

EXPLORATION OF OUTER HELIOSPHERE AND NEARBY INTERSTELLAR MEDIUM

NOVEMBER 7-8, 2019
SATURN HALL A0418

Short term (100 AU, Two directions)

Long term (1000 AU)

Vision (50,000 - 100,000 AU)



CONTENTS

| | |
|--|-----------|
| ABOUT ISSI-BJ | 3 |
| ISSI-BJ Call for proposals | 4 |
| ORGANIZERS | 5 |
| Conveners | 5 |
| Sponsors | 5 |
| FORUM OUTLINE AND PROGRAM | 6 |
| Context and Objectives of the Forum | 6 |
| Main Themes of the Forum | 7 |
| Program | 8 |
| PRACTICAL INFORMATION | 11 |
| Venue | 11 |
| WIFI Access | 11 |
| Accommodation | 12 |
| Lunch | 13 |
| Coffee Breaks | 13 |
| Useful Information | 13 |
| Emergency Contact Person in China | 13 |
| November 7 Dinner Location | 14 |
| PARTICIPANTS | 15 |
| NOTES | 17 |

ABOUT ISSI-BJ

The International Space Science Institute in Beijing (ISSI-BJ) was 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 Space Science Strategic Project of the Chinese Academy of Sciences (CAS). ISSI-BJ is a close cooperation partner of ISSI in Bern. The two 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.

ISSI-BJ is a non-profit research institute. Our main mission 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, modelling, numerical simulation and laboratory experiments, using the same tools as ISSI, i.e. **Forums, International Teams, Workshops, Working Groups or individual Visiting Scientists.**

The Program of ISSI-BJ covers a widespread spectrum of space science disciplines, including astrophysics, solar and space physics, planetary science, astrobiology, microgravity science and Earth observation from space.



ISSI-BJ CALL FOR PROPOSALS

ISSI-BJ Activities

ISSI-BJ organizes a wide range of activities, such as Forums, Workshop, Working Groups, and International Teams. **Applications to join our programs are always welcome.** More info available at issibj.ac.cn.



International Teams *Annual call in January*

Goal: Research focus, 10-15 scientists
 Duration: 1-2 years
 Result: Publications
 Support: Living costs while in Beijing, travel support to team leader



Workshops

Goal: Research focus, 30-40 scientists
 Duration: 5 days
 Result: Book
 Support: Living costs while in Beijing



Forums

Goal: Open discussion among 20-30 scientists
 Duration: 2 days
 Result: Taikong Magazine
 Support: Living costs while in Beijing



Visiting Scientists

Goal: Research focus
 Duration: As long as needed
 Result: Book and publications
 Support: Living costs while in Beijing, travel support if needed

ORGANIZERS

The forum "Exploration of Outer Heliosphere and nearby Interstellar Medium" is organized by the International Space Science Institute - Beijing (ISSI-BJ).

Conveners

- Wang Chi - NSSC, CAS, China
- Ralph L. McNutt Jr. - Johns Hopkins University, USA
- Robert F. Wimmer-Schweingruber - University of Kiel, Germany
- John D. Richardson - Massachusetts Institute of Technology, USA
- Li Hui - NSSC, CAS, China
- Maurizio Falanga - ISSI-BJ, China

Sponsors



FORUM OUTLINE AND PROGRAM

Context and Objectives of the Forum

The outer heliosphere and its interaction with surrounding interstellar space is still an uncharted territory in heliophysics. Although in-situ observations from Voyagers and remote observations from IBEX and Cassini are providing significant new information about the heliospheric boundary region, a specially designed interstellar probe with modern instruments and measurement requirements better defined by these recent observations can provide the new information to the scientific questions, likely,

- 1) What is the nature of the nearby interstellar medium?
- 2) How does solar wind evolve and interact with the interstellar medium?
- 3) What is the structure and dynamics of heliosphere?
- 4) How did matter in the solar system and interstellar medium originate and evolve?

NASA and ESA have done many pre-studies on a specially designed interstellar mission. Since 2014, China started to carry out some concept studies on similar mission, such as the Strategic Priority Research

Program of Chinese Academy of Sciences. Recently, a Xiangshan scientific conference was held in Beijing to discuss the feasibility of launching two interstellar probes with opposite directions by China. One probe is expected to fly towards the heliospheric "nose" region and the other one is towards the heliotail.

The aims of this ISSI-BJ FORUM are related to understand the global nature of our local galactic environment, which is significantly more complex than previously thought. During this FORUM the participants, will discuss:

- 1) the most valuable scientific objectives for two different directions;
- 2) how to maximize scientific outputs during the journey to the heliospheric boundary;
- 3) payload suggestions and specifications.

Main Themes of the Forum

The forum aims to divide the meeting into 4 main sessions, including:

- Fundamental questions in contemporary space science related to outer heliosphere and nearby interstellar medium
- Scientific objectives of an interstellar mission with two exploring directions
- The overall payload suggestions and specifications
- International Collaborations

Program

THURSDAY, November 7

| | Subject | Contributor |
|-------------|--|----------------------------|
| Session 1 | Introduction and Overview | Chair: John Richardson |
| 09:00-09:10 | Welcome and Introduction to ISSI-BJ | Laura Baldis |
| 09:10-09:40 | Interstellar Express: A New Chinese Mission to Outer Heliosphere | Wang Chi |
| 09:40-10:10 | Study of a Near-Term Interstellar Probe for the Decadal Survey: Status | Ralph L. McNutt Jr. |
| 10:10-10:30 | <i>Coffee Break</i> | |
| Session 2a | Recent Progresses in Understanding Outer Heliosphere and Nearby Interstellar Medium | Chair: Guo Xiaocheng |
| 10:30-11:00 | The heliosphere and interstellar medium interaction: current and future observations | John Richardson |
| 11:00-11:30 | Magnetic trapping of galactic cosmic rays in the outer heliosheath | Vladimir Florinski |
| 11:30-12:00 | Free Discussion | |
| 12:00-14:00 | <i>Group photo and lunch</i> | |
| Session 2b | Recent Progresses in Understanding Outer Heliosphere and Nearby Interstellar Medium | Chair: Ralph L. McNutt Jr. |
| 14:00-14:30 | Magnetic field in the outer heliosheath: existing constraints and open questions | Vladislav Izmodenov |
| 14:30-15:00 | Our Heliospheric Shield: Some of the Most Pressing Science Questions | Merav Opher |
| 15:00-15:30 | <i>Coffee Break</i> | |

THURSDAY, November 7

| | Subject | Contributor |
|-------------|--|---------------|
| 15:30-16:00 | Interstellar neutrals (H, He, O, Ne) in the heliosphere measured by IBEX | Igor Baliukin |
| 16:00-16:30 | Study galactic cosmic ray modulation using the interstellar probe | Luo Xi |
| 16:30-17:00 | Solar wind events and their consequences in the outer heliosphere | Guo Xiaocheng |
| 17:00-17:30 | Free Discussion | |
| 18:30 | <i>Dinner offered by ISSI-BJ</i> | |

FRIDAY, November 8

| | Subject | Contributor |
|-------------|--|------------------------------------|
| Session 3 | Scientific objectives of interstellar mission | Chair: Robert Wimmer-Schweingruber |
| 09:00-09:30 | From Earth's Magnetospheres to the Outer Heliosphere & beyond | Zong Qiangang |
| 09:30-10:00 | Icy Giants (and Planet Nine) as the Windows of Opportunity in Outer Heliospheric Exploration | W-H Ip |
| 10:00-10:30 | <i>Coffee Break</i> | |
| Session 4 | Payload Suggestions and Specifications | Chair: Li Hui |
| 10:30-11:00 | In-Situ Investigation Of The Interstellar Medium | Robert Wimmer-Schweingruber |
| 11:00-11:30 | PKU ENA Imager | Wang Linghua |

FRIDAY, November 8

| | Subject | Contributor |
|-------------|---|--------------------------------|
| 11:30-12:00 | Free Discussion | |
| 12:00-14:00 | <i>Lunch</i> | |
| 14:00-14:30 | Prospect of Vector Atomic Magnetometer in the Exploration of Outer Heliosphere and Nearby Interstellar Medium | Xue Hongbo |
| 14:30-15:00 | Payloads Proposal for Chinese Interstellar Express Mission | Zhang Aibing |
| 15:00-15:30 | Requirements and design of a dual, thermal ion-electron instrument for an outer heliosphere and interstellar mission (remote) | Benoit Lavraud |
| 15:30-16:00 | <i>Coffee Break</i> | |
| Session 5 | Discussion | |
| 16:00-16:45 | Discussion: - Key science goals - Payload priority | Ralph L. McNutt Jr. |
| 16:45-17:30 | Future work plan: - Outline, structure, publication of the forum report - International Collaboration | Guo Xiaocheng; Laura Baldis |
| 18:00 | <i>Dinner</i> | |

PRACTICAL INFORMATION

Venue

The forum will be held in the Saturn Hall (A0418), NSSC building A, 4th Floor.

Address
N°1 Nanertiao, Zhongguancun, Haidian District, Beijing, 100190
北京市海淀区中关村南二条一号

ISSI-BJ Office
The ISSI-BJ office is located at NSSC, Building A, 4th Floor. It is equipped with computers (MS Windows) with USB ports, connected to high-speed network and printer.

WIFI Access

Login via web: NSSC-guest

Username: issi-bj

Password: issi-bj



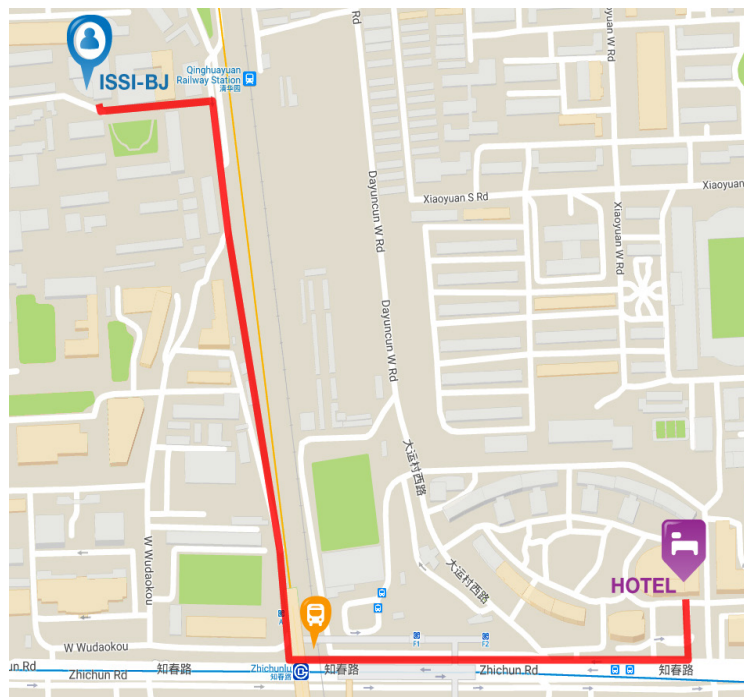
Accommodation

ISSI-BJ covers the cost of the accommodation and breakfast. Please kindly note that all the other expenses in hotel will be deducted from your check-in deposit.

Park Plaza Hotel Beijing Science Park
No.25, Zhichun Road, Haidian District, 100083, Beijing China
北京市海淀区知春路25号

Directions: Turn right on Zhichun Rd. (知春路) when going out of

the hotel. Climb the stairs to the entrance of the metro station Zhichunlu (Exit A), turn left and walk straight for about two minutes. Then turn right on West Wudaokou (西五道口), following the northbound elevated subway. Walk for about 10 minutes, towards the direction of LiaoNing International Hotel (辽宁大厦) or the National Microgravity Laboratory Tower, finding NSSC (国家空间科学中心) on the left. The way is highlighted in red on the map.



Lunch

Lunch for all participants of the ISSI-BJ forum will be available at

the canteen on the -1 floor of the NSSC Building A.

Coffee Breaks

Coffee breaks will be provided at the ISSI-BJ office, across from Saturn hall. See the Program

section to check the coffee break times.

Useful Information

Credit Cards: Credit and debit cards can be used in ATMs displaying the appropriate sign. Credit cards are increasingly becoming accepted in major shopping zones and high level restaurants but keep some cash handy just in case.

Drinking Water: Avoid drinking tap water directly. Bottled water and mineral water can be found in convenience stores and drink stalls. The price is 2-10 yuan RMB per bottle.

You can find two ATMs at the NSSC lobby of Building A.

Electricity: 220 volts AC

Currency: Chinese Yuan Renminbi (RMB)
(1 USD = approx. 7 RMB)
(1 EUR = approx. 7.8 RMB)

Taxi: Please contact Ms. Lijuan EN: +86-139-1139-7464 if you need to book a taxi.

Time: UTC/GMT +8 hours

Emergency Contacts in China

Ms. Lijuan EN +86-139 1139 7464

Ms. Laura BALDIS +86-157 2667 3953

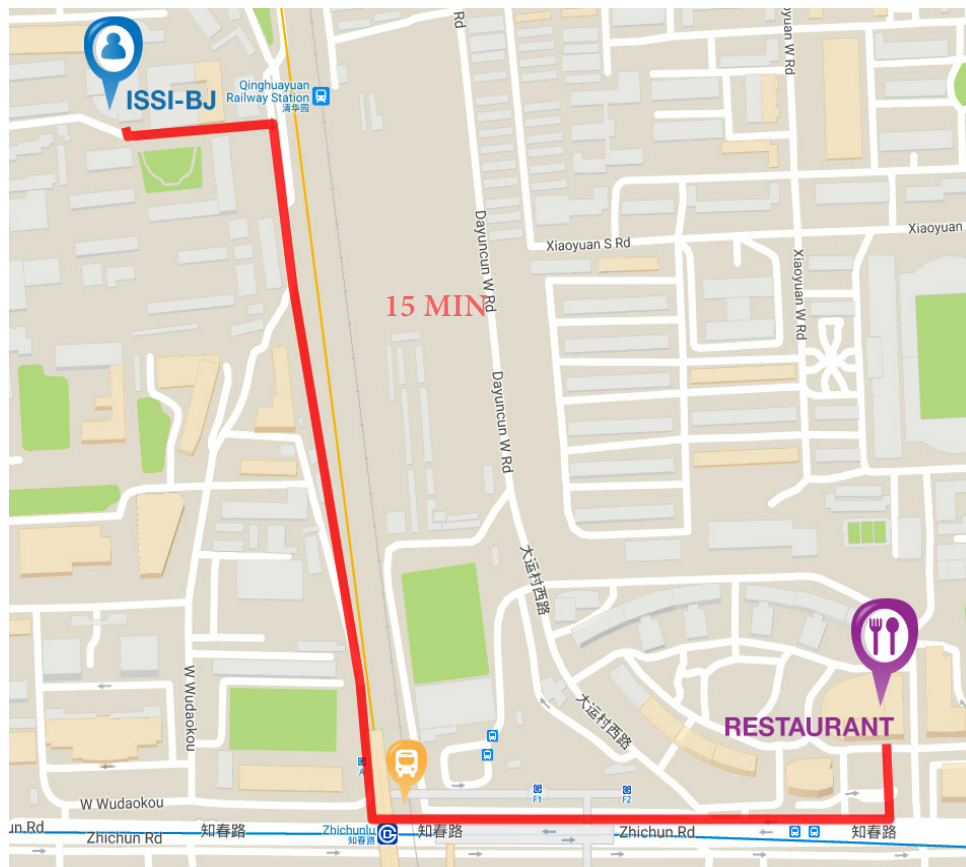
DINNER

Dinner on November 7, 2019

Dinner offered by ISSI-BJ on Thursday, November 7, 2019 at 18:30.

Restaurant:
Amber 6, 2nd Floor of Park Plaza
Beijing Science Park
丽亭华苑酒店金辉6厅 (2楼)

Address:
No. 25 Zhichun Rd. (知春路),
Haidian District, Beijing
北京市海淀区知春路25号



PARTICIPANTS

| No. | Name | Institution |
|-----------------------------------|-------------------------|---|
| CONVENERS AND PARTICIPANTS | | |
| 1 | Baldis Laura | ISSI-BJ, China |
| 2 | Baliukin Igor | Lomonosov Moscow State University, Russia |
| 3 | Florinski Vladimir | University of Alabama at Huntsville, USA |
| 4 | Falanga Maurizio | ISSI-BJ, China |
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| 6 | He Jiansen | Peking University, China |
| 7 | Huang Jiangchuan | China Academy of Space Technology (CAST), China |
| 8 | Ip Wing-Huen | National Central University, Taiwan |
| 9 | Izmodenov Vladislav | Lomonosov Moscow State University, Russia |
| 10 | Lavraud Benoit (remote) | Institut de Recherche en Astrophysique et Planetologie (IRAP), France |
| 11 | Li Hui | National Space Science Center, CAS, China |
| 12 | Luo Xi | National Space Science Center, CAS, China |
| 13 | McNutt Jr. Ralph L. | The Johns Hopkins University, Applied Physics Laboratory, USA |
| 14 | Meng Linzhi | China Academy of Space Technology (CAST), China |
| 15 | Opher Merav | Boston university, USA |
| 16 | Richardson John | Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology, USA |

| No. | Name | Institution |
|-----|-----------------------------|---|
| 17 | Wang Chi | National Space Science Center, CAS, China |
| 18 | Wang Linghua | Peking University, China |
| 19 | Wimmer-Schweingruber Robert | University of Kiel, Germany |
| 20 | Wu Weiren | China National Space Administration (CNSA), China |
| 21 | Xue Hongbo | National Space Science Center, CAS, China |
| 22 | Zhang Aibing | National Space Science Center, CAS, China |
| 23 | Zong Qiugang | Peking University, China |

NOTES

Forum website:

http://www.issibj.ac.cn/Program/Forums/OuterHeliosphere/201906/t20190618_211821.html





Advancing Space Science Research by Worldwide Collaboration

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