INTERNATIONAL SPACE SCIENCE INSTITUTE-BEIJING
国际空间科学研究所—北京

TOWARD DETECTION OF EARTH-LIKE PLANETS IN THE UNIVERSE

June 24-25, 2024

Saturn Hall, A0418

FORUM HANDBOOK

CONTENTS

Cover Source: NASA/Ames/JPL-Caltech
Editor/Graphic Design: Francesca GARFAGNOLI, ISSI-BJ

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 is an indipendent and politically neutral institute. We offer generous financial support to the scientists that come to Beijing: we offer coffe break, snacks, launch and dinner at our institute, as well as covering travelling and hotel expenses for the conveners of Workshops and Forums, and the leaders of the International Teams. After each meeting, we also offer support in publishing and promoting articles, essays and peer-reviewed papers.

INTERNATIONAL SPACE SCIENCE INSTITUTE - BEIJING

ISSI-BJ CALL FOR PROPOS-

ISSI-BJ Activities

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

International Teams — Annual call in January

Goal: Research focus, 10-15 scientists
Duration: 5 days each time
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

Working Groups

Goal: Specific tasks, 8-12 scientists
Duration: As long as needed
Result: Springer ISSI Scientific Report Series (SR)
Support: Living costs while in Beijing, travel support if needed

ORGANIZERS

The Forum "Toward Detection of Earth-like Planets in the Universe" is organized by the International Space Science Institute–Beijing (ISSI–BJ).

Conveners

- Christiansen Jessie, NASA Exoplanet Science Institute at Caltech, USA
- Favata Fabio, Imperial College London, UK
- Ge Jian, Shanghai Astronomical Observatory, Chinese Academy of Sciences, China
- Howell Steve, NASA Ames Research Center, USA
- Huang Chelsea, Centre for Astrophysics, University of Southern Queensland, Austrilia
- Mao Shude, Department of Astronomy, Tsinghua University, China
- Wang Sharon, Tsinghua University, China

Sponsor

NSSC

More Information

Wechat Account

Newsletter

FORUM OUTLINE & PROGRAM

Context

"Are we alone?" has been a fundamental question since the dawn of civilization, and we have always been curious about the possibility of extraterrestrial life. Since the discovery of the first giant exoplanet orbiting a sun-like star named 51 Peg in 1995, over 5000 exoplanets have been discovered, with diverse properties and characteristics that are often different from our own planets. However, despite these great advancements, we have yet to discover another habitable Earth-like planet orbiting a sun-like star - an Earth 2.0. This forum will discuss key scientific issues such as "are we alone?", "How common are Earth-like planets in the universe?" "How do terrestrial planets form?", review status on searching of terrestrial-like planets and understanding their formation and discuss future plans for follow-up studies of Earth-like planet candidates detected by the ET space mission.

ET will deploy a space observatory consisting of six wide-field transit telescopes and one microlensing telescope on a halo orbit around the Sun-Earth Lagrange L2 point. It will be the first combined effort to utilize the transit method and the microlensing method, employing space-based ultra-wide field and high-precision optical photometric observations. Its primary objective is to search for as yet undiscovered 'Earth 2.0s' and determine their occurrence rates, conducting the first large-scale survey of terrestrial planets and free-floating planets that are currently poorly understood. It aims to make the first discovery of free-floating Earths and determine their occurrence rates, thereby unraveling the origins of terrestrial and free-floating planets, and providing candidates and new directions for the search for extraterrestrial life.

Objectives

- Reviewing the state in observational and theoretical studies of Earth-like planets and free-floating planets and their formation and evolution
- Increasing the international visibility and impacts of the Earth 2.0 (ET) space mission
- Strengthening the international collaboration in Earth-like planets and ET related science studies
- Discussing follow-up studies of Earth-like planet candidates with ground and space-based telescopes

Forum Program

Monday, June 24

	Subject	Contributor
	Section Chair: Ge Jian	
08:30-09:00	Registration	
09:00-09:10	Welcome Speech	de Grijs Richard
09:10-09:40	Formation of Terrestrial Planets & Evolution of Planetary Systems	Lin Doug
09:40-10:00	Planet Formation & Carbon Depletion Problem in Terrestrial Planets	Ida Shigeru
10:00-10:20	Earth as a Planet Disk	Deng Hongping
10:20-10:40	Early Solar System Giant Planet Instability Triggered by Dispersal of the Protoplanetary	Liu Beibei
10:40-11:00	Simulating the Physics of the Innermost Protoplanetary Disk and its Implications	Bai Xuening
11:00-11:20	Coffee Break	
11:20-11:40	Standing on the Shoulders of Kepler	Zhu Wei
11:40-12:30	Open Discussion	
12:30-12:40	Group Photo at First Floor of Building A	
12:40-14:00	Lunch	
	Section Chair: Lin Doug	

14:00-14:30	What Have We Learned from Kepler & K2 About Small (<2 R_e) exoplanets (*online*)	Howell Steve
14:30-14:50	Gravitational Microlensing: Current Status & Future Prospects	Mao Shude
14:50-15:10	Exoplanets & Iodine	Butler Paul
15:10-15:30	Towards a Unified Story for Planet Formation	Wang Songhu
15:30-15:50	Near-Resonant Configuration Are Prevalent Among Young, Close-in Planetary Systems	Dai Fei
15:50-16:10	Coffee Break	
16:10-16:30	The PLATO Mission (*online*)	Rauer Heike
16:30-16:50	Constraining the Presence of Terrestrial Planet in Hot Jupiter System Through TTV	Ma Bo
16:50-17:10	Atmospheric Characterization of Small-sized Exoplanets	Chen Guo
17:10-17:30	Surfaces of Airless Hot Rocky Exoplanets	Koll Daniel

Tuesday, June 25

Section Chair: Zhou Jilin		
08:30-09:00	Challenges & Opportunities of Re-observing the Kepler Field (*online*)	Vanderberg Andrew

09:00-09:20	Lessons Learned from Space Based Precision Photometry & New Opportunities for a New Deep Wide Field Survey (*online*)	Huang Chelsea
09:20-09:40	The TESS M-dwarf Opportunity - Validation of Small Transiting Planets Around Small Stars (*online*)	Shporer Avi
09:40-10:00	Exoplanet Census: from LAMOST - Gaia - Kepler Synergy to LAMOST - Gaia -ET Synergy	Xie Jiwei
10:00-10:20	Observations of Solar System Analogs	Feng Fabo
10:20-10:40	Holistic Characterization of Small Planets	Wang Sharon
10:40-11:00	Mapping Microlensing Planets: from KMTNet to ET, from Mass-ratio to Mass	Zang Weicheng
11:00-11:20	The MIT Quick Look Pipeline: Leveraging Precise Photometry for Exoplanet, Stellar & Galactic Astrophysics	Sha Lizhou
11:20-11:40	Coffee Break	
11:40-12:30	Open Discussion	
12:30-14:00	Lunch	
	Section Chair: Mao Shude	
14:00-14:20	Enabling Planetary Science Across Light Years with Ariel	Tinetti Giovanna

14:20-14:40	The Earth 2.0 (ET) Space Mission	Ge Jian
14:40-15:00	Ground-based Highresolution Spectroscopy in the Era of ELTs & the Exploration of Small Planet Atmospheres	Palle Enric
15:00-15:20	Planning & Preparation for the Habitable Worlds Observatory (*online*)	Christiansen Jessie
15:20-15:40	Search & Characterize Habitable Planets in Solar Neighbors with Miying Mission	Zhou Jilin
15:40-16:00	The Tianlin Mission & its Recent Progress	Wang Wei
16:00-16:20	Coffee Break	
16:20-16:40	CHES: an Astrometry Mission Searching for Habitable Planets Orbiting Nearby Solar-type Stars	Ji Jianghui
16:40-17:00	The Planet Yield Simulation of ET- How Many Earth 2.0 Could be Discovered by the ET Mission	Zhang Hui
17:00-18:00	Open Discussion & Forum Summary for the Taikong Magazine	
19:00-21:00	ISSI-BJ Annual Dinner	

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 a printing machine, connected to staff members computers. If you need to print something, you can send the file both via email or USB transfer.

WIFI Access

Login via web: ISSI-BJ
Username: ISSI-BJ
Password: ISSI-BJ20130716

Accomodation

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 when going out of Park Plaza Hotel and walk straight for 3 minutes, there is a road "DAYUNCUN LU" (大运村路) in front of the Exit F of ZHICHUNLU (知春路) subway station, then keep going north along "DAYUNCUN LU" (大运村路) for 7-8 minutes, there is JINGZHANG RAILWAY PARK (京张铁路遗址公园) on your left, pass by the football field in the park, and follow the sign (down below) towards the National Microgravity Laboratory Tower, then cross the path, NSSC (国家空间科学中心) is located at the end of the path.

Lunch

Lunch for all participants of the ISSI-BJ Workshop will be available at the canteen on the -1 floor of the NSSC Building A.

Coffee Break

Coffee breaks will be provided by ISSI-BJ in our office in room A0421. 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.
You can find two ATMs at the NSSC lobby of Building A.

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.

Currency: Chinese Yuan Renminbi (RMB)
(1 USD = approx. 7.2 RMB)
(1 EUR = approx. 7.8 RMB)

Electricity: 220 volts AC

Emergency Contacts in China

Ms. EN Lijuan +86-136 9912 1288

Ms. GARFAGNOLI Francesca +86-195 6873 9884

Address:
No. 1 South Street, Haidian District, Zhongguancun, Beijing
北京市海淀区中关村南大街1号

PARTICIPANTS

	Name	Affiliation
CONVENERS & FORUM LEADERS		
1	Christiansen Jessie (*online*)	NASA Exoplanet Science Institute at Caltech, USA
2	Favata Fabio	Imperial College London, UK
3	Ge Jian	Shanghai Astronomical Observatory, Chinese Academy of Sciences, China
4	Howell Steve (*online*)	NASA Ames Research Center, USA
5	Huang Chelsea *online*)	University of Southern Queenland, Australia
6	Mao Shude	Tsinghua University, China
7	Wang Sharon	Tsinghua University, China
PARTICIPANTS		
8	Bai Xuening	Tsinghua University, China
9	Butler Paul	Carnegie Institution for Science in Washington, USA
10	Chen Guo	Purple Mountain Observatory, Chinese Academy of Sciences, China
11	Dai Fei	University of Hawaii, USA
12	Deng Hongping	Shanghai Astronomical Observatory, Chinese Academy of Sciences, China
13	Feng Fabo	Shanghai Jiao Tong University, China
14	Gan Tianjun	Tsinghua University, China; University of Montreal, Canada
15	Hu Quanquan	Shanghai Astronomical Observatory, Chinese Academy of Sciences, China
16	Ida Shigeru	Tokyo Institute of Technology, Japan
17	Ji Jianghui	Purple Mountain Observatory, Chinese Academy of Sciences, China

18	Jin Luoxi	Shanghai Astronomical Observatory, Chinese Academy of Sciences, China
19	Koll Daniel	Peking University, China
20	Lin Doug	University of California at Santa Cruz, USA
21	Liu Beibei	Zhejiang University, China
22	Liu Qingtian	Shanghai Astronomical Observatory, Chinese Academy of Sciences, China
23	Ma Bo	Sun Yat-sen University, China
24	Palle Enric	Institute of Astrophysics of the Canary Islands, Spain
25	Sha Lizhou	University of Wisconsin at Madison, USA
26	Tang Jiaxin	Tsinghua University, China
27	Tinetti Giovanna	Imperial College London, UK
28	Wang Songhu	Indiana University, USA
29	Wang Wei	National Astronomical Observatories, Chinese Academy of Sciences, China
30	Xie Jiwei	Nanjing University, China
31	Yang Hongjing	Tsinghua University, China
32	Yao Xinyu	Shanghai Astronomical Observatory, Chinese Academy of Sciences, China
33	Zang Weicheng	Harvard-Smithsonian Institution, USA
34	Zhang Hui	Shanghai Astronomical Observatory, Chinese Academy of Sciences
35	Zhou Jilin	Nanjing University, China
36	Zhu Wei	Tsinghua University, China

ONLINE SPEAKERS

37	Shporer Avi	Massachusetts Institute of Technology, USA
38	Rauer Heike	Institute of Planetary Research of the German Aerospace Center, Germany
39	Vanderberg Andrew	Massachusetts Institute of Technology, USA

NOTES

NOTES

NOTES

NOTES

INTERNATIONAL SPACE SCIENCE INSTITUTE BEIJING

国际空间科学研究所—北京

The Prime Networking Venue for Space Scientists in East Asia

International Space Science Institute - Beijing

No.1 Nanertiao, Zhongguancun, Haidian District

Beijing, China | Postcde: 100190

Email: g.francesca@issibj.ac.cn