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COVER PAGE

Bubbles composed of seven images (from the upper right to the lower left):

1. On July 13, 2015, Dr. Li Xinjun, Secretary-General and CEO of the Asia-Pacific Space Cooperation Organization (APSCO) and Prof. Maurizio Falanga, Executive Director of the ISSI-BJ signing a Memorandum of Understanding.
 2. Image of Crab Nebula is the remnant of a massive star that ended its life in a supernova explosion. The supernova explosion was recorded in the constellation of Taurus by Chinese astronomers in the year 1054 AD. (NASA/JHubble Space Telescope)
 3. On July 6, 2015, Prof. Claude Nicollier, the first and only Swiss astronaut, gave a talk on the servicing aspects of the Hubble Space Telescope, and the scientific accomplishments it made possible within the Understanding Science seminars.
 4. On April 16, 2015, Prof. Ji Wu gave a public talk on the past and upcoming achievements of China's Space Science at Bridge Cafe in Beijing within the Understanding Science seminars.
 5. Artistic image of a Gamma-Ray Burst (Gemini Observatory/AURA, artwork by Lynette Cook.)
 6. Artistic Image of Earth and Sun, a moment of brilliant sunlight glints earth snapped by telescope.
 7. The Dark Matter Particle Explorer (DAMPE) Satellite, launched on December 17, 2015, is one of the first four scientific satellites employed in Chinese Academy of Sciences (CAS) space program.
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MESSAGE FROM THE CHAIRMAN OF THE BOARD OF TRUSTEES



The second business year ended in December 2015, which was another year of stunning success. I am glad to see how ISSI-BJ is growing and able to attract visitors from around the world. ISSI-BJ has become a platform of exchange of scientific and technological ideas in the field of space research.

In 2015 after two years of agreement between ISSI and NSSC, it was subject to be renewed. Therefore, the BoT requested to “peer-review” the performance of the Institute in fulfilling its mandate by an ad-hoc reviewers committee, composed by internationally renowned scientists. The international visiting assessment reports gave ISSI-BJ a good credit and concluded that ISSI-BJ had an impressive start and had been gaining excellent reputations from the international science communities. Based on the evaluation, NSSC and ISSI agreed to continue their cooperation on ISSI-BJ. The Board of Trustees of ISSI-BJ and ISSI approved the assessment report, therefore, on October 23, 2015, Professor Rosine Lallement, representative and vice chair of the Board of Trustees of International Space Science Institute in Bern, and I signed a new agreement, which confirmed the cooperation of two sides on continuation of ISSI-BJ for at least three more years.

Speaking of continuity, the Directorate, under the leadership of Maurizio Falanga, has prepared the new three-year strategic and implementation plan 2015-2018, approved by the board in April 10, 2015. ISSI-BJ will pay much attention in building up its science program with a bottom-up approach, and at the same time maximize scientific achievement from Chinese or Asian science missions. It is critical to involve new international partners with additional in-kind and financial supports, since ISSI-BJ serves as an open platform encouraging and fostering international cooperation.

The success so far can be assessed also on the outcomes from scientific activities. I am glad to see that so many scientific papers have been published with acknowledgement to ISSI-BJ from the 11 active international teams. ISSI-BJ magazines Taikong have been published as an outcome of the forums, through which the eight missions of Strategic Priority Program (SPP) on Space Science in the intensive study phase have been studied. The valuable insight and advice were highly appreciated and helpful for further development of these missions.

I see a bright future for ISSI-BJ with the fast growing Chinese space science communities. The dark matter explorer mission “Wukong” and the first Chinese microgravity and life sciences mission “SJ-10” was successively lifted off in 2015 and 2016, and the scientific data has been received and analyzed successfully so far. The data is promising breaking news, China’s space science has entered into its most exciting era. ISSI-BJ is recognized to become more and more significant as the bridge of space scientists with different nationalities. Science is freely discussed here for a deeper understanding of future space missions as well as of the scientific results from current and past missions.

My heartfelt thanks goes to all employees of ISSI-BJ for their excellent work, especially the Executive Director, Professor Maurizio Falanga, for his devotion to ISSI-BJ so long. I would also like to extend my thanks to ISSI and the Science Committee for their contribution to our science program. Thank all financial supporters of ISSI-BJ, whose kind offers are greatly appreciated. For the further development of ISSI-BJ, more financial resources are necessary and expected. Therefore, welcome all potential sponsors to join us, and I am expecting to have you in our board in the near future.

A handwritten signature in black ink, appearing to read 'Ji Wu', with a stylized, flowing script.

Ji Wu
Beijing, May 2016

MESSAGE FROM THE EXECUTIVE DIRECTOR

During the 2nd year of ISSI-BJ the institute has been assessed by an external committee very successfully, and it is satisfactory to report here that the committee, and not only, found remarkable that in this very short time, all the main tools (workshops, international teams, forums, outreach) that have worked so well for ISSI Bern are in place and operating greatly in Beijing. What's particularly important in the evaluation process was the perception by the committee of the increasingly important international character and reputation of the Institute.

On the 10th of April 2015, the directorate presented to the BoT a strategic and implementation plan 2015-2018, which was well received, critically discussed, and unanimously approved. The main points to be implemented are; increasing the ISSI-BJ scientific staff, build-up a scientific program based on a bottom-up approach, and the search for new partners to increase also the financial sources (direct or in-kind). Therefore, this year was marked by several major events in these directions.

We appointed on June 2015 a discipline scientist in Astrophysics, Prof. Dr. Richard de Grijs, from the Kavli Institute for Astronomy and Astrophysics, Peking University. Richard de Grijs is familiar with the Chinese space science communities and space programs in his research fields. He actively proposed already in 2015 a workshop on Astronomical Distance Determination in the Space Age, which has been approved and implemented in May 2016. In addition ISSI-BJ agreed with the director of IKI/RAS Prof. Lev Zelenyi, that IKI/RAS provides a young scientist to ISSI-BJ as an in-kind support and to strengthen the cooperation between the two organizations and countries. In this agreement ISSI-BJ increased his scientific staff with a solar physicist, Dr. Ivan V. Zimovets, deputy scientific director of the Russian solar and heliospheric mission – Interhelioprobe. It is worth mentioning how many scientific papers they already published, two of them in Nature, all with ISSI-BJ affiliation. The staff publications are listed in this annual report.

On Jan. 14, 2015, Prof. Saku Tsuneta, Vice President of the JAXA and Director of ISAS, and Prof. Masaki Fujimoto, Director for Dept. Solar System Science and Director for International Strategy and Coordination of ISAS visited ISSI-BJ. Both parties discussed about potential cooperation opportu-

nities for the future, and agreed that ISAS is supporting ISSI-BJ indirectly through ISSI in Bern.

On July 13, 2015, ISSI-BJ and Dr. Li Xinjun, Secretary-General and CEO of the Asia-Pacific Space Cooperation Organization (APSCO)



signed a Memorandum of Understanding (MoU). Through this MoU, APSCO and ISSI-BJ establish cooperation, within the framework of their respective mandates, developing and strengthening the links between scientists of the APSCO Member States and the users' community of ISSI-BJ. They agreed to organize the 1st Space Science School in October 17-26, 2016.

It is an essential step in the life of ISSI-BJ and its continuation to increase its scientific activities. Therefore, I visited on Nov. 23-24, 2015 several institutions in Taiwan, among them the National Space Organization (NSPO), where I had the honor to present ISSI-BJ to the Director General Dr. G. S. Chang. On December 1st ISSI-BJ also visited the National Satellite Oceanic Application Service, which agreed that they will support ISSI-BJ Earth Sciences activities related to their research fields. On Nov. 11, 2015 ISSI-BJ visited also the ESA Earth Sciences HQ and head of the Dragon project, Dr. Yves-Louis Desnos, to discuss possible direction in order to collaborate in the near future.

ISSI-BJ welcomed also this year several high level scientists e.g., Prof. Claude Nicollier, the first and only Swiss astronaut, or Dr. Holger Sierks, the Rosetta/OSIRIS Principal investigator. They all gave an outreach seminar for the younger generation. In conclusion, we are glad to see how the scientific activities are increasing, so, let's keep ISSI-BJ unique and aiming always at the highest level and serving at best all the space scientists interests as an international and informal institute.

A handwritten signature in blue ink that reads "M. Falanga".

Maurizio Falanga

ABOUT ISSI-BJ

The International Space Science Institute Beijing (ISSI-BJ) is a non-profit research institute jointly established by the National Space Science Center (NSSC) and the International Space Science Institute (ISSI) with the support of the International Cooperation Bureau and the Strategic Priority Program on Space Science. from the CAS ISSI-BJ is a close cooperation partner of ISSI in Bern. Both institutes share the same Scientific Program Committee, the same study tools, and other information of mutual relevance and interest. However, both use independent operational methods and different funding sources.

The main mission of ISSI-BJ is to contribute to the achievement of a deeper scientific and technological understanding of future space missions as well as of the scientific results from current and past missions through multidisciplinary research, possibly involving whenever felt appropriate, ground based observations and laboratory experiments. The Program of ISSI-BJ covers a widespread spectrum of space science disciplines, including solar and space physics, planetary science, astrobiology, micro-gravity science and earth observation. It offers a complement to the ISSI program with special emphasis on future scientific opportunities.

History

In October 2011, Professor Ji Wu, the Director General of the National Space Science Center (NSSC), visited the International Space Science Institute (ISSI) and the Executive Director Roger-Maurice Bonnet. They proposed to establish an International Space Science Institute in Beijing (ISSI-BJ) during his visit.

In February 2012, Simon Aegeter, Chairman of ISSI's Board of Trustees and Roger-M. Bonnet, Executive Director of ISSI, visited NSSC for further discussion. Both parties exchanged opinions and signed the Memorandum of Understanding (MoU) which was approved by the ISSI Board of Trustees (BoT) in June 2012. On April 19, 2013, the BoT of ISSI signed the Agreement of Cooperation with NSSC and approved the implementation plan of cooperation between ISSI and ISSI-BJ. It was decided, for the first time in the history of ISSI, to share the name with another institution. This decision was made because it was convinced that NSSC is an extremely trustworthy partner. According to this decision, ISSI and NSSC moved forward on the



Signature of the new Agreement of Cooperation between ISSI and NSSC on October 23, 2015. Left Professor Ji Wu, Director General of NSSC, CAS, and right Rosine Lallement representative and vice chair of the ISSI Board of Trustees.

implementation plan for establishment of ISSI-BJ.

The inauguration ceremony of ISSI-BJ was held at the NSSC in Beijing on July 16, 2013. Professor Rafael Rodrigo, the new Executive Director of the International Space Science Institute, and Professor Wu Ji, Chairman of the BoT of ISSI-BJ and Director General of NSSC, jointly inaugurated the new institute located on the 3rd floor of the NSSC building.

A brainstorm forum on the strategy of ISSI-BJ was held in November, 2014, and an international visiting assessment committee was established to evaluate the performance of ISSI-BJ. The international visiting assessment reports gave ISSI-BJ a very good credit and concluded that ISSI-BJ had a good start and had been gaining excellent reputations from the international science communities. Based on the evaluations, NSSC and ISSI agreed to continue their cooperation on ISSI-BJ. The Board of Trustees of ISSI-BJ and ISSI approved the assessment report and the new agreement in April and June, 2015, respectively. Therefore, on October 23, 2015, Professor WU Ji, director-general of NSSC and chair of the Board of Trustees of ISSI-BJ, and Professor Rosine Lallement, representative and vice chair of the Board of Trustees of ISSI in Bern, Switzerland, signed a new agreement, which confirmed the cooperation of the two sides on continuation of ISSI-BJ. According to the new agreement, the cooperation will last for at least three years and after the specified period of three years, the agreement can be extended or a new agreement will be signed to continue the cooperation. This new agreement ensures the continuation of ISSI-BJ for at least three years.

ISSI-BJ'S SCIENTIFIC PROGRAM

The International Space Science Institute in Beijing (ISSI-BJ) is the only institute to share the name, the same scientific committee, the same study tools, and other information of mutual relevance and interest with the International Space Science Institute (ISSI) in Bern, Switzerland. ISSI-BJ mission's objectives are quite unique, since it is an institute to serve the space science communities in multi-lateral and multi-disciplinary activities. ISSI-BJ is open to support projects from any Asia or international scientists or institutes; therefore, ISSI-BJ is able to attract Asia as well as international scientists to work together in Beijing.

The Program and the Tools

Workshops are study projects on specific scientific themes, selected in consultation with the Science Committee. The duration of Workshops is typically one week. Workshops are organized by a group of conveners who define the theme, set up the program, and list the group of participants. Participation is by invitation only. The size of any Workshop is usually limited to a maximum membership of 45 including a few young scientists. The results of the Workshops are published as refereed papers in issues of Space Science Reviews and in parallel as volumes of the Space Science Series of ISSI (SSSI).

Working Groups are set up by the Directorate for specific tasks, often of technical nature. Their life time can be of several years. The results of the Working Groups are published as volumes of ISSI-BJ Scientific Report Series (SR) or in the scientific literature.

International Teams follow a strict bottom-up approach whereby in response to a specific call issued every year at the beginning of January, scientists can propose projects corresponding to topics, which are broadly identified in the Call. The reviewing and ranking process is the responsibility of the Science Committee.

International Teams are composed of about 5-15 scientists from different institutions, nationalities, and expertise. They meet at ISSI-BJ for one or several periods of time of typically one week. They are active for 12-18 months. Their project, often involves data or modelling work. Their activity is directed and organised by a team leader, generally the initiator of the proposal. Teams are largely independent in the execution of their project, but maintain close contact with ISSI-BJ.

Forums are informal and free debates among 20-25 high-level participants on open questions of scientific or science policy nature. A Forum may lead to formal recommendations or decisions depending upon the topic or issues addressed in the Forum. The TAIKONG magazines constitute the output of the Forums organized at ISSI-BJ. It reports the contents of the Forums and reflects in a neutral way the Forum discussions and advises from all the participants.

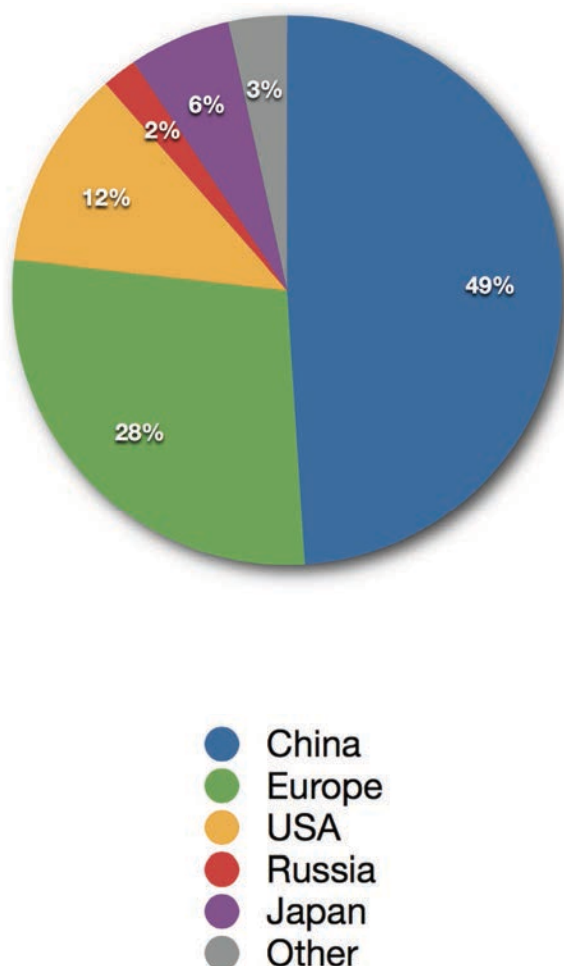
Senior and Junior Visiting Scientists carry out scientific work in collaboration with, or under the supervision of the ISSI-BJ scientific staff on matters directly or indirectly connected with the ISSI-BJ projects. They contribute to the scientific environment at ISSI-BJ in complement to the ISSI-BJ scientific staff.

Understanding Science is organized by the UK Royal Society of Chemistry, the Institute of Physics and ISSI-BJ. Its goal is to make a broader public aware of today's accomplishments in research through short scientific lectures in English (popularization talks) as well as to have an opportunity to talk with either international or Chinese scientists currently carrying out research in China, in a relaxed atmosphere.

ISSI-BJ Space Science School: It is intended to promote a biennial School on space sciences and space science missions for international students. The School will teach the students to develop the connections between scientific objectives and requirements, mission and spacecraft design and mission cost. The aim is to develop a comprehensive approach for designing a space science mission. The students will be provided with the required scientific background relevant to produce a report, outlining a possible space science mission concept.

Statistics

During the first three years of activities, the scientific program expanded significantly. From June 2013 until mid 2016 ISSI-BJ organized a total of 9 forums, 3 Workshops, 6 Understanding Science public seminars, 4 scientific seminars, and we 11 active international teams. Since its inception a total of 435 international scientists participated in the scientific activities of ISSI-BJ, and in Figure 1 we illustrate the number of individual participants and their geographical distribution (end 2015).



Pie chart showing the ISSI-BJ visitors countries of origin. A total of 435 scientists worked during from June 2013 until end of 2015.

How to use the ISSI-BJ Tools

Submit your proposal for an International Team:

A joint call for proposals is released by ISSI/ISSI-BJ every year in January. These proposals are evaluated, prioritized and recommended to ISSI-BJ by the Science Committee of (shared with ISSI). The activity is directed and organized by a team leader who is also the initiator of the proposal to ISSI-BJ. They hold a series of two to three one-week meetings over a period of 12 to 18 months. The results of Teams are published in scientific journals.

Submit your proposal, at any time, for a Workshop, Working Group, or Forum:

There is no annual call. The scientific community can put forward suggestions at any time on future Workshops, Working Groups, and Forums by submitting a summary of maximum one page, explaining the proposal topic, the rationale to organize the event at ISSI-BJ and the list of proposers.

Gamma-Ray Bursts: a tool to explore the young Universe

April 13-17, 2015

Conveners: Zi Gao Dai (Nanjing University, China), Maurizio Falanga (ISSI-BJ, China), Neil Gehrels (NASA GSFC, USA), Diego Götz (CEA Saclay, Irfu/Service d'Astrophysique, France), Emeric Le Floc'h (CEA Saclay, Irfu/Service d'Astrophysique, France), Nial Tanvir (University of Leicester, UK), Bing Zhang (University of Nevada, Las Vegas, USA)

Despite the recent progresses in Gamma-Ray Burst (GRB) science, obtained in particular thanks to the Swift and Fermi satellites, there are still many open questions in the field. One concerns the mechanisms that power these extreme explosions (in a handful of seconds the isotropic equivalent energy emitted by GRBs spans from 10^{50} to 10^{54} erg, making them the most luminous events in the Universe), which is still unclear after more than four decades since their discovery. In particular the content of the relativistic flow that produces the GRBs, remains to be investigated: especially in terms of its bulk Lorentz factor, its magnetization, its baryon loading and their consequences on the possibility of GRBs being the sources of Ultra High Energy Cosmic Rays (UHECRs).

This ISSI-Beijing workshop aims to elucidate the connection between GRBs and the deep Universe.

In recent years much effort has been put into the ground based follow-up of GRB afterglows: the median measured redshift of long GRBs is ~ 2 (with the highest value reported to date of ~ 9.4), which means that GRBs are among the best candidates to study the deep Universe. Ten years after the launch of Swift, statistics on GRBs above $z=3$ have been constantly improving, reaching more than 40 events to date. It is hence timely to coherently review and assess the current knowledge on Gamma-Ray Bursts, their progenitors, their environment, and the emission mechanisms of the prompt and afterglow emission, in order to understand their nature and origin. Understanding the GRB phenomenon globally is of paramount importance for the use of GRBs as beacons of the deep Universe.

At the same time it is wise to start thinking about how to develop synergies between the high- z GRB studies and the surveys of the deep Universe, especially in the framework of the future GRB dedicated facilities (e.g. SVOM, POLAR).

Under its special program for supporting young scientists, ISSI-BJ invited six early career scientists, within two years of their PhD, to take fully part in the Workshop. The young scientist session in the afternoon of the fourth workshop day opened new perspectives and was highly appreciated by all participants.



Workshop participants on "Gamma-Ray Bursts: a tool to explore the young Universe" in Beijing.

INTERNATIONAL TEAMS

Every year in January since 2014, ISSI-BJ and ISSI released jointly the Call for International Teams in Space and Earth Sciences to invite proposals for study projects from internationally collaborating teams of scientists from different institutions. The Call is open to scientists of any nationality actively involved in the following research fields:

1. Space Sciences (Solar and Heliospheric Physics, Solar-Terrestrial Sciences, Space Plasma and Magnetospheric Physics, Planetary Sciences, Astrobiology, Cosmology, Astrophysics, and Fundamental Physics in Space)
2. Earth Sciences using space data

Teams selected in 2014

1. Cheng K. S. (CN) & Dogiel V. (RU)

New Approach to Active Processes in Central Regions of Galaxies

Session: June 1-5, 2015, & June 6-8, 2016

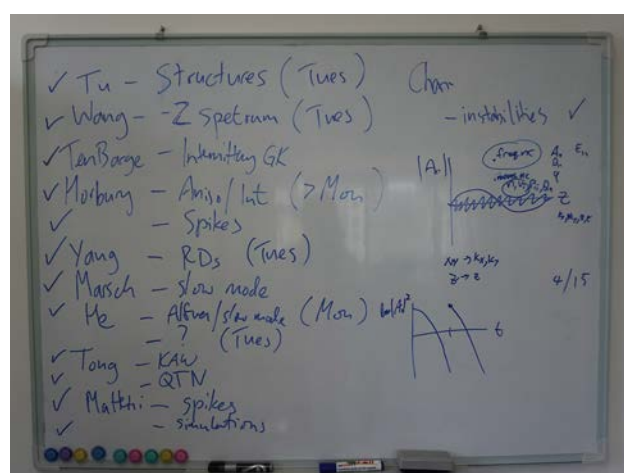
Scientific Rationale: The aim of this project is to search and to understand the origin of processes in the very special region of the Galaxy - the Galactic central region (GCR). Recent discoveries obtained with new observational missions like Fermi, Planck, Swift, INTEGRAL, Chandra etc. found there very unusual phenomena with huge energy release which are not seen in any other part of the Galaxy. It seems that similar processes also take place in central regions of other galaxies. We intend to discuss and to analyze these processes in attempt to find physical reasons for these unusual phenomena associated in the galactic centers.

2. Chen C. (UK) & He J. (CN)

Title: Anisotropy and Intermittency in Solar Wind Turbulence (ISSI-BJ & ISSI Team)

Session: June 29-July 3, 2015

Scientific Rationale: Plasma turbulence is ubiquitous throughout the heliosphere but in many respects remains poorly understood. As well as being of intrinsic interest, this turbulence is important for understanding plasma heating, such as in the solar corona, and determining the propagation, and therefore origin, of energetic particles. Two fundamental features of turbulence in the solar wind are anisotropy (different properties with respect to the magnetic field direction) and intermittency (burstiness of the fluctuations), but their origin, precise



Impression of the team work on "Anisotropy and Intermittency in Solar Wind Turbulence", held in June/July 2015 (Credit: team C. Chen and J. He).

nature, and, in particular, the relationship between them is not well understood. The team combines observations, simulation and theory to make progress in understanding these features.

3. Corpetti T. (FR)

Remote Sensing Image Data Assimilation for Pollution Monitoring: Application to Urban and Ocean Pollution

Session: January 27-30, 2015

Scientific Rationale: In this project we aim at defining methodological tools devoted to image data assimilation. Such tools will be applied to oil slick monitoring in ocean and to urban pollutant estimation and forecasting in city environments (these applications require indeed common computer vision methods). Detection and monitoring of the evolution of oil slicks aims firstly at helping to the planning of contingency or cleanup actions of oil

spill in case of serious pollution and secondly, to enable identification of polluters. As for urban environment, because of the large increase of pollution in large cities (and especially in China), the question of the estimation, understanding, monitoring and forecasting of pollutants is crucial.

4. Dunlop M. (UK)

Small Scale Structure and Transport During Magnetopause Magnetic Reconnection: from Cluster to MMS (ISSI-BJ & ISSI Team)

Session: October 26-30, 2015

Scientific Rationale: The team project is designed to investigate small-scale structure and transport induced by magnetic reconnection (MR) in the Earth's magnetosphere; focusing on the dayside magnetopause. The team includes experts in both, reconnection physics and four-spacecraft analysis to address two specific goals: 1. Examine Cluster observations of reconnection on the dayside magnetopause, and establish the likely signatures that will be observed by MMS, 2. Review and collate all the Cluster four-spacecraft techniques and determine how these techniques can be used by MMS with its much smaller tetrahedron.

5. Kretschmar P. (ES)

Coronae in the X-ray Flashlight

Session: May 11-15, 2015, & June 13-17, 2016

Scientific Rationale: The concept of a corona, a hot gas flow radiating inefficiently, has been widely used to model spectral state transitions in X-ray binaries and the connection between disk and jets. The intrinsic properties of these coronae

are difficult to obtain and quite different views are proposed in the literature. Expanding on the methodology used in a recent series of papers, the team discusses the impact of type I X-ray bursts on the coronae in X-ray bursters as a mechanism to explore corona properties in these systems. This project is expected to shed some further light also on the possible connections among the accretion disk, the corona and jets in other kinds of X-ray binaries. The project will also lay the groundwork for observing opportunities of X-ray bursters with the first Chinese hard X-ray satellite, HXMT, which is to be launched in 2016. HXMT will provide the largest detection area yet at 20–250 keV, an energy band that is crucial for this line of research.



Mars imaged by the Hubble Space Telescope in 2003.

6. Mueller-Wodarg I. (UK)

Aeronomy of Terrestrial-sized Bodies (ISSI-BJ & ISSI Team)

Session: November 16-20, 2015

Scientific Rationale: The team discusses comparative aeronomy of terrestrial sized bodies in the solar system (Titan, Venus, Mars) as well as predictions for extrasolar terrestrial sized planets. The scientists focus on four key topics related to small-scale structures and perturbations, including waves, large-scale background structures and solar cycle/seasonal/diurnal variations as well as ionospheric structure, variability and chemistry. The key innovation lies in the comparative understanding of these bodies, which are characterized by different boundary conditions, and development of a more fundamental physical understanding of their properties.



Impression of the team work on "Coronae in X-ray Flashed", held in May 2015 (Credit: team P. Kretschmar).

Teams selected in 2015

7. Brasseur G. (DE) & Bouarar I. (DE)

Analysis of Persistent Regional Air Pollution in Asia (ISSI-BJ & ISSI Team)

Session: February 29-March 4, 2016

Scientific Rationale: We propose to assemble an international and interdisciplinary team of air pollution specialists to address the unresolved problem of the formation of persistent and health-threatening aerosol layers during wintertime in large areas of Asia.

Our objective is to bring together a group of experts representing different disciplines to address the problem of the formation of large haze episodes in Asia from different perspectives (space observations, surface monitoring, profiling, laboratory approaches, data analysis, modeling and impacts). The two projected meetings, one in Bern and one in Beijing should lead to the production of a book and to papers that present the state-of-the-art on this issue. Of highest importance is the participation of Asian experts who have collected large datasets and are ready to contribute.



Impression of the team work on "Analysis of Persistent Regional Air Pollution in Asia", held in February-March 2015 (Credit: team G. Brasseur & I. Bouarar).

8. Miyoshi Y. (JP) & Hosokawa K. (JP)

Pulsating aurora as a manifestation of non-linear wave particle

Session : May 30-June 3, 2016

Scientific Rationale: The ISSI-BJ Team will understand the causal relationship between the micro-process of the wave-particle interactions in the magnetosphere and pulsating aurora (PsA) in the ionosphere. We have assembled a team of experts of ground-based observations, satellite observations, and simulations to tackle the focused questions on the pulsating aurora, which is a manifestation of the non-linear wave particle interactions of whistler mode chorus waves. Besides the experts of the observations, we invite several members from the simulation studies for comprehensive understanding of the physical processes. These members also represent several space missions providing the data that are relevant for our focused research, namely, NASA's Van Allen Probes and THEMIS missions, ESA's Cluster mission, and the upcoming JAXA's ERG mission.

9. Nakariakov V. (UK) & Van Doorselaere T. (BE)

Magnetohydrodynamic Seismology of the Solar Corona in the Era of SDO/AIA

Session : December 14-18, 2015

Scientific Rationale: We are going to assess in depth, develop and create the basis for full-scale implementation of the magnetohydrodynamic (MHD) seismological methods for the diagnostics of the solar coronal plasmas by MHD waves and oscillations with the use of data obtained with the Atmospheric Imaging Assembly (AIA) on the Solar Dynamics Observatory. The unique capabilities of the instrument, such as the combination of the high spatial and time resolution, high sensitivity and 24/7 full-disk coverage allows for the confident detection of coronal wave and oscillatory processes, and assessing their key parameters. These observational findings, in combination with the advanced MHD wave theory and instrument-oriented forward modelling provide us with the ground for the delivery of robust coronal plasma diagnostics of the key coronal plasma parameters, such as the coronal heating function and sub-resolution structuring. Aims of the proposed activity are: 1. major expansion of the international

research collaboration in the field by establishing new research collaborations and enhancing existing links 2. conducting collaborative research on several selected topical problems, 3. performing effective knowledge exchange, and 4. creation of a fertile ground for the joint application for collaborative research grants.

10. Ouzounov D. (US) & Zhang X. (CN)

Validation of Lithosphere-Atmosphere-Ionosphere-Magnetosphere Coupling (LAIMC)

Session : September 21-25, 2015, & August 22-26, 2016

Scientific Rationale: We propose an investigation of the near-Earth space plasma dynamics and electromagnetic environment by multi-parameter analysis from variety of space-based missions (ESA, NASA, NOAA, JMA and CNSA). This study aims to advance the physical concept of the coupling mechanism between lithosphere, atmosphere, ionosphere and magnetosphere, which is linked to the chain of processes initiated by atmospheric boundary layer modification associated with major natural disasters: earthquakes, tsunamis, typhoons, dust storms and volcanoes. Our primary interests for this inter geosphere exploration are to utilize ensemble of space-borne observations to verify the geospheres interaction caused by large-scale natural disasters over Taiwan (ROC) and Mainland China. This study is advancing the initial study "Multi-instrument space-borne observations and validation of the physical model of the Lithosphere-Atmosphere-Ionosphere-Magnetosphere Coupling" (Pulinets and Ouzounov, ISSI-Bern, 2013-15).

Team of leading international and Chinese experts from different disciplines of space and Earth sciences will provide an unique opportunity for knowledge fusion to make breakthrough in the holistic understanding the physics of coupling process among different geospheres of our planet.

11. Tian F. (CN)

Astrobiology in the New Age (ISSI-BJ & ISSI Team)

Scientific Rationale: Astrobiology, the quest for life in the universe, is "scientifically" driving most NASA and ESA exploratory missions in the Solar System and beyond. China is developing a solid plan of exploration of the Solar System and construction of new generation scientific satellites. A strong astrobiology community in China will be able to suggest substantial science cases to make its space exploration efforts beneficial. Here we proposed to organize an ISSI-BJ astrobiology team in order to address some strategic questions important to the development of China's astrobiology community. The team is highly interdisciplinary with a broad expertise to study Astrobiology. The results of our project will be important for identifying priorities in astrobiology in China and will foster the growth of this discipline in China, which could in turn contribute to relevant researches internationally.

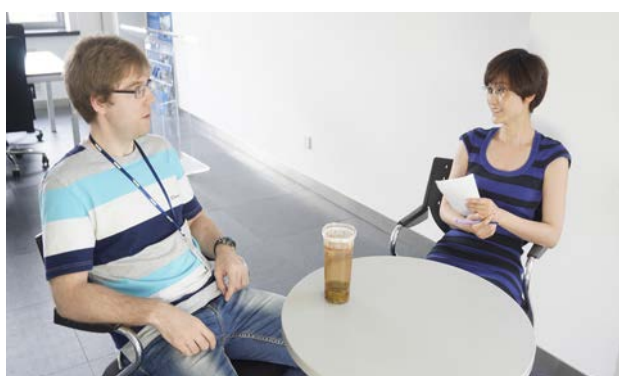


Artistic impression on Astrobiology (Credit: Astrobiology. Kiwi).

VISITING SCIENTISTS

Interview with Ivan Zimovets

Ivan Zimovets graduated from the Moscow Institute and Technology in 2007 and joined the Space Research Institute (IKI) of RAS. He defended his PhD thesis in solar physics in 2010 and is working at IKI as a scientific associate. In 2015 Ivan also got a visiting scientist position at ISSI-BJ and NSSC.



Ivan Zimovets is enjoying a cup of green tea in a friendly atmosphere with Lijuan EN at the ISSI-BJ cafeteria.

Could you briefly explain the project you were working on while staying at ISSI-BJ?

My research interests are related to the processes of energy release in solar flares. Though this topic is not new, it is still very hot and contains many unanswered questions. Energy for flares is extracted from magnetic field and electric currents of parental active regions. The current paradigm states that energy is released by the process of magnetic reconnection in current sheets forming in the solar corona. Since current sheets are expected to be very thin (less than one kilometer) it is very difficult to observe them by modern telescopes with the spatial resolution of several tens of kilometers at best. There is an alternative idea that, at least, some flares can be a result of disruption of electric currents flowing along magnetic field lines. Using vector magnetograms we can calculate vertical currents at the photosphere and compare them with the sources of flare energy release in the low solar atmosphere (e.g., emitting in hard X-ray, ultraviolet or optical ranges). If there would be some correlation between these electric currents and emission sources, one could speculate about possible links between them. That is what I am studying now.

Why did you choose to be a visiting scientist at ISSI-BJ?

The initial and the most important reason is the agreement between the director of IKI/RAS academician Lev Zelenyi and the executive director of ISSI-BJ prof. Maurizio Falanga. According to this agreement IKI/RAS provides a young scientist to ISSI-BJ as a support and to strengthen the cooperation between the two organizations and countries. Lev and Maurizio made me an offer, which I accepted with inspiration. ISSI-BJ is already known as a good place where leading scientists from around the world meet together to discuss topical issues of the modern space science. It was interesting for me to plunge into this atmosphere.

How did your project continue after leaving China? Are you finished already?

My investigation is not complete yet. I still collaborate with colleagues from the State Key Laboratory of Space Weather, hosted in NSSC/CAS, to extend and deepen the study. This collaboration is very promising and, I hope, long-term. Also, I have another goal here, in ISSI-BJ and NSSC/CAS. Being a deputy scientific director of the Russian solar and heliospheric mission – Interhelioprobe – I would like to initiate a joint collaboration between my alma mater in Moscow (IKI/RAS) and NSSC/CAS. The idea is to jointly develop a spectrometer of sub-relativistic electrons for this space project. The idea is in the embryonic phase yet.

How would you describe ISSI-BJ? What do you think is special about the institute?

I found that ISSI-BJ is a very comfortable and interesting place. It is located in the same campus with NSSC/CAS, in the district where many institutes of CAS are situated, and not far from the Beijing University. This district is full of well-educated, polite, predominantly young people. The place is very energetic and demonstrates clearly high potential of China and Chinese science in particular. The staff of ISSI-BJ is very friendly. Here you quickly start to feel almost as comfortable as in your home institute. Here you can meet leading researchers in different fields of space science and here you have excellent opportunity to organize meeting with colleagues from your own field. Definitely, this is the place where you want to return again.

SCIENTIFIC SEMINARS GIVEN BY OUR VISITORS

Comparative magnetospheric study: Now the time

Masaki Fujimoto

January 14, 2015

Masaki Fujimoto, Director for Dept. Solar System Science and Director for International Strategy and Coordination of ISAS visited ISSI-BJ, and gave an talk for the sceintitfci staff at NSSC

It has been a slogan for a long time that we learn a lot about magnetospheric physics by comparing processes from different magnetospheres. Now, with good viewpoints set by in-depth study on rich terrestrial magnetospheric observations, and with new data coming from planetary exploration missions (especially, Cassini and MESSENGER) revealing how known processes behave differently once they are set in a different parameter regime, it is the time not to leave it as just a slogan but to truly perform a study in the style. In this talk, reviewed are some nice recent examples in which thinking in the comparative style made our eyes open to the real faces of plasma processes that we had thought to know well enough.



Masaki Fujimoto givin his seminar on the Comparative magnetospheric study: Now the time.

Spatially resolved observations of coronal type II radio burst with multiple emission lanes

Ivan Zimovets

June 10, 2015

Ivan Zimovets, Scientific Associate and Deputy Scientific Director of the Interhelioprobe mission at the IKI of RAS gave a talk on 'Spatially resolved observations of coronal type II radio burst with multiple emission lanes' at the NSSC organized by ISSI-BJ. During his talk he presented his recent results some spatially resolved observations of



Dr. Ivan Zimovets giving his seminar on Spatially resolved observations of coronal type II radio burst with multiple emission lanes.

type II bursts in the lower corona (below 2Rs) with the Nancay Radioheliograph and the Atmospheric Imaging Assembly onboard the Solar Dynamics Observatory. He clearly showed that the observations do not contradict the hypotheses that multiple emission lanes of type II bursts are the result of radio emission from ahead and behind of CME-driven shocks propagating through the highly inhomogeneous solar corona.

The Current Goals and Successes of the ESA Mission Rosetta

Holger Sierks

August 18, 2015

Holger Sierks, based at the MPI for Solar System Research in Göttingen, Germany visited the ISSI-BJ and gave an impressive talk on the current goals and successes of the ESA mission Rosetta. He updated the audience about the whereabouts of lander Philae and showed remarkable images of Comet 67P/Churyumov-Gerasimenko and its surroundings taken by the onboard camera OSIRIS.



Dr. Holger Sierks giving his seminar on the Current Goals and Successes of the ESA Mission Rosetta.

The Rosetta mission of the European Space Agency arrived on August 6, 2014, at the target comet 67P/Churyumov-Gerasimenko. OSIRIS (Optical, Spectroscopic, and Infrared Remote Imaging System) is the scientific imaging system onboard Rosetta. OSIRIS consists of a Narrow Angle Camera (NAC) for the nucleus surface and dust studies and a Wide Angle Camera (WAC) for the wide field gas and dust coma investigations.

OSIRIS imaged the nucleus and the coma of comet 67P/C-G during approach, arrival, and descent of the Philae lander. OSIRIS continued monitoring and mapping the surface and activity in escort phase in 2015 with close fly-bys and remote observations. The scientific results reveal a nucleus with bi-lobed shape and varied morphology. Active regions are located at steep cliffs and collapsed pits which form collimated gas jets. Dust is accelerated, forming jet filaments and the large scale, diffuse coma of the comet.



Comet 67P/Churyumov-Gerasimenko on 3 August 2014 (Credit: ESA/Rosetta/MPS for OSIRIS Team).

The Ultimate Fate of Planetary Systems

Sylvie Vauclair

March 10, 2016



Sylvie Vauclair giving his seminar on the Ultimate Fate of Planetary Systems.

Since the discovery of the first exoplanet in orbit around a solar-type star in 1995, a large number of observations have been performed from the ground and from space. More than a thousand exoplanets have now been detected. What is the fate of these planetary systems, including ours, when the star evolves and becomes a white dwarf after the giant stage? More and more observations of white dwarfs show evidences of debris disks around them, with planetary matter falling onto the star. Accretion rates may be derived from theoretical studies and modelling of these stars. This becomes a lively field for the following years. I will present the context and the first results on this subject.

UNDERSTANDING SCIENCE

Space Observations of China: Past and new achievement

WU Ji

April 16, 2015

ISSI-BJ organized on April 16th his third Understanding Science seminar very successfully at Bridge Café, a coffeehouse in Beijing's university district Wudaokou. The lecture on "Space Observation of China: Past and New Achievements" was held by Prof. Ji Wu, director general of the National Space Science Center, Chinese Academy of Sciences. More than 60 young students listened to Prof. Wu's explanation on how China's space science has undergone a breathtaking development in exploration as well as experiment technologies, and accomplished many major missions during the past 50 years.



Impression of the Understanding Science seminar.

During his talk, Prof. Wu showed the history of the Chinese Space Observation, starting with the earliest records dating back to about 2,400 BC, "One of the first recorded Chinese space observations was a solar eclipse". The Modern Space Program started in China during the 1950's triggering very ambitious missions. However, Space Science didn't receive remarkable attention until China realized its first manned space program in 2001. Prof. Wu further introduced accomplished milestone missions in China's modern Space Science, like the Lunar Exploitation Program and the Geospace Double Star Program. Giving an outlook on future selected missions, like the Global Water

Observation mission (WCOM), Magnetosphere, Ionosphere and Thermosphere mission (MIT) and the Einstein Probe, Prof. Wu closed his lecture and answered a number of questions from the audience, including both Chinese and foreigners.

Hubble: 25 years of Utilization and On-orbit Servicing

Claude Nicollier

July 6, 2015

Claude Nicollier, the first and only Swiss astronaut, held the fourth ISSI-BJ Understanding Science Talk on "Hubble: 25 years of utilization and on-orbit servicing" and fascinated the audience with his personal insights on an astronaut's life in space. More than 50 young students listened to Prof. Nicollier's explanation on the invention and implementation of the Hubble telescope, which is celebrating its 25th birthday this year.

The Hubble Space Telescope, joint project of NASA and ESA, was installed on a Low Earth Orbit by the Space Shuttle in April of 1990. Suffering from a serious optical problem, it was visited for the first time by another Shuttle crew to recover the expected optical quality and exchange other components. Since that time, it became a very productive space-based astronomical facility and was visited again during four extra servicing



Impression of the Understanding Science seminar.

missions until May 2009 to maintain it as an up-to-date instrument of superior performance. It has been used extensively to study the Solar System, protostars and star formation regions in our galaxy, as well as planetary nebulae, galaxies, clusters of galaxies, and the very deep universe as well. Both the servicing aspects of the telescope, and the scientific accomplishments it made possible, were presented in Nicollier's lecture.

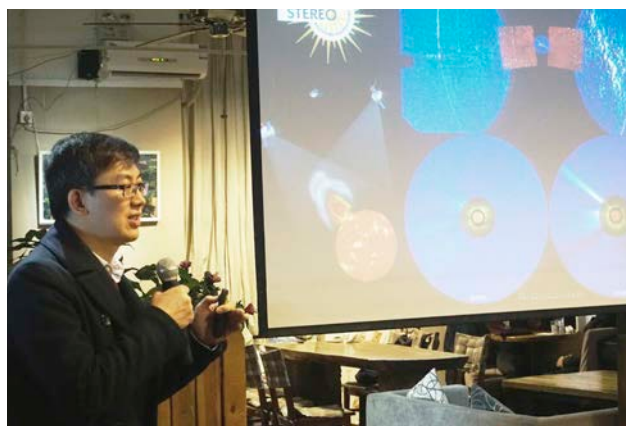
He told about his training and service of the first and the third missions to the Hubble Space Telescope and his space walk outside the telescope. The audience was taken in by his personal description of the takeoff. Claude Nicollier further showed pictures taken by the space telescope to emphasize the achievements of Hubble.

During his talk, Prof. Liu explained what the Solar storms (CMEs) are, what the exploration of CMEs contribute to the genesis of a new field, which now we call "space weather" and summarized his views of CMEs and how they affect our life based on his studies in this field.

Living with the Furious Star

Ying Liu

December 1, 2015



Impression of the Understanding Science seminar.

ISSI-BJ organized Understanding Science seminar very successfully at House Café on December 1 2015, a coffeehouse in Tsinghua university district Wudaokou. The lecture on "Living with the Furious Star" was held by Prof. Ying Liu, space physicist of the National Space Science Center, Chinese Academy of Sciences. More than 30 young students joined his talk.

EVENTS & MEDIA COVERAGE

January 14 2015

Prof. Saku Tsuneta, Vice President of the Japan Aerospace Exploration Agency (JAXA) and Director of Institute of Space and Astronautical Science (ISAS), and Prof. Masaki Fujimoto, Director for Dept. Solar System Science and Director for International Strategy and Coordination of ISAS visited ISSI-BJ. It was a very meaningful and fruitful meeting. Both parties discussed about potential cooperation opportunities for the future.



ISAS/JAXA delegation visited the International Space Science Institute in Beijing.



Tohoku university Japan delegation visited the International Space Science Institute in Beijing.

July 6 2015

Claude Nicollier visited ISSI-BJ and eagerly learning about the Institute's past achievements and future plans, he discussed possible activities with ISSI-BJ's executive director Maurizio Falanga. In collaboration with the Science, Technology and Education Section of the Embassy of Switzerland in Beijing on the occasion of the 2nd Swiss Day on July 7th 2015, at the Beihang University in Beijing, ISSI-BJ was present with an exhibition panel and annual reports for distribution. Over 1,000 people visited the different exhibition panels.



Claude Nicollier and the executive director Maurizio Falanga discussing about ISSI-BJ.

March 5 2015

Dr. Liam Baird, Program Coordinator at the Tohoku Forum for Creativity, Dr. Kaori Watanabe, Dr. Kouichi Nagayama, Dr. Keiichi Sato and Dr. Yukako Endo, staff members at Tohoku Forum for Creativity visited the International Space Science Institute-Beijing (ISSI-BJ). During the meeting, both parties discussed about potential joint activities opportunities for the future.

The Tohoku Forum for Creativity was established by Tohoku University in 2013, which is the first international visitor research institute in Japan.

July 13 2015

Dr. Li Xinjun, Secretary-General and CEO of the Asia-Pacific Space Cooperation Organization (APSCO) and Prof. Maurizio Falanga, Executive Director of the International Space Science Institute-Beijing (ISSI-BJ) signed a Memorandum of Understanding (MoU). The signing ceremony took place at APSCO HQ and marks the start of cooperation between the two organizations. Through this MoU, APSCO and ISSI-BJ establish a cooperation, within the framework of their respective mandates, recognizing the importance of scientific cooperation and scientific exchanges as well as the multi-disciplinary and international character of space science, agree to collaborate in promoting, developing, and strengthening the links between scientists of the APSCO Member States and the users' community of ISSI-BJ.



Agreement Signing Ceremony between APSCO and ISSI-BJ. Prof. Maurizio Falanga, Executive Director of ISSI-BJ and Dr. Li Xinjun, Secretary-General and CEO of APSCO.

November 11, 2015

ISSI-BJ visited the ESA Earth Sciences HQ and head of the Dragon project, Dr. Yves-Louis Desnos, to discuss possible direction in order to collaborate in the near future.

November 23-24, 2015

This is an essential step in the life of ISSI-BJ and its continuation to increase its scientific activities. Therefore, M. Falanga visited on Nov. 23-24, 2015 several institutions in Taiwan, among them the National Space Organization (NSPO), where M. Falanga had the honor to present ISSI-BJ to the Director General Dr. G. S. Chang.



J. Y. Liu, M. Falanga, G. S. Chang, and W. Ip, at the National Space Organization, Taiwan.

December 1, 2015

ISSI-BJ visited the National Satellite Oceanic Application Service, which agreed that they will support ISSI-BJ Earth Sciences activities related to their research fields.

Media Coverage

Article

"Who Said that China is not up to Space Science?"

with Maurizio Falanga

Go Taikonauts! 龙腾太空, January 2016

Interview

"合作与竞争同等重要"

with Maurizio Falanga

Science News 科学新闻, September 2015

Article

"我校举办第二届北航瑞士日"

about ISSI-BJ

Beihang University 新闻网, 8 July 2015

Article

"国际空间科学合作：1+1可以大于2"

with Maurizio Falanga

China Science Daily 中国科学报, 22 April 2015

Astronomical Distance Determination in the Space Age

May 23-27, 2016

Conveners:

Richard de Grijs (Kavli Institute for Astronomy and Astrophysics / PKU, China; Discipline Scientist at ISSI-BJ, China), Giuseppe Bono (Universita di Roma Tor Vergata, Italy), Barry Madore (Carnegie Institution for Science, Washington, D.C, USA), Noriyuki Matsunaga (The University of Tokyo, Japan), Sherry Suyu (Institute of Astronomy and Astrophysics, Academia Sinica, China; Max-Planck-Institut für Astrophysik, Garching, Germany), Jianmin Wang (IHEP CAS, China), Maurizio Falanga (ISSI-BJ, China)



The galaxies used in this composite artwork are all infrared images from Spitzer (credit: Spitzer/JPL).

Knowing the distance of an astrophysical object is key to understanding its formation and evolution: without an accurate distance, we do not know how bright it is, how large it is, or even when it existed. Astronomical distance measurements are challenging tasks, and indeed the typical information we have about Galactic and extragalactic sources are its position (perhaps as a function of time) and its brightness (as a function of wavelength and time).

This ISSI-BJ workshop will highlight the tremendous amount of recent and continuing research into a myriad of exciting and promising aspects of accurately pinning down the cosmic distance scale. Putting the many recent results and new developments into the broader context of the physics

driving cosmic distance determination is the next logical step, which will benefit from the combined efforts of theorists, observers and modellers working on a large variety of spatial scales, and spanning a wide range of expertise.

We will specifically address future efforts in this field, both theoretically and observationally. We plan to address the impact that accurate cosmic distances will have, together with the new and unprecedented near-infrared spectroscopic opportunities offered by the James Webb Space Telescope, on metallicity gradients in nearby galaxies. This is a critical time in the context of firming up the astronomical distance scale: VLBI (very long baseline interferometry) sensitivity is being expanded allowing, for example, direct measurement of distances throughout the Milky Way and to Local Group ($D < 1$ Mpc) galaxies. The field will benefit tremendously in the Gaia era, which is now truly upon us. The first science verification data obtained with Gaia will soon be made available publicly (late 2015). In addition, the next-generation "extremely large telescopes" (ELTs) will play a crucial role in cosmic distance determination, since they will allow us to determine the Hubble constant only using primary distance indicators. Significant modeling efforts are currently underway to prepare the community for use of the Thirty Meter Telescope (USA, Japan, China, India), the European ELT (ESO) and the Giant Magellan Telescope (California, South Korea, Taiwan).

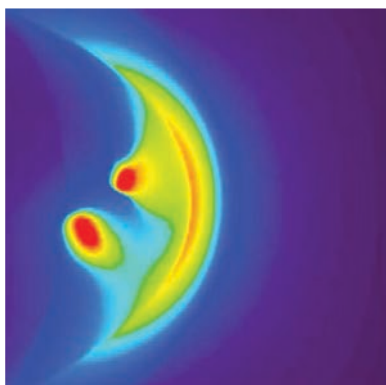
Space-based observatories, in particular, are allowing major advances to be made, and this will only increase in the next decade. In addition to the European Hipparcos and Gaia missions, Asian scientists, in particular our Japanese colleagues, are leading the field in relevant space mission. Nano-, micro- and (full) JASMINE, as well as the Japanese space interferometry missions VSOP/VSOP-2 complement Russian efforts related to eRosita, in addition to US and European space missions like the Hubble and Spitzer Space Telescopes, WFIRST, Herschel, WMAP and Planck. These space- and ground-based facilities will have an immediate bearing on the astronomical distance scale. Nevertheless, many uncertainties remain at the level of at least 5–10%, particularly in terms of our understanding of the physics underlying many of the methods commonly used for distance determination.

FORTHCOMING FORUMS

The link between Solar wind, Magnetosphere, Ionosphere

July 6-7, 2016

Conveners: Chi Wang (NSSC, China), Graziella Branduardi-Raymont (UCL, UK), Benoit Lavraud (CNRS, France), Tony Lui (APL, USA) and Maurizio Falanga (ISSI-BJ, China).



Numerical simulation of the Solar wind, Magnetosphere, Ionosphere (Credit: NSSC/CAS & ESA).

The aims of this ISSI-BJ FORUM are related to the scientific questions of how the Sun controls the Earth's magnetic environment and space weather. Recently the European Space Agency (ESA) and the Chinese Academy of Sciences (CAS) selected a joint small mission (SMILE to be launched in 2021) to trace these processes from beginning (the Sun) to end (the Earth's aurora) and investigate how the solar wind interacts with the Earth's magnetic environment in a way unmatched so far.

SMILE is a self-standing mission in a highly elliptical Earth orbit which will observe solar wind-magnetosphere coupling via simultaneous in situ solar wind/magnetosheath plasma and magnetic field measurements, X-ray images of the magnetosheath and magnetic cusps, and UV images of global auroral distributions defining system-level consequences. During this FORUM the participants will discuss the interaction between Earth's protective shield – the magnetosphere – and the supersonic solar wind. SMILE is expected to give an important contribution to our understanding of space

weather and, in particular, the physical processes taking place during the continuous interaction between the solar wind and the magnetosphere.

The Forum will cover the following main themes We aim to divide the meeting into 5 main sessions, including:

1. Overview to the Solar Wind Mag. and Ionosphere Coupling
2. Key science of the Solar wind, Magnetosphere, Ionosphere Coupling
3. Instruments and capability required
4. Synergies Complementary missions and International Collaborations

Lunar and Planetary Seismology

October 2016

Conveners : Philippe Lognonné (University of Paris Diderot/Institut de Physique du Globe de Paris, Paris, France) , Ip Wing Huen (National Central University, Graduate Institute of Astronomy, Taiwan) Yosio Nakamura (The University of Texas at Austin, Institute for Geophysics, Austin, USA) , Mark Wieczorek (CNRS/Institut de Physique du Globe de Paris, Paris, France) , Wang Yanbin (Department of Geophysics, School of Earth and Space Sciences, Peking University) , Maurizio Falanga (ISSI-BJ, CN) Tilman Spohn (Chairman ISSI-BJ SC, DLR, Berlin, Germany).



Front side of the Moon showing locations of the four Apollo lunar seismic stations that operated simultaneously. (Credit: Khan and Mosegaard (2002), Journal of Geophysical Research, Vol. 107).

Planetary seismology is not only the best tool to determine the internal structure of planets, but it also enables us to monitor the tectonic activity of planets, to determine the impact cratering rates of planets, and to quantify acoustic sources of planetary atmospheres. The Apollo Passive Seismic Experiment (PSE), conducted as a component of the Apollo Lunar Surface Experiment Package (ALSEP), was not only the unique example of a successful seismic experiment on a terrestrial body other than Earth, but also one of the few examples of seismic data used by the science community more than forty years after their acquisition. The experiment successfully led to the discovery of the crust and core of the Moon, quake mechanisms never observed on Earth, and provided the impact rate of meteoroids on the Earth-Moon system.

The first goal of the Forum will be to review the achievements of the Apollo seismic experiment, almost forty years after the termination of ALSEP, with a special focus on the analyses made in the last fifteen years, and to identify the science goals of a new post-Apollo seismic return on the Moon. The Forum will not only focus on the lunar interior, but will also address science goals associated with the use of the Moon as a platform enabling the detection of gravitational waves, which is made possible by its very low background seismic noise. The second goal of the Forum will be to review the perspective of planetary seismology on other bodies of the solar system, such as Mars, Venus, Mercury and small bodies. This assessment will be made not only for the ongoing missions in development, but also in terms of seismic waves and source modeling, with specific focus on differences between Earth and planets (such as impact processes, scattering of waves in a high-Q crust, and interior/atmosphere coupling).

Tropical Cyclone and extreme weather events with satellite observations

November 2016

Conveners : Lennart Bengtsson (University of Reading, UK/Max Plank Institute of Meteorology), WU Ji, (National Space Science Center, CAS), DONG Xiaolong (National Space Science Center, CAS & ISSI-BJ), Mark Bourassa (Center for Ocean-Atmospheric Prediction Studies, Florida State University) YU Hui (Shanghai Typhoon Institute, CMA), Maurizio Falanga (ISSI-BJ, CN)



(Credit: ISS).

Tropical cyclones and extreme convective weather events has significant impacts on lives, properties and global and regional hydrological and energy circles. Satellite observations can provide atmospheric and surface information over ocean and land, which is important for the forecast and nowcast for these meteorological processes. The goal of this forum is to review the achievement, development and perspective of satellite observations for tropical cyclones and extreme convective weather events. The forum will also discuss the gaps between the current observation capabilities and the requirements from assimilation, forecast and assessment of the impacts, which would contribute to the formulation of future development of both the satellite observations and research on the tropical cyclones and extreme convective weather events.

FORTHCOMING SPACE SCHOOL

The 1st ISSI-BJ & APSCO Space Science School



This is an international 10 days school on « How to design a Space Science Mission ». The school will be held at the Geo-informatics and Space Technology Development Agency (GISTDA), in Si Racha, Chon Buri Province, Thailand.

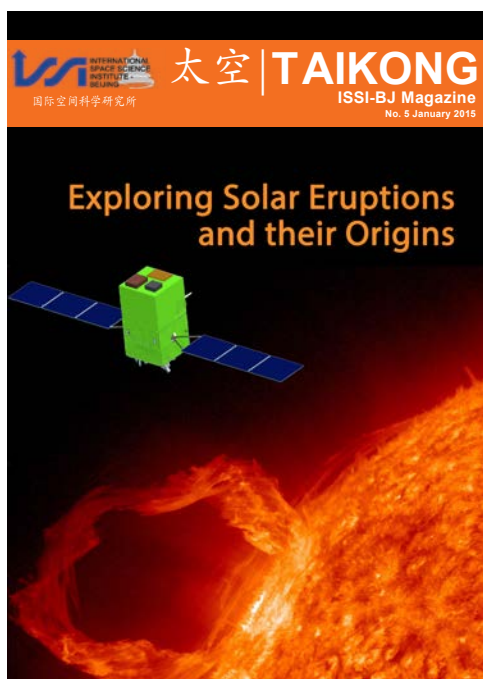
This is the first joint space science school organized between the Asia-Pacific Space Cooperation Organization (APSCO) and the International Space Science Institute in Beijing (ISSI-BJ). It is intended to promote a biennial School on space sciences and space science missions for master, Ph.D. or Post-doc students or early career scientists or engineers. The School will provide the students with in-depth knowledge on specific space science topics and on space mission engineering. It will also acquaint them with the leading experts in the field and will motivate them to pursue a career in space sciences. The School intends to build links between the students from different countries, where they may have the potential to become leaders in the future by developing their abilities to work in a multidisciplinary international team.

The School will teach the students to develop the connections between scientific objectives and requirements, mission and spacecraft design and mission cost. The aim is to develop a comprehensive approach for designing a space science mission. The students will be provided with the required scientific background relevant to produce a report, outlining a possible space science mission concept in the future. The School will also facilitate and initiate different discussions in an international and multi-disciplinary way; it will encourage creativity and provide the contacts for the participants to develop a professional network. International collaboration will also be an important theme at the school. This school will make the participants aware that successful space science mission projects always face big challenges, but nevertheless, space sciences and space projects provide exciting and challenging opportunities. The participants are also invited to submit a title and abstract in order to give an oral presentation or just to provide a poster.

The lecturers are expected to cover the following general themes

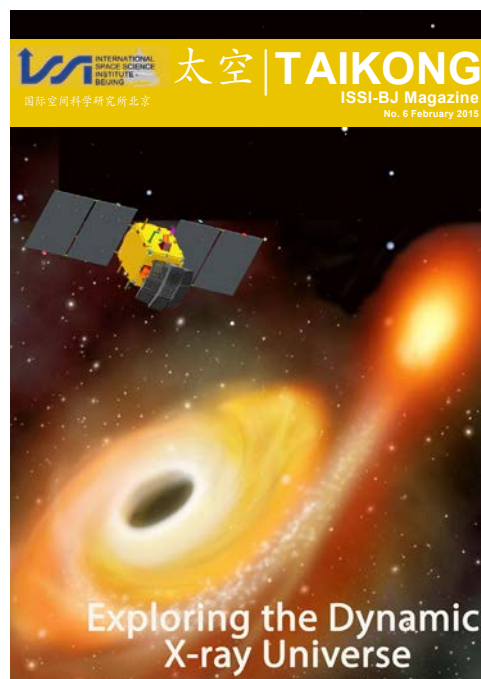
- Past, present and future space science missions for different space agencies
- Scientific objectives: from the science case to the scientific requirements
- Payload design : achieving state of the art instruments in space
- Orbital constraints
- Spacecraft AOCS (attitude & orbit control system & Service module), Solar panels, thrusters & Sails
- GNC (Guidance , Navigation, & Control & communications)
- Spacecraft design and optimization
- Operations ground segment: spacecraft and payload health monitoring
- Scientific management: data rights and policy (observatories vs PI missions)
- Project management: planning and mission cost & risk management
- Micro-satellite launching and operation
- Cubesat mission design and integration
- Designing of space science experiment for Space Station
- International collaborations

PUBLICATIONS



The Authors: Weiqun Gan and Li Feng (PMO, CAS, China).

Solar flares and coronal mass ejections (CMEs) are the two most intense eruptive phenomena on the Sun. The energies of these eruptions are believed to originally come from the solar magnetic field. Therefore, the simultaneous observations of the solar magnetic field, solar flares, and CMEs, are of particular importance in study of their relationships one other. Advanced Space-based Solar Observatory (ASO-S) is specially proposed to serve these goals. The forum will overview the research progress on the relationships among magnetic field, flares and CMEs, and relevant results acquired by the current missions. Then with the outlook of relevant observations by future missions, special attention will be given to the ASO-S, its key science goals and mission definition, as well as some of the key technological issues. This TAIKONG magazine provides an overview of the scientific objectives and the overall design of the ASO-S project, including spacecraft and instrumentation discussed during the forum.



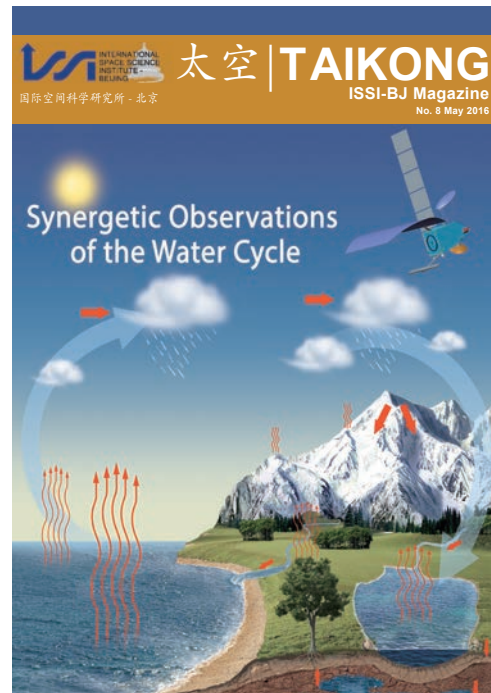
The Authors: Weimin Yuan (NAOC, CAS, China), Julian Osborne (Leicester University, UK).

Transients and variable objects pervade the sky in the X-ray universe. All-sky monitors contributed to new discoveries and/or extensively studies of the X-ray sky since the early days of X-ray astronomy. Time domain astronomy will see its golden era towards the end of this decade with the advent of major facilities across the electromagnetic spectrum and in the multi-messenger realms of gravitational wave and neutrino. The TAIKONG report the scientific use of soft X-ray wide-field monitoring observatories in the Violent Universe domain as well as the technologies. In the soft X-ray regime, the novel micro-pore lobster-eye optics provides a promising technology to realize, for the first time, focusing X-ray optics for wide-angle monitors to achieve a good combination of sensitivity and wide field of view. In this context – a soft X-ray all sky monitor – has been proposed by the Chinese Academy of Sciences. This TAIKONG magazine provides an overview of the scientific objectives and the overall design of the Einstein Probe (EP) project, including spacecraft and instrumentation discussed during the forum.



The Authors: Ding Chen (NSSC, CAS, China), Baoquan Li (NSSC, CAS, China), Doug Lin (UCSC, USA), Michael Shao (Pasadena, USA), Ji Wu (NSSC, China).

Exoplanet research has grown explosively in the past decade, supported by improvements in observational techniques that have led to increasingly sensitive detection and characterization. However, a lasting challenge is the detection and characterization of planetary systems consisting in a mixed cortege of telluric and giant planets, with a special regard to telluric planets orbiting in the habitable zone (HZ) of Sun-like stars. The accomplishment of this goal requires the development of a new generation of facilities, due to the intrinsic difficulty of detecting Earth-like planets with existing instruments. In this context – a Space Micro-arcsecond Astrometry mission to Search for the Terrestrial Exo-Planets (STEP) – has been proposed to enter a new phase in exoplanetary science by delivering an enhanced capability of detecting small planets at and beyond 1 AU. This TAIKONG magazine provides an overview of the scientific objectives and the overall design of the STEP project, including spacecraft and instrumentation discussed during the forum.



The Authors: Jiancheng Shi (RADI, CAS, China), Xiaolong Dong (NSSC, CAS, China), Tianjie Zhao (RADI, CAS, China).

Water (hydrological) cycle is the most active and important component in global mass and energy circulation of the earth system. The existence, transport, and change of water in the atmosphere, land (surface and underground) and oceans play very important roles in the earth system, ecosystem and human society. The responses and feedback (causes and consequences) of water cycle to global change are one of the key questions in the earth science. Observations and modeling are the essentials of water cycle and global change research, especially the retrieval of parameters based on satellites with fine spatial, temporal resolutions and accuracies. A global water observation mission (WCOM) has been proposed by the Chinese Academy of Sciences. The implementation of WCOM expects significant improvement in the observation capabilities and understanding of the responses and feedbacks of water cycle to global change. This TAIKONG magazine provides an overview of the scientific objectives and the overall design of the WCOM project, including spacecraft and instrumentation discussed during the forum.

STAFF PUBLICATIONS

Bernardini, F.; de Martino, D.; Mukai, K.; Israel, G.; Falanga, M.; Ramsay, G.; Masetti, N.; Swift J0525.6+2416 and IGR J04571+4527: two new hard X-ray-selected magnetic cataclysmic variables identified with XMM-Newton; MNRAS, 453, 3100, 2015

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INTERNATIONAL SPACE SCIENCE INSTITUTE BERN

The International Space Science Institute (ISSI) celebrated in autumn 2015 its 20th birthday with a special two day Symposium (see figure). ISSI was created by Space Pioneer Prof. Johannes Geiss in 1995. Since then the institute offers scientists from all around the world a platform to work together.

In 2015 ISSI organized six Workshops: Solar Magnetic Fields (12-16 January 2015), Integrative Study of Sea Level Budget (2-6 February 2015), Dust Devils on Mars and Earth (16-20 February 2015), Earth Magnetic Field (18-22 May 2015), Jets and Winds in Pulsar Wind Nebulae, Gamma Ray Bursts and Blazars (16-20 November 2015), High Performance Clocks, with special emphasis on Geodesy and Geophysics and applications to other bodies of the Solar System (30 November – 4 December 2015) in collaboration with HISPAC.

All Workshops activities lead to a volume in the Space Science Series of ISSI (SSSI) published by Springer.

In the reported period four Working Groups were active: EXPLORNOVA (leader: V. Minier), Consistency of Integrated Observing Systems Monitoring the Energy Flows in the Earth System (leader: K von Schuckmann), Ionospheric Multi-Spacecraft Analysis Tools (leaders: M. Dunlop and H. Lühr), and Satellite Earth Observation for Atmosphere-Ocean Gas Exchange (leader: J. Shutler). Every Working Group work leads to a Scientific Report Volume (SR).

Furthermore 72 Team Meetings were organized. The teams publish usually their results in refereed journals with acknowledgement to ISSI. Over 200 papers are published per year based on ISSI Team activities. Twenty-nine new International Teams

activities. Twenty-nine new International Teams – approved in 2015 by the Science Committee – started their activities in the following business year.

ISSI is using all these tools to address in a strict scientific framework controversial issues and to promote a science program related directly to the most pressing issues raised by space and Earth science missions. On average ISSI is now hosting around 950 scientists per year in its activities.

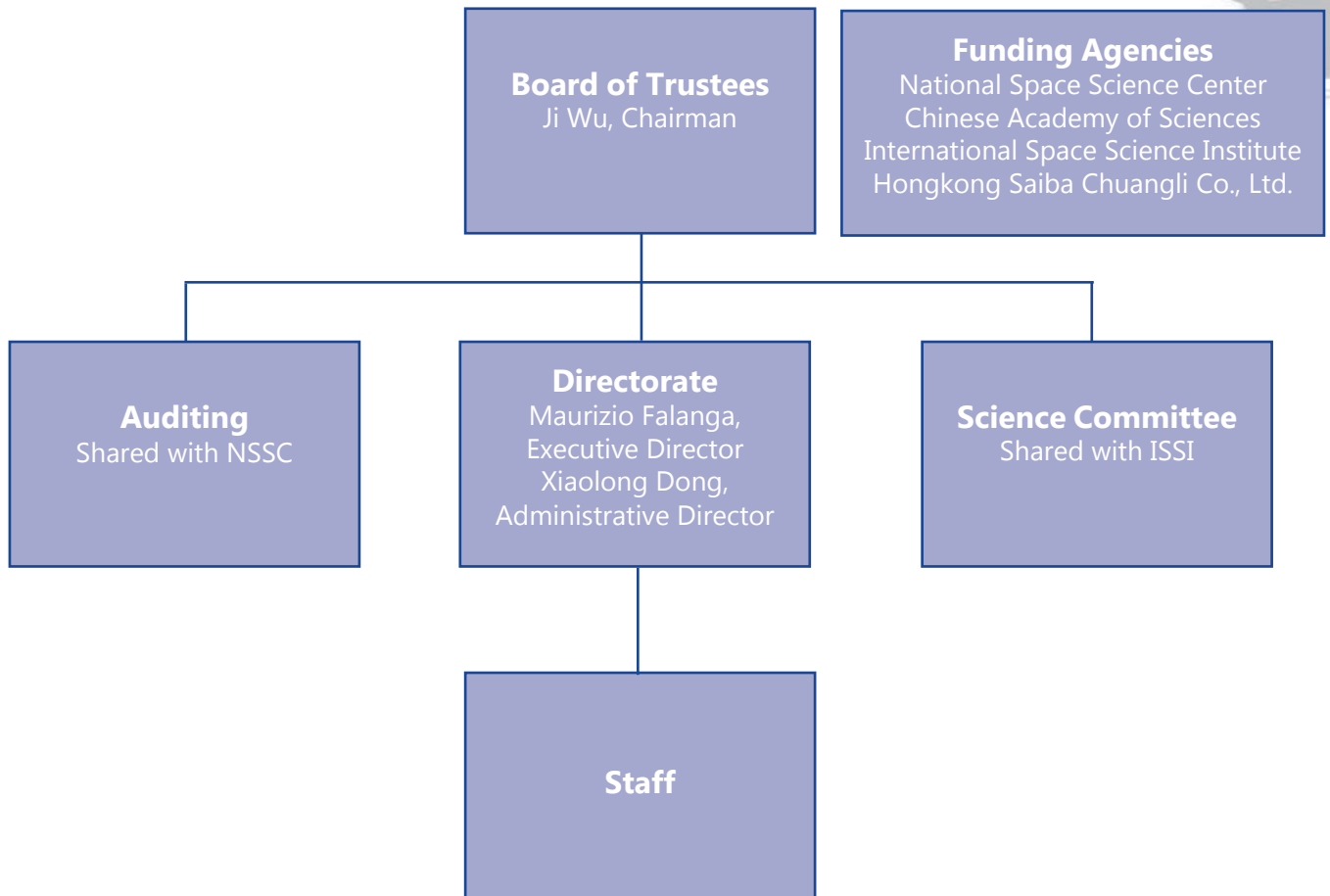
Three statutory bodies interact regularly in matters of strategy, operation, finance or public relations: the Board of Trustees, the ISSI Directorate and the Science Committee. The latter is shared with ISSI-BJ. Since 2013 Rafael Rodrigo is ISSI's Executive Director. Together with the other directors Rudolf von Steiger, Anny Cazenave and John Zarnecki, the directorate is in charge of the scientific, operational and administrative management of the institute. The complete ISSI staff (scientists and administration) counts 19 members.

The European Space Agency (ESA), the Swiss Confederation, the Swiss National Science Foundation (SNF) provide the financial resources for ISSI's operation. The University of Bern contributes through a grant to a Director and in-kind facilities. The Space Research Institute (IKI) and the Institute of Space and Astronautical Science (Japan Aerospace Exploration Agency, JAXA) are supporting ISSI with an annual financial contribution.

The complete information about the Institute, its present and near term program and its publications can be found on the web page www.issibern.ch.



ISSI-BJ's ORGANIZATIONAL STRUCTURE



The **Board of Trustees** supervises the work accomplished at the Institute, exerts financial control and appoints the Directors. It consists of representatives of the Founder and of the funding agencies. The Board of Trustees is presided over by Ji Wu.

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the International Team proposals in response to the annual call. Science Committee members serve a three year term with a possible extension of one year.

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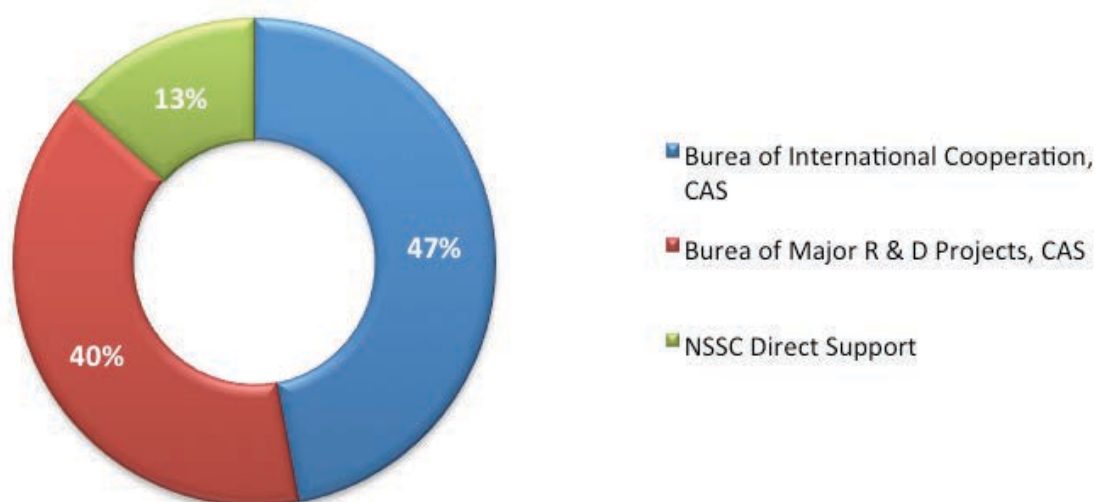
FINANCIAL OVERVIEW

The 2015 fiscal year, from 1 January, 2015 to 31 December of 2015, ISSI-BJ was operated with the total revenue of 1'440'983.93 RMB and the total expenses were 1,339,324.71 RMB. The surplus is 101,659.22 RMB, which will be transfer to 2016 budget and used for the cross-year activities. In addition we have a donation of 500'000 RMB.

The funding includes: direct financial support of 678'000.00 RMB from the Bureau of International Cooperation of Chinese Academy of Sciences (CAS); project support of 570'000.00 RMB from the Bureau of Major Research and Development

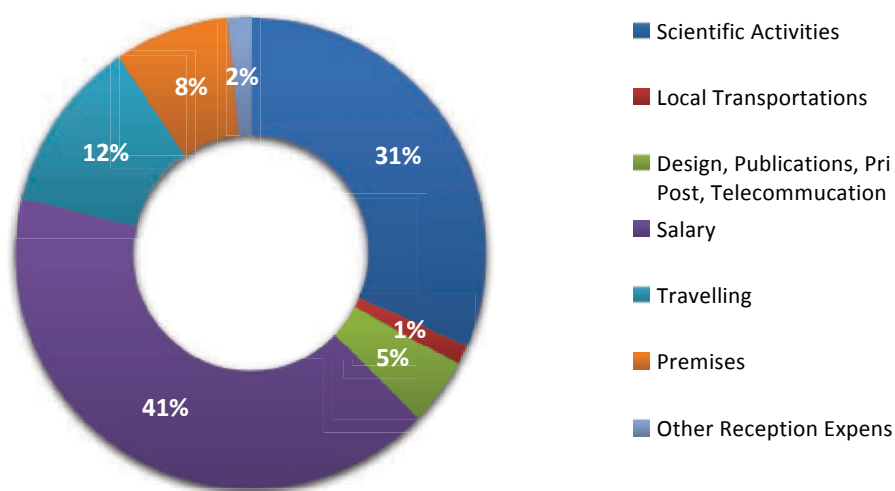
Programs of CAS for activities; direct support of 192'983.93 RMB from the National Space Science Center (NSSC) of CAS for expenses on premises, facilities, half salary of one staff and the international traveling of the administrative director for ISSI/ISSI-BJ activities. The financial support from the Bureau of International Cooperation of CAS include 350'000.00 RMB as international organization project for ISSI-BJ activities and 328'000.00 RMB as international talent project for the salary and traveling of the Executive Director.

2015 Revenues



2015 fiscal year revenues

2015 Expenses



2015 fiscal year expenses

Total Revenues in RMB for 2015 Fiscal Year (1 January, 2015 - 31 December, 2015)

Funding Sources	Amount
Bureau of International cooperation, CAS (ISSI-BJ activities)	350'000.00
Bureau of International cooperation, CAS (Talent project)	328'000.00
Bureau of Major R & D Projects, CAS	570'000.00
NSSC direct support	192'983.93
Total	1'440'983.93

Operating Expenses in RMB for 2015 Fiscal Year (1 January, 2015 - 31 December, 2015)

Expenses	Amount
Scientific Activities ¹	421'210.53
Local Transportations	18'548.00
Design, Publications, Printing, Post, Telecommunication	61'815.77
Salary ²	551'901.34
Travelling ³	159'987.68
Premises	104'652.39
Other Reception Expenses	21'209.00
Total	1'339'324.71

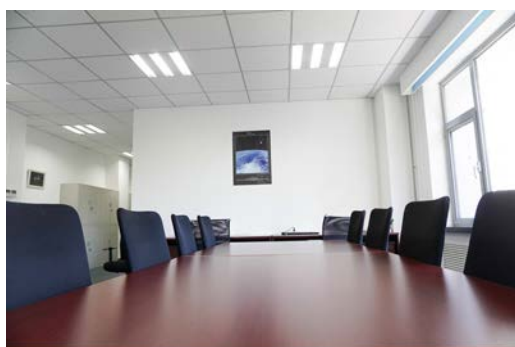
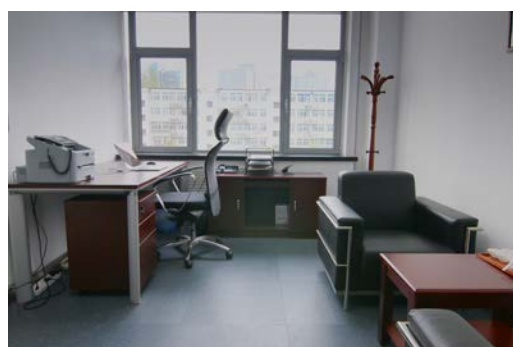
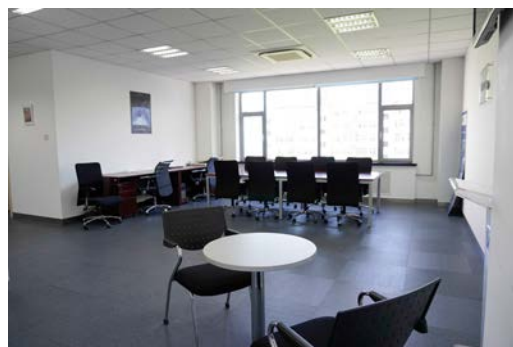
Remarks:

¹Scientific activities expenses include 1 workshop and 11 international teams;

²Salary includes the salaries for staff (salary for administrative director is not included);

³Traveling expenses include the international and domestic traveling of of the executive director and other ISSI-BJ and ISSI activities.

FACILITIES



The 90 m² ISSI-BJ office space consists of one smaller meeting room (suitable for up to 12 participants) equipped with a projector, a working station with a computer, as well as a coffee and reading area providing all ISSI-BJ and ISSI publications. The two attached office rooms offer space for the ISSI-BJ staff members and are equipped with printers, laptops and computers. Furthermore, ISSI-BJ shares its conference facilities with the National Space Science Center of the Chinese Academy of Sciences. The facilities are composed of six seminar rooms (20-30 participants each), two lecture halls (up to 100 participants each) and one multimedia conference hall (30 participants). All rooms are equipped with overhead projectors for large screen presentations and high speed wireless network connection.



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