



Issue 18

All About The Chinese Space Programme

# Go TAIKONAUTS!

龙腾太空

January 2016



**One Track, Two Stations -  
Proposal for Cooperation on CSS and ISS**



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

by Jacqueline Myrrhe

Among chocolate, precision watches and other noble and interesting things, Switzerland is famous for its cheese with big-big holes in it. What is lesser known about Switzerland is the existence of its academic environment and space science expertise. But still, it was Professor Johannes Geiss, a Swiss scientist who drove the establishment of the International Space Science Institute in Bern.

In the late 1980s, the international exploration of Comet Halley, involving the big space agencies of that time lead to a big success but also a wealth of data. Together with his colleagues, Prof. Geiss wanted to make best use out of those collected valuable information, and looked for ways to utilise the results in an interdisciplinary way - coordinated and across the different fields of science. So what might be good for Swiss cheese - having big holes and gaps - is not at all desirable in scientific research.

Since the establishment of ISSI in Bern in 1995, several means of scientific interaction and intellectual exchange were successfully introduced. The office is open to **Visiting Scientists** by invitation "to work on scientific subjects at the forefront of research in areas of the international space science communities."

But there are also **International Teams** formed after applications originating from an Annual Call. Typically, the International Teams

are "composed of about 8-15 scientists of different laboratories, nationalities and expertise. They hold a series of two to three one-week meetings over a period of 12 to 18 months".

Another ISSI tool are **Working Groups**, which "are set up for specific tasks, also of technical nature. The results of the Working Groups activities are published as volumes of ISSI Scientific Report Series or in the scientific literature".



**"I wish science could be a tool, just like sport, to break any political barrier and bring people to work together"**

**interview with Prof. Maurizio Falanga, Executive Director of International Space Science Institute Beijing**

For the past two decades, China has been greatly looking to the stars. In 1992, China started the implementation of a strong space programme, which resulted in the development and launch of the Shenzhou spacecraft and the Long March launcher, the first taikonaut in space in 2003, as well as the orbiting space station Tiangong 1 in 2011. Meanwhile, China has sent various satellites to space, including the lunar probe Chang'e, to

ISSI's Science Committee recommends up to five topics per year, studied during a one-week long **Workshop**. The Workshops "can be attended by 40-45 invited scientists and experts. 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".

And last but not least, once a year, ISSI invites 25 leading experts for a two-day **Forum** where "informal and free debate ... on open questions of a scientific nature or of science policy matters" can take place in Bern.

ISSI Bern's website (<http://www.issibern.ch/index.html>) explains in clear and good detail the conditions and options for taking part in those activities. Also, on the website are well-sorted links to ISSI's publications, although only the outreach publications (Annual Report, ISSI presentation, Spatium magazine) are for free download.



On 16 July 2013, Professor Rafael Rodrigo, Executive Director of the International Space Science Institute ISSI and Professor Wu Ji, Chairman of the Board of Trustees of ISSI-Beijing and Director General of NSSC, jointly inaugurated the International Space Science Institute-Beijing. ISSI Beijing is hosted at the National Space Science Center NSSC of the Chinese Academy of Sciences CAS. (credit: ISSI/NSSC)



ISSI Beijing's science publication "Taikong" (credit: ISSI/NSSC)



The success of ISSI, did not echo throughout Switzerland only. ISSI Bern earned European-wide, actually world-wide recognition. In autumn 2011, the Director General of China's National Space Science Center, NSSC, Prof. Wu Ji visited the Bern institution and what he saw inspired him to the idea to "export" ISSI's structure, tools and working mechanisms to Beijing. Later on he recalled: "The idea to establish ISSI-BJ goes back to my visit of ISSI Bern in October 2011. It surprised me that a small organisation, with less than 20 staff members, has such a good performance attracting nearly 1,000 top-level scientists from all over the world every year in different disciplines of space science to do cutting-edge research and to discuss the frontier topics together. Of course, my positive impression also came from the institute's outstanding outcomes of both publications and reports, which has a significant influence on the space science communities. During this visit, I proposed the initiation of establishing a branch in Beijing. I discussed with Professor Roger-Maurice Bonnet, then the Executive Director of ISSI. We both agreed that such a new institute could contribute to the international space science community, to the development of space science in China and of course to the development of ISSI itself."

In the "Annual Report 2013/2014 of International Space Science Institute Beijing (ISSI-BJ)" Wu Ji, describes what then followed after his trail-blazing visit.

Already in February 2012, Mr. Simon Aegerter, at that time Chair of the ISSI Board of Trustees, and Professor Roger M. Bonnet, the Executive Director of ISSI flew to China's capital to meet Wu Ji at his home institution, the National Space Science Center (NSSC) in Beijing. Here the group discussed the implementation of ISSI in Beijing and the two parties signed a MoU for cooperation, which was approved by the ISSI Bern's Board of Trustees in June 2012. After the adoption of the proposal in November 2012, preparation of the new institute started straight away. Wu Ji again: "In April 2013, the ISSI Board confirmed the status of ISSI-BJ and agreed that ISSI-BJ can share the name, the logo and the

explore our solar system more intensely. Future missions are already planned: the Chinese nation continues its "space dream". Prof. Maurizio Falanga, Executive Director of ISSI Beijing was so kind to give more detail on the involvement of his institute in progressing the current situation.

***GoTaikonauts!: What is your evaluation of the work of ISSI Beijing during the first two and a half years of its existence?***

**Prof. Falanga:** I would say that ISSI Beijing was established at the right moment in the appropriate country. There are two reasons behind it: 1. ISSI Beijing is an international cooperative platform for space science research. 2. China is now developing space science missions quickly.

It is not only an important platform of international cooperation for Asian space science, but also an important window of making Chinese space science missions open to the world and making scientists all over the world know Chinese or Asian space science missions.

The programme of ISSI covers a widespread spectrum of disciplines including the physics of the solar system and planetary sciences to astrophysics and cosmology, and from Earth sciences to astrobiology. Already during the first two and a half years of its existence, ISSI Beijing was able to invite world-leading space science scientists and Principal Investigators. ISSI Beijing is developing into an institute of excellence in Beijing and is also able to strengthen the relations between Asian/Chinese scientists and foreign scientists, such as ESA and NASA, etc.

***GoTaikonauts!: Which of ISSI Beijing's tools are in particular successful and why?***

**Prof. Falanga:** ISSI Beijing is an international, neutral and non-profit institute to serve the space science communities. ISSI Beijing's mission objectives are quite unique, since it is an institute to serve the space science communities in multi-lateral and multi-disciplinary activities. ISSI-Beijing is open to support projects from any Asian or international scientist or institute; therefore, ISSI Beijing is able to attract Asian as well as international scientists to work together in Beijing. Its main objective is to deepen the understanding of space science and technology for future Chinese space missions and to study the results of past missions through multi-disciplinary research. To achieve this, the Institute organises equally useful forums, workshops, meetings for international teams, etc.

***GoTaikonauts!: What are the long-term objectives of ISSI Beijing?***

**Prof. Falanga:** NASA (National Aeronautics and Space Administration of the U.S.A.) and ESA (European Space Agency) cut some financial resources, but China has a remarkable space programme. Before, Europe used to look at the United States for international cooperation, now

tools with ISSI." Just as ISSI's tools would be shared and implemented mirroring the Bern institutional environment. But most importantly Prof. Wu stressed: "ISSI-BJ quickly became an ISSI-like institute but with its own characteristics. ... [The] new institute, the International Space Science Institute - Beijing, was inaugurated on July 16, 2013. Since then, we have seen ISSI-BJ growing well and becoming a wonderful platform for the international space science communities, which is both the objective of ISSI in Bern and also this institute in Beijing."

While ISSI-Beijing's first Executive Director, became Professor Maurizio Falanga, the function of the Chairman of the Board of Trustees of the International Space Science Institute Beijing, was given into the trustworthy hands of Prof. Wu Ji - a scientist who has gained extensive working experience in Europe and is like nobody else predestined and experienced to drive China's science onto the global stage. He stated in ISSI-Beijing's Annual Report 2013/2014: "The message I would like to impart to you here is, that what you have seen till now is just the beginning. There is still a great potential for development. On the one hand, China is developing very fast which provides great opportunities to invest in space science satellite missions. On the other hand, a fast-growing space research community in China needs to talk with their colleagues abroad. The most efficient way is to go to ISSI-BJ. For the same reason, space researchers outside of China may find new opportunities here with both missions and people. I would like to express, that everyone is welcome at ISSI-BJ. It is a purely international, and multi-lateral, platform. Science is freely discussed without disturbances. Please come to visit us and give your contributions on space science."

For all who cannot so easily come along to Beijing, ISSI Beijing's website is worth a side trip. One can find the download link for the Taikong magazine, published by ISSI Beijing. The Taikong brochure constitutes the output of the Forums organised at ISSI-Beijing. It reports the content of the forums



and reflects, in a neutral way, the Forum's discussions and advice from all the participants.

Also on the website are information on all the past and upcoming activities, organised in Beijing. An interesting and innovative activity in Beijing is "Understanding Science" co-organised by the UK Royal Society of Chemistry RSC, the Institute of Physics IoP and the International Space Science Institute in Beijing. Through scientific lectures in the English language, a broader public is made aware of today's accomplishments in research. During its past events, Swiss astronaut Prof. Claude Nicollier or even Prof. Wu Ji himself have used this opportunity to get in direct contact with the young generation of Chinese scientists. It is worth stressing that the already mentioned "Annual Report 2013/2014" is an informative and revealing read. On page 15 - 16, Visiting Scientists Professor Mario J. Pinheiro, University of Lisbon, Portugal and Vittorio De Falco, Ph.D. candidate, University of Basel/ISSI, Switzerland, share their rich experience about their work in ISSI-Beijing and their experiences in China.

Prof. Falanga was right when he emphasised the fact that ISSI Beijing "was established at the right moment in the appropriate country." A recent interview with Chinese physicist Pan Jianwei by science weekly "Nature", revealed that China is in the middle of getting rid of its past reputation of not investing sufficiently in space science.

Pan Jianwei from the University of Science and Technology of China in Hefei is leading a satellite project aimed at setting-up a quantum communications link between Earth and space to be launched in June this year. When "Nature" magazine asked him whether basic-research satellites are a new trend

the attention of U.S., European and Japanese scientists moved to China for future space missions, they even come to Beijing at their own expense, to take part in our international and neutral platform to do research, to bring their contribution and to discuss about future missions.

I wish science could be a tool, just like sport, to break any political barrier and bring people to work together on science. China contributes significantly to this process and ISSI Beijing should give its small contribution.

**GoTaikonauts!: What do you personally like best about your work in Beijing - with Chinese colleagues, in a Chinese environment?**

**Prof. Falanga:** China nowadays opens its doors to all and this Institute is a small part of this new philosophy: be open to other countries, to welcome scientists here to work together with Chinese colleagues to facilitate international cooperation in space research. So, all what is organised here, must be international, multi-disciplinary, and informal. This is a neutral area where scientists meet just for the sake of scientific research.

for China, he answered that previously only the army and the Ministry of Industry and Information Technology were able to transport payloads into space: "So scientists had no way to launch a satellite for scientific research. ... We at the Chinese Academy of Sciences CAS really worked hard to convince our government that it is important that we have a way to launch science satellites. In 2011, the central government established the Strategic Priority Program on Space Science, which DAMPE and our quantum satellite are part of. This is a very important step." Pan Jianwei went on to explain that also for the future Chinese Space Station, the signs look promising for science: "The mechanism to make decisions for which projects can go to the [Chinese] space station

has been significantly changed. Originally, the army wanted to take over the responsibility, but it was finally agreed that the Chinese Academy of Sciences is the right organisation. We will have a quantum experiment on the space station and it will make our studies easier because we can from time to time upgrade our experiment (unlike on the quantum satellite). We are quite happy with this mechanism. We need only talk to the leaders of CAS - and they are scientists, so you can communicate with them much more easily."

Pan Jian Wei's words illustrate clearly that ISSI Beijing was indeed established in the right place at the right time - offering potential benefits for the science community all over the world.

Links:

**ISSI Beijing:** <http://www.issibj.ac.cn/>

**Taikong magazine:** [http://www.issibj.ac.cn/Publications/Forum\\_Reports/201404/t20140404\\_119042.html](http://www.issibj.ac.cn/Publications/Forum_Reports/201404/t20140404_119042.html)

*The article is based on information from ISSI Bern and ISSI Beijing website and the "Annual Report 2013/2014 of International Space Science Institute - Beijing (ISSI-BJ)" The interview by science magazine "Nature" with physicist Pan Jianwei can be found at: <http://www.nature.com/news/china-s-quantum-space-pioneer-we-need-to-explore-the-unknown-1.19166>*

## "We hope that our institute will become an integral and important part of the Chinese space institutional environment."

interview with Prof. John Zarnecki

Go Taikonauts! spoke with Prof. Dr. John Zarnecki at the 10th UK-China Workshop on Space Science & Technology in September 2015 in Newbury, UK.

**GoTaikonauts!: Prof. Zarnecki, I understood that you – despite being retired – are very-very busy again?**

**Prof. Zarnecki:** I always have listened in disbelief to those old people who claim that they have never been so busy since they retired. Now I find, that I am saying that.

**GoTaikonauts!: How does it feel?**

**Prof. Zarnecki:** I took the right decision. After having taught

students for 35 years, I do, again, interesting things. I work part-time at ISSI, the International Space Science Institute. ISSI was established in 1995 in Bern, Switzerland. One of ISSI's strengths is to bring people from all over the world together - in a multi- and interdisciplinary way – to address open scientific questions. At the end of this process which can take up to a week, the experts produce an output in the form of a scientific paper, or we have a series of books published by a renowned international science publisher.

The brain behind ISSI was Swiss Professor Johannes Geiss who is a very eminent space scientist now approaching the age of 90. He was responsible for the first experiment deployed