynamics, Type Ia supernovae, time-domain astronomy

● Fan, Xiaohui (樊晓晖): visiting chair professor (Qianren B)

★ Research interests: First light and reionization, surveys of high-redshift galaxies and quasars, supermassive black holes, intergalactic medium

● Herczeg, Gregory J. (沈雷歌): youth Qianren research professor

★ Research interests: Accretion onto young stars, disk dissipation mechanisms and disk structure, observational diagnostics of wind-launching mechanisms, pre-main sequence stellar evolution, chromospheric and coronal activity around dwarf stars

● Ho, Luis C. (何子山): director, university chair professor

★ Research interests: Processes in galactic nuclei, accretion disks and jets, massive black holes, origin of the Hubble sequence, extragalactic star formation, star clusters, interstellar medium

● Jiang, Linhua (江 林 华): Research fellow (研 究 员 ; from September 2014)

★ Research interests: Extragalactic astronomy and cosmology, high-redshift quasars/active galactic nuclei and supermassive black holes, high-redshift galaxies, cosmic reionization

● Kouwenhoven, M.B.N. (Thijs; 柯文采): Bairen research professor

★ Research interests: Formation and evolution of binary and multiple stellar systems, dynamics of planetary systems, star formation, N-body simulations, the initial mass function

● Lee, Kejia (李 柯 伽): youth Qianren research professor

★ Research interests: Pulsars, gravitational waves

● Li, Li-Xin (李立新): professor

★ Research interests: Black hole physics, accretion disks, X-ray binaries and quasi-periodic oscillations, gamma-ray bursts and supernovae, active galactic nuclei and jets, cosmology, gravitational lensing, dark matter and dark energy, brane world and extra dimensions

● Shen, Yue (沈 悦): youth Qianren research professor (from September 2014)

★ Research interests: Quasars and supermassive black holes (SMBHs), galaxy formation and evolution, binary SMBHs, time-domain science

● Wang, Ran (王 然): Bairen research professor

★ Research interests: Formation and co-evolution of supermassive black holes and their host galaxies in the early Universe

● Wu, Xue-Bing (吴 学 兵): professor, associate director

★ Research interests: Quasars and active galactic nuclei, supermassive black holes, accretion physics, X-ray binaries

● Yan, Huirong (闫慧荣): Bairen research professor

★ Research interests: Cosmic ray physics, interstellar medium theories, astrophysical magnetic fields, turbulence, dust dynamics, supernovae, clusters of galaxies, gamma-ray bursts, accretion disks

● Yu, Qingjuan (于 清 娟): professor

★ Research interests: Black hole physics, planetary and stellar dynamics, galaxy formation and evolution, galactic nuclei, and cosmology

● Zemp, Marcel: Bairen research professor (until August 2014)

★ Research interests: Cosmological structure formation, dark matter, dark energy, N-body techniques, dynamics, and black holes

Joint KIAA/Department of Astronomy (DoA) Faculty

● Fan, Zuhui (范 祖 辉): professor, associate director of the DoA

★ Research interests: Cosmology, gravitational lensing, clusters of galaxies, galactic dynamics

● Li, Zhuo (黎 卓): Bairen research professor

★ Research interests: Gamma-ray bursts and supernovae, high-energy cosmic rays and neutrinos, relativistic collisionless shocks

● Liu, Fukun (刘 富 坤): professor, director of the DoA

★ Research interests: Supermassive black hole binaries, accretion disks and active galactic nuclei

● Liu, Xiao-Wei (刘 晓 为): professor

★ Research interests: Wide-field astronomy, spectroscopy, Galactic archeology and near-field cosmology, interstellar medium, atomic and molecular processes, radiation mechanisms

● Peng, Eric W. (彭 逸 西): associate professor

★ Research interests: Galaxy formation and evolution, stellar populations, galaxy dynamics, globular cluster systems

● Xu, Renxin (徐 仁 新): professor

★ Research interests: Particle astrophysics, pulsars, quark stars, neutron stars

● Zhang, Bing (张 冰): Cheung Kong visiting chair professor

★ Research interests: High-energy astrophysics, gamma-ray bursts and relativistic jets, black holes, neutron stars, multi-messenger astrophysics

● Zhang, Hua-Wei (张 华 伟): associate professor

★ Research interests: Stellar abundances, Galactic structure

Joint KIAA/NAOC Faculty

● Spurzem, Rainer: professor

★ Research interests: Modeling dense stellar systems, galactic nuclei with black holes, relativistic dynamics, N-body simulations, parallel many-core and accelerated computing

Postdoctoral Researchers

● Alamo-Martínez, Karla: CAS-CONICYT China-Chile Fellow (from July 2014)

★ Research interests: Galaxy evolution, globular cluster systems, galaxy clusters, fossil groups

● Chen, Bingqiu (陈丙秋): DoA Postdoc

★ Research interests: Three-dimensional extinction maps; dust, interstellar medium, structure of the Milky Way; pulsating stars; photometric/spectroscopic surveys

● Dong, Xiaoyi (董晓怡): DoA Postdoc

★ Research interests: Active galactic nuclei, galactic star formation, supermassive black holes

● Flores Fajardo, Nahiely: DoA Postdoc

★ Research interests: Interstellar medium; photoionization models and spectroscopy observations; diffuse ionized gas in galaxies and its ionization sources; protoplanetary disks (proplyds) in the Orion Nebula, ionization by θ1C and θ2A stars; chemical abundances in photoionized nebulae

● Jose, Jessy: KIAA Postdoc (from October 2014)

★ Research interests: Galactic HII regions, embedded star clusters, triggered star formation, young stellar objects

● Lim, Sungsoon: DoA Postdoc (from October 2014)

★ Research interests: Galaxy formation and evolution, starburst galaxies, star clusters, globular cluster systems, ultracompact dwarf galaxies

● Meiron, Yohai (林友海): KIAA Fellow

★ Research interests: Stellar dynamics

● Okamoto, Sakurako (冈本樱子): KIAA Fellow (until March 2014)

★ Research interests: Dwarf galaxies in the Local Group

● Rebassa Mansergas, Alberto: LAMOST Fellow

★ Research interests: Formation and evolution of compact binaries;

physical properties of white dwarfs and low-mass main-sequence stars; supernovae Type Ia progenitors; protoplanetary disk evolution; surveys and data mining

● Ren, Juanjuan (任娟娟): DoA Postdoc (from July 2014)

★ Research interests: Binary stars, astronomical data mining, the Milky Way, spectroscopic surveys

● Shin, Jihye: KIAA Fellow (from April 2014)

★ Research interests: Cosmological origin of globular clusters, dynamical evolution of globular cluster systems

● Uhm, Z. Lucas (严整辉): KIAA Postdoc

★ Research interests: Gamma-ray bursts, hydrodynamics, radiation processes, relativistic shock waves

● Yu, Hao-Ran (于浩然): KIAA-CITA Joint Postdoctoral Fellow (from July 2014)

★ Research interests: Cosmology, large-scale structure, weak gravitational lensing, N-body simulations, supercomputing

● Yuan, Haibo (苑 海 波): LAMOST fellow, KIAA Fellow

★ Research interests: Wide-field photometric and spectroscopic surveys, data mining, Galactic archaeology, near-field cosmology (e.g., M31), astrophysics of emission-line nebulae, photoionization modeling

● Zhang, Fupeng (张 福 鹏): KIAA Postdoc

★ Research interests: Stellar dynamics around massive black holes, general relativity, active galactic nuclei

● Zhang, Hongxin (张 红 欣): CAS - CONICYT China - Chile Fellow

★ Research interests: Star formation in galaxies, dwarf galaxies, globular cluster systems, ultracompact dwarf galaxies

● Li, Zhaosheng (李兆升): DoA Postdoc,

★ Research Interests: Neutron Star and Strange Star, Low-mass X-ray binary

Graduate students (December 2014)

● Cao, Rong; 曹荣 (class of 2013)
★ PhD supervisor: Liu, Fukun

● Chen, Xiaodian; 陈孝钿 (class of 2011)
★ PhD supervisors: Richard de Grijs, Licai Deng (NAOC)

● Chen, Yunfeng; 陈云峰 (class of 2012)
★ PhD supervisor: Yu, Qingjuan

● Dai, Shi; 代实 (class of 2010)
★ PhD supervisor: Xu, Renxin

● Gao, Hua; 高桦 (class of 2013)
★ PhD supervisor: Luis Ho

● Guo, Yanjun, 郭彦君 (class of 2014)

● Guo, Zhen; 郭震 (class of 2012)
★ PhD supervisor: Gregory Herczeg

● Huang, Yang; 黄样 (class of 2011)
★ PhD supervisor: Liu, Xiaowei

● Li, Biao; 李彪 (class of 2010)
★ PhD supervisor: Eric Peng

● Li, Chengyuan; 李程远 (class of 2010)
★ PhD supervisors: Richard de Grijs, Licai Deng (NAOC)

● Li, Qiong; 李琼 (class of 2014)

● Li, Yun; 李云 (class of 2009)
★ PhD supervisor: Thijs Kouwenhoven

● Liu, Beibei; 刘倍贝 (class of 2010)
★ PhD supervisor: Douglas Lin

● Liu, Dezi; 刘德子 (class of 2012)
★ PhD supervisor: Fan, Zuhui

● Liu, Xiangkun; 刘项琨 (class of 2010)
★ PhD supervisor: Fan, Zuhui

● Liu, Yiqing; 刘逸清 (class of 2011)
★ PhD supervisor: Eric Peng

● Long, Feng; 龙凤 (class of 2013)
★ PhD supervisor: Gregory

Herczeg

● Lu, Jiguang; 卢吉光 (class of 2012)
★ PhD supervisor: Xu, Renxin

● Luo, Rui; 罗睿 (class of 2013)
★ PhD supervisor: Lee, Kejia

● Ma, Chao; 马超 (class of 2013)
★ MSc supervisor: Richard de Grijs

● Men, Yunmeng; 门云鹏 (class of 2014)

● Molloy, Matthew; 马强 (class of 2011)
★ PhD supervisor: Gregory Herczeg

● Shangguan, Jinyi; 上官晋沂 (class of 2012)

★ PhD supervisor: Liu, Fukun

● Shao, Yali; 邵 亚 莉 (class of 2013)

★ PhD supervisor: Wang, Ran

● Shu, Qi; 舒琦 (class of 2014)

● Sun, Hui; 孙惠 (class of 2012)

★ PhD supervisor: Zhang, Bing

● Sun, Ningchen; 孙宁晨 (class of 2013)

★ PhD supervisor: Liu, Xiaowei

● Wang, Bin; 汪斌 (class of 2009)

★ PhD supervisor: Li, Zhuo

● Wang, Chun; 王 春 (class of 2013)

★ PhD supervisor: Liu, Xiaowei

● Wang, Feige; 王飞格 (class of 2012)

★ PhD supervisor: Wu, Xue-Bing

● Wang, Jianfeng; 王健锋 (class of 2014)

● Wang, Long; 王 龙 (class of 2011)

★ PhD supervisors: Thijs Kouwenhoven, Rainer Spurzem

● Wang, Shu; 王澍 (class of 2014)

● Wu, Jin; 吴晋 (class of 2014)

● Wu, Junfei; 吴 骏 飞 (class of 2013)

★ PhD supervisor: Eric Peng

● Xia, Moran; 夏 默 然 (class of 2011)

★ PhD supervisor: Yu, Qingjuan

● Xiang, Maosheng; 向茂盛 (class of 2010)

★ PhD supervisor: Liu, Xiaowei

● Xie, Xiaojia; 解 小 佳 (class of 2014)

● Xu, Siyao; 徐 思 瑶 (class of 2011)

★ PhD supervisor: Yan, Huirong

● Yang, Jinyi; 杨 锦 怡 (class of 2011)

★ PhD supervisor: Wu, Xue-Bing

● Yang, Qian; 杨倩 (class of 2012)

★ PhD supervisor: Wu, Xue-Bing

● Yuan, Shuo; 袁 硕 (class of 2013)

★ PhD supervisor: Fan, Zuhui

● Yu, Siyue; 余 思 悦 (class of 2014)

● Zhang, Bing; 张 兵 (class of 2013)

★ PhD supervisor: Li, Zhuo

● Zhang, Chengpeng; 张 程 鹏 (class of 2014)

● Zhang, Congyao; 张从尧 (class of 2010)

★ PhD supervisor: Yu, Qingjuan

● Zhao, Yulin; 赵 玉 琳 (class of 2013)

★ PhD supervisor: Luis Ho

● Zheng, Xiaochen; 郑晓晨 (class of 2010)

★ PhD supervisor: Thijs Kouwenhoven

● Zhou, Enping; 周恩平 (class of 2012)

★ PhD supervisor: Xu, Renxin

● Zhou, Zhiqin; 周 智 勤 (class of 2014)