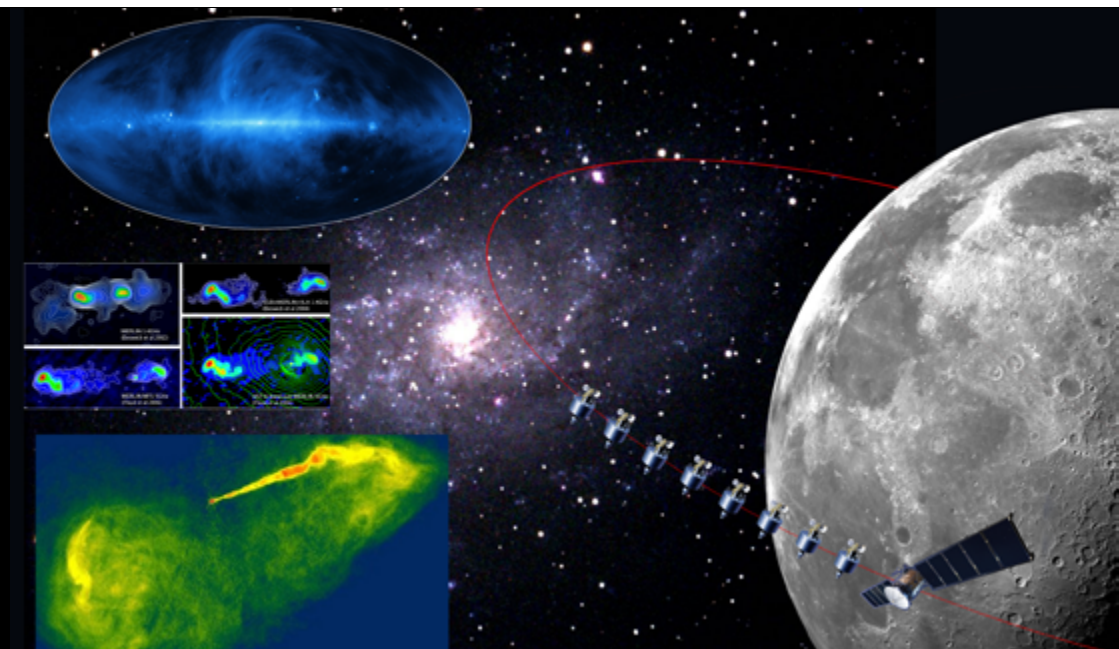


DISCOVER THE SKY BY LONGEST WAVELENGTH  
WITH SMALL SATELLITE CONSTELLATION

January 23-25, 2019



FORUM  
HANDBOOK

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## 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.



## ORGANIZERS

The Forum on “Discover the Sky by Longest Wavelength with Small Satellite Constellation” is organized by the International Space Science Institute - Beijing (ISSI-BJ).

### CONVENERS

- Xuelei Chen, NAOC, China
- Ji Wu, NSSC, CAS, China
- Jack Burns, Colorado University, USA
- Joe Silk, JHU/IAP, USA/France
- Leon Koopmans, Groningen, The Netherlands
- Hanna Rothkaehl, SRC, PAS, Poland
- Maurizio Falanga, ISSI-BJ, China

### SPONSORS



## FORUM OUTLINE AND PROGRAM

### CONTEXT AND OBJECTIVES OF THE FORUM

The aims of this ISSI-BJ FORUM are to discuss the problems of low frequency radio observation, which is hampered on the ground by the ionosphere and man-made radio frequency interferences, and so far our knowledge about the sky in this part of the electromagnetic spectrum is very limited. The scientific problems related to this include e.g., the cosmic dark age and dawn, the Sun, planets and exoplanets, interstellar medium (ISM), galactic structure, radio galaxies, quasars, clusters and intergalactic medium (IGM).

The Chinese Academy of Sciences (CAS) in collaboration with domestic and international partners, is preparing to carry out a few pilot experiments during the

Chang'e-4 (CE-4) lunar mission to be launched this year (2018), and is carrying out intensive studies for a possible future lunar orbit array mission. The lunar orbit array is made up of satellites flying in linear formation on the same orbit, which make both interferometric and single unit observations of the sky on the part of orbit where the Earth is shielded from the view by the Moon.

During this FORUM the participants will discuss the various science problems related to the low frequency radio, such as the signature of cosmic dark age and dawn, the solar system, galactic and extragalactic sources, the propagation effects, and data analysis methods.

### MAIN THEMES OF THE FORUM

1. Overviews of low frequency sky and missions
2. Overview to the Science Problems
3. Past and Current Observations
4. Instruments and capability required
5. Synergies Complementary missions and International Collaborations

## PROGRAM

## Wednesday, January 23

	Subject	Contributor
<b>Session 1</b>	<b>Introduction and Overview</b>	<b>Chair: Ji Wu</b>
8:30-9:00	<i>Registration</i>	
9:00-9:10	Welcome and introduction to ISSI-BJ and requirement for forum	Maurizio Falanga, Xuelei Chen
9:10-9:30	Introduction to CAS Strategic Priority Program on Space Science	Chi Wang
<b>Session 2</b>	<b>Future Low Frequency Space Missions</b>	<b>Chair: Jingye Yan</b>
9:30-10:00	SUNRISE	Justine Kasper
10:00-10:30	Lunar Orbit—DSL	Xuelei Chen
10:30-11:00	<i>Coffee Break</i>	
11:00-11:30	Dark Cosmology: Investigations of Dark Matter with the Dark Ages Polarimeter PathfindER (DAPPER)	Jack Burns (remotely)
11:30-12:00	Future Missions Discussion	Heino Falcke
12:00-13:30	<i>Group Photo and Lunch</i>	
<b>Session 3</b>	<b>Science Cases</b>	<b>Chair: Xuelei Chen</b>
13:30-14:00	Solar Physics	Gregg Hallinan
14:00-14:30	Planets and Exoplanets	Baptiste Cecconi
14:30-15:00	Space Experiments	Stuart Bale
15:00-15:30	Calibration	Albert-Jan Boonstra
15:30-16:00	<i>Coffee Break</i>	

### Wednesday, January 23

	Subject	Contributor
16:00-16:30	Calibration and LOFAR	Leon Koopmans
16:30-17:00	Neutrinos and Cosmic Rays	Linjie Cheng
17:00-17:30	Cosmology with the 21-cm line from the epoch of reionization	Yi Mao
17:30-18:00	Extragalactic Science	Zhiqiang Shen
18:00	<i>Dinner hosted by ISSI-BJ</i>	

### Thursday, January 24

	Subject	Contributor
9:00-9:30	ISM and Pulsar	Ue-Li Pen (remotely)
<b>Session 4</b>	<b>Global Spectrum Experiments</b>	<b>Chair: Joe Silk</b>
9:30-10:00	EDGES	Raul Monsalve
10:00-10:30	SARAS-2	Ravi Subrahmanyan
10:30-11:00	<i>Coffee Break</i>	
11:00-11:30	SCI-HI/High-Z	Jeff Peterson
11:30-12:00	PRIZM	Cynthia Chang
12:00-13:30	<i>Lunch</i>	
13:30-14:00	Dark Ages and Cosmic Dawn Models	Anastasia Fialkov
14:00-14:30	Inhomogeneous Gas and Global Spectrum	Yidong Xu
14:30-15:00	Discussions on Cosmology	Joe Silk
15:00-15:30	<i>Coffee Break</i>	
<b>Session 5</b>	<b>Past and Current Space Missions</b>	<b>Chair: Hanna Rothkaehl</b>
15:30-16:00	CE-4 Longjiang	Li Deng
16:00-16:30	CE-4 NCLE	Marc Klein Wolt

**Thursday, January 24**

	<b>Subject</b>	<b>Contributor</b>
16:30-17:00	CE-4 LFRS	Mark Klein Wolt
17:00-17:30	Discussion on Past and Current Space Experiments	Leonid Gurvits
18:00	<i>Dinner hosted by NAOC</i>	

**Friday, January 25**

	<b>Subject</b>	<b>Contributor</b>
<b>Session 6</b>	<b>Instrument and Technology for Space Missions</b>	<b>Chair: Leon Koopmans</b>
9:00-9:30	DSL: Space Mission CONsideration and Engineering Concept	Jingye Yan
9:30-10:00	Antenna and Receiver	Hanna Rothkaehl
10:00-10:30	Some key technologies for HF and VHF VLBI network radio astronomy in Earth-Moon space	Jinsong Ping
10:30-11:00	<i>Coffee Break</i>	
11:00-11:30	EMI Elimination	Harish Vedantham (remote talk)
11:30-12:00	Imaging	Ben McKinley
12:00-12:30	<i>Lunch</i>	
<b>Session 7</b>	<b>Synergies and Collaboration</b>	<b>Chair: Ji Wu</b>
13:30-14:30	Discussion <ul style="list-style-type: none"> <li>• Open discussion on science and technology</li> <li>• International collaboration</li> <li>• Summary of the Forum</li> <li>• Outline, structure, publication of the forum report</li> <li>• Future work plan`</li> </ul>	



## PRACTICAL INFORMATION

### VENUE

The Forum will be held in the Saturn Hall, NSSC building A, 4<sup>th</sup> 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 CD/DVD drives and USB ports, connected to high-speed network and printer.

### WIFI ACCESS

Login via web: NSSC-guest

Username: issi-bj

Password: issi-bj



## ACCOMMODATION

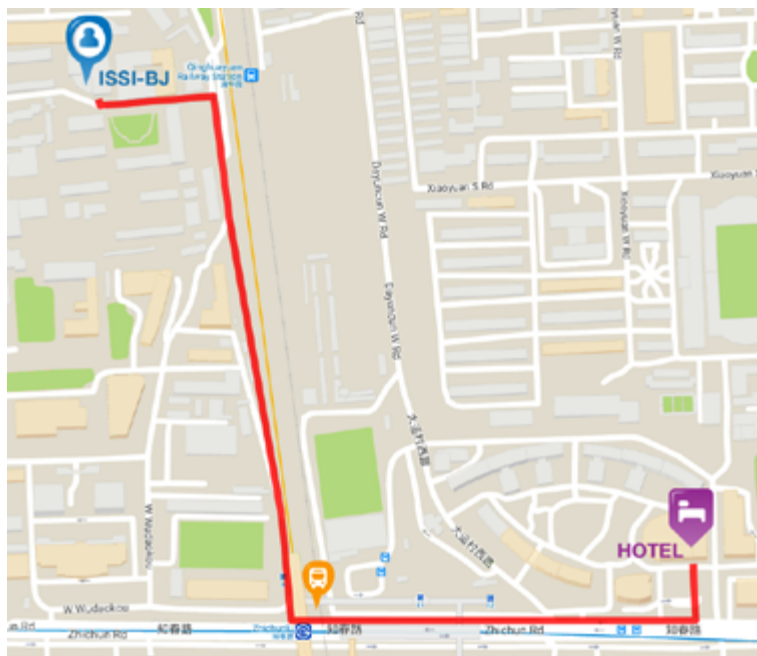
ISSI-BJ covers the cost of the accommodation and breakfast. Please kindly note that all the other expenses in hotel will be deducted from your check-in deposit.

### 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 buffet 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 in the ISSI-BJ Office, across from the

meeting room, see Program 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.

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

**Currency:** Chinese Yuan Renminbi (RMB) (1 USD = approx. 6.6 RMB)  
(1 EUR = approx. 7.8 RMB)

**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.

**Electricity:** 220 volts AC

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

**Time:** UTC/GMT +8 hours

## EMERGENCY CONTACT PERSON IN CHINA

Ms. Lijuan EN +86-139 1139 7464

Ms. Anna YANG +86-185 1002 9307

## ISSI-BJ DINNER LOCATION

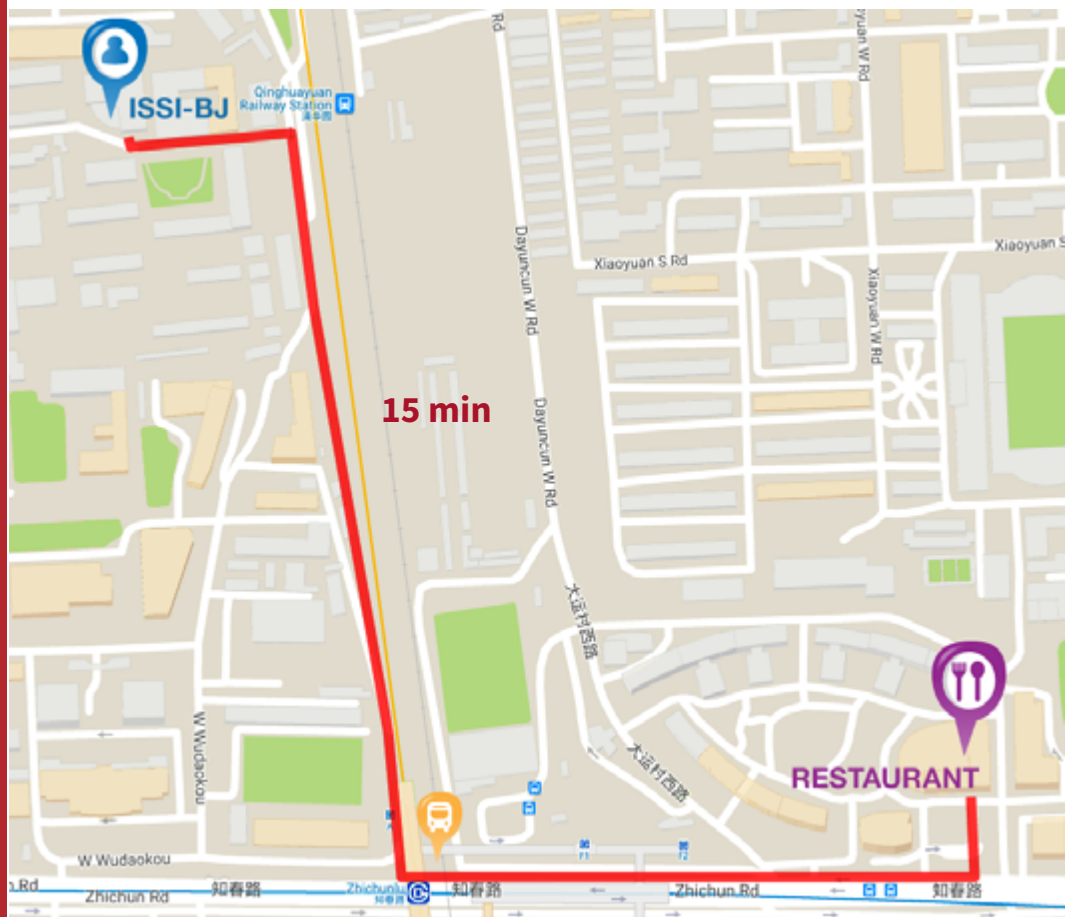
Dinner hosted by ISSI-BJ on  
**Wednesday, January 23 at 18:00.**

### Restaurant:

Amber 6, 2nd Floor of Park Plaza  
Beijing Science Park  
丽亭华苑酒店金辉6厅

### Address:

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

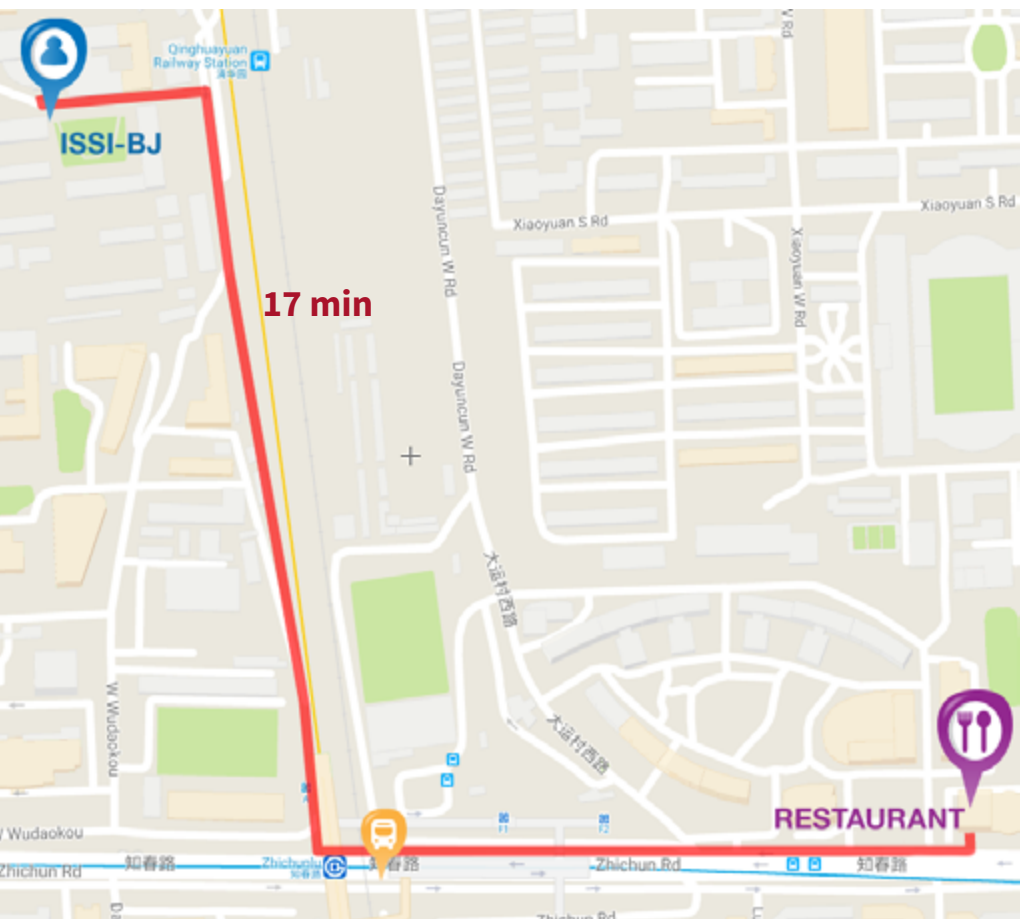


## NAOC DINNER LOCATION

Dinner hosted by NAOC on  
**Thursday, January 24 at 18:00.**

**Restaurant:**  
Feiteng Yuxiang,  
沸腾鱼乡

**Address:**  
No. 17 Zhichun Rd., Haidian  
District, Beijing  
北京市海淀区知春路17号



## PARTICIPANTS

No.	Name	Institution
<b>CONVENERS</b>		
1	Xuelei Chen	NAOC, China
2	Ji Wu	NSSC, China
3	Jack Burns *	Colorado, United States
4	Joe Silk	JHU / IAP, United States / France
5	Leon Koopmans	Groningen, The Netherlands
6	Hanna Rothkaehl	SRC, PAS, Poland
7	Maurizio Falanga	ISSI-BJ, China
<b>PARTICIPANTS</b>		
8	Stuart Bale	Berkeley, United States
9	Albert-Jan Boonstra	Groningen, The Netherlands
10	Baptiste Cecconi	Obs. de Paris, France
11	Cynthia Chang	UKZN, South Africa
12	Linjie Chen	NAOC, China
13	Li Deng	NSSC, China
14	Heino Falcke	Radboud University, The Netherlands
15	Quanlin Fan	NSSC, CAS, China
16	Guangyou Fang	Inst. Electronics, China
17	Taotao Fang	Xiamen, China
18	Anastasia Fialkov	CfA, Cambridge, United Kingdom
19	Leonid Gurvits	European Research Infrastructure Consortium (JIVE), The Netherlands
20	Gregg Hallinan	Caltech, United States
21	Justin Kasper	Michigan, United States
22	Kejia Li	PKU, China
23	Yi Mao	Tsinghua, China

No.	Name	Institution
24	Ben McKinley	Curtin, Australia
25	Raul Monsalve	McGill University, Canada
26	Ue-Li Pen *	CITA, CA
27	Jeff Peterson	Carnegie-Mellon, United States
28	Jinsong Ping	NAOC, China
29	Zhiqiang Shen	SHAO, China
30	Ravi Subrahmanyam	Raman Inst, India
31	Harish Vedantham *	ASTRON, The Netherlands
32	Chi Wang	NSSC, China
33	Marc Klein Wolt	Radboud University, The Netherlands
34	Fengquan Wu	NAOC, China
35	Yidong Xu	NAOC, China
36	Jingye Yan	NSSC, China
37	Bin Yue	NAOC, China
38	Lijuan En	International Space Science Institute - Beijing (ISSI-BJ)
39	Anna Yang	International Space Science Institute - Beijing (ISSI-BJ)

## NOTES



Forum website:

<http://www.issibj.ac.cn/Program/Forums/DiscoverSky/>







Advancing Space Science Research  
by Worldwide Collaboration

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