

CROSS-DISCIPLINARY PERSPECTIVES ON SMALL BODY FORMATION AND EVOLUTION

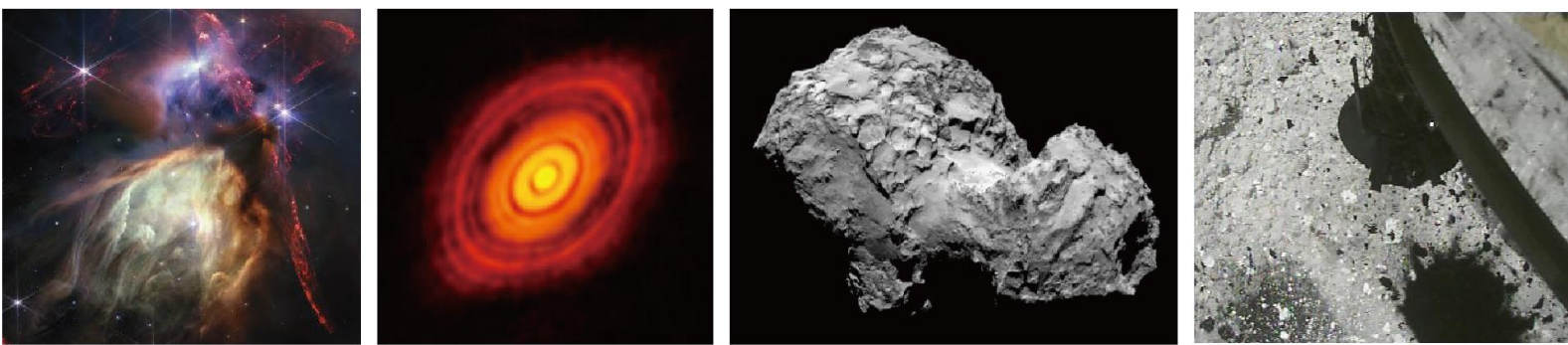


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WORKSHOP HANDBOOK

26-30 OCTOBER, 2026

BEIJING, CHINA

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ISSI-BJ INTRODUCTION

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 Science 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 simulations 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.

WORKSHOP INTRODUCTION

Context

Small bodies preserve a record of the physical and chemical processes that shaped the solar system, from its galactic birth environment and molecular clouds to protoplanetary disks. Planetesimal formation, and the subsequent dynamical, collisional, thermal, and chemical evolution shaped present-day asteroids and comets. Understanding this connected history requires evidence and expertise that are usually distributed across astronomy, planetary science, cosmochemistry, geophysics, materials science, laboratory studies, theoretical modelling, and space exploration.

This workshop comes at a particularly timely moment. Samples returned by JAXA's Hayabusa2 and NASA's OSIRIS-REx missions are providing unprecedented information on primitive asteroids. China's Tianwen-2 mission, launched in 2025, targets a near-Earth quasi-satellite and a main-belt comet, while Japan's Martian Moons eXploration (MMX) mission will investigate Mars's small satellites. At the same time, ALMA and JWST observations of star and planet forming environments and rapidly developing theories allow the earliest stages of star and planetary system evolution to be connected more directly to the small bodies observed and sampled today.

By bringing together experts across national and disciplinary boundaries, the workshop will establish the current state of knowledge, identify the principal "Grand Challenges" for the coming decade, improve the interpretation of mission and laboratory data, and help shape priorities for future observations, experiments, modelling, and exploration.

Objectives

The main aim of the workshop is to synthesize our current understanding of small-body formation and evolution and construct a coherent, cross-disciplinary picture of planetary-system evolution from its origins to the present day. Extended overview talks, shorter topical talks, and dedicated discussion sessions will connect the following themes:

- ✧ From molecular clouds to protoplanetary disks
- ✧ Evolution of protoplanetary disks
- ✧ Planetesimal formation
- ✧ Thermochemical evolution of small bodies
- ✧ Collisional and dynamical evolution of small bodies
- ✧ Small bodies in the solar system today
- ✧ Grand challenges and future missions

The workshop will maximize the scientific return from small-body studies, establish shared goals among neighboring fields, and promote new international and interdisciplinary collaborations.

Convenors

Hiroyuki Kurokawa	The University of Tokyo, Japan
Jeong-Eun Lee	Seoul National University, Republic of Korea
Haolan Tang	University of Science and Technology of China, China
Eri Tatsumi	Instituto de Astrofisica de Canarias, Spain

Program

Day 1, 26 October 2026: From Galactic Environments to the Solar System

Morning Session: From Molecular Clouds to Protoplanetary Disks: Chemistry

Chaired by: Jeong-Eun Lee

09:00-09:10	Opening Speech	Xiaolong Dong
09:10-09:15	Workshop Introduction	Hiroyuki Kurokawa
09:15-10:05	From Cloud to Disk: What Is Inherited, and What Is Processed?	Yuri Aikawa
10:05-10:30	Ice Evolution from Cloud to Disk	Yao-Lun Yang
10:30-10:40	Group Photo at 1F Building A	
10:40-11:10	Coffee Break at Earth Hall Entrance	
11:10-11:35	Chemistry in Embedded Class 0/I Disks	Merel van't Hoff (online)
11:35-12:00	Astrochemical Modeling of Ice Formation and Evolution in Star- and Planet-Forming Regions	Kenji Furuya
12:00-12:25	Tracing Astrophysical Context of the ESS through SLRs	François Tissot
12:25-14:00	Lunch Break at -1F Building A	

Afternoon Session: From Molecular Clouds to Protoplanetary Disks: Dynamics

Chaired by: Hiroyuki Kurokawa

14:00-14:50	Why Disks Care About the Cloud They Form In	Jonathan Williams
14:50-15:15	Feeding Protostars and Disks: Gas Flows from Molecular Clouds to Dense Cores	Jaime E. Pineda
15:15-15:40	Observational Constraints on Dust and Gas Properties of Class 0/I Disks	Patrick Sheehan
15:40-16:10	Coffee Break at Earth Hall Entrance	
16:10-16:35	Disk Structure and Evolution Resulting from Core Collapse	Shantanu Basu

16:35-17:00	Do Meteorites Carry a Memory of Infall?	Christoph Burkhardt
Discussion Session: How Did Galactic Environments Shape the Solar System? Chaired by: Hiroyuki Kurokawa		
17:00-18:00	All Participants	

Day 2, 27 October 2026: Protoplanetary Disk Evolution and the Birth Environment of Planetesimals

Morning Session: Evolution of Protoplanetary Disks: Chemistry Chaired by: Haolan Tang		
09:00-09:50	How Can We Uncover the Chemical Composition of Protoplanetary Disks?	Maria Drozdovskaya
09:50-10:15	Observations of Gas in Class II Disks	Dana Anderson (<i>online</i>)
10:15-10:40	Chemical Evolution of Gas, Ice and Dust in Protoplanetary Disks	Hideko Nomura
10:40-11:10	Coffee Break at Earth Hall Entrance	
11:10-11:35	Tracing Disk Transport with REE Isotope Anomalies	Jingya Hu
11:35-12:00	Comets as Laboratories for Prebiotic Chemistry	Dennis Bodewits
12:00-12:25	From Disk Ices to Cometary Organics: The Chemical Inventory of V883 Ori Revealed by an Accretion Outburst	Jeong-Eun Lee
12:25-14:00	Lunch Break at -1F Building A	

Afternoon Session: Evolution of Protoplanetary Disks: Dynamics
Chaired by: Jeong-Eun Lee

14:00-14:50	Observational Planet Formation	Ruobing Dong
14:50-15:15	From Snowline to Snowband: Condensation-Driven Opacity Enhancement Promotes Rapid Planetesimal & Giant Planet Formation	Teng Ee Yap
15:15-15:40	Multiphysics Coupling in Protoplanetary Disks	Xue-Ning Bai
15:40-16:10	Coffee Break at Earth Hall Entrance	

16:10-16:35	Planet-Induced Substructures as Seen by ALMA	Lucas Cieza
16:35-17:00	How Dust Fragility Influences Planet Formation	Takahiro Ueda
Discussion Session: Where and When Do Planetesimals Form in Evolving Disks? Chaired by: Jeong-Eun Lee		
17:00-18:00	All Participants	
18:30-19:30	Social Dinner at Amber 6 Hall, 2F Park Plaza Hotel	

Day 3, 28 October 2026: Accretion and Thermochemical Evolution of Small Bodies

Morning Session: Planetesimal Formation		
Chaired by: Haolan Tang		
09:00-09:50	Planetesimal Formation via Pebble Cloud Collapse	Andrew Youdin
09:50-10:15	Metallicity Enrichment and Planetesimal Formation in MHD Accretion Disks	Satoshi Okuzumi
10:15-10:40	Using Streaming Instability Clumping Criteria to Study When and Where Planetesimals Form	Linn Eriksson
10:40-11:10	Coffee Break at Earth Hall Entrance	
11:10-11:35	Radioactive Heating and Asteroid Processing: Linking Galactic Environments to the Evolution of Small Bodies	Hiroyuki Kurokawa
11:35-12:00	Chronology of Planetary Materials, Constraints on Planetesimal Formation	Audrey Bouvier <i>(online)</i>
12:00-12:25	Timing and Duration of Aqueous Alteration in Asteroid Parent Bodies	Ming-Chang Liu <i>(online)</i>
12:25-14:00	Lunch Break at -1F Building A	
Afternoon Session: Thermochemical Evolution		
Chaired by: Hiroyuki Kurokawa		
14:00-14:50	Chemical and Isotopic Evolution of CI-Like Bodies	Tetsuya Yokoyama
14:50-15:15	Organic Evolution Driven by Aqueous Alteration and Space Weathering on Carbonaceous Asteroids	Yamei Li

15:15-15:40	Salt Minerals Reveal Divergent Final Fates of Liquid Water on Icy Planetesimals	Jinfei Yu
15:40-16:10	Coffee Break at Earth Hall Entrance	
16:10-16:35	Asteroid Families: Probing the Interior of Planetesimals	Chrysa Avdellidou (online)
16:35-17:00	What Comets May Tell Us About Their Formation	Jürgen Blum (online)
Discussion Session: Can We Reconstruct Planetesimal Formation Pathways from the Properties of Present-Day Small Bodies? Chaired by: Haolan Tang		
17:00-18:00	All Participants	

Day 4, 29 October 2026: Evolution among Small Bodies

Morning Session: Collisional and Dynamical Evolution of Small Bodies		
Chaired by: Eri Tatsumi		
08:40-09:30	Small Body Impact Processing	Martin Jutzi
09:30-09:55	Volatile Inventories of the Earliest Planetesimals: What Iron Meteorites Tell Us About Collisional Processing	Damanveer S. Grewal (<i>online</i>)
09:55-10:20	Collisional Evolution and the Size Distribution of Small Bodies	Hiroshi Kobayashi
10:20-10:50	<i>Coffee Break at Earth Hall Entrance</i>	
10:50-11:15	Ground-Based Observation as a Method to Provide Context of Space Missions	Eri Tatsumi
11:15-11:40	From Asteroid Families to Meteorites	Michaël Marsset
Discussion Session: What Is a “Parent Body”? How Do They Look Like?		
Chaired by: Eri Tatsumi		
11:40-12:20	All Participants	
12:20-13:30	<i>Lunch Break at -1F Building A</i>	
Free afternoon		

Day 5, 30 October 2026: Present-Day Small Bodies and Future Grand Challenges

Morning Session: Small Bodies in the Solar System Today

Chaired by: Hiroyuki Kurokawa

09:00-09:50	The Role of Primitive Small Bodies in Unraveling the History of the Solar System and the Origins of Life	Driss Takir
09:50-10:15	From Isotopic Reservoirs to Giant-Planet Instability: How Gas-Disk Shaped the Early Solar System	Beibei Liu
10:15-10:40	Between Asteroids and Comets: Diversity, Similarity, and Blurred Boundaries	Masateru Ishiguro
10:40-11:10	Coffee Break at Earth Hall Entrance	
11:10-11:35	From Main Belt to Near-Earth Space: Tracing Evolutionary Pathways with Tiny Asteroids	Jin Beniyama (online)
11:35-12:00	Connecting Different Aspects of Asteroid Evolution: Current Insights and Future Perspectives	Bojan Novaković
12:00-12:25	3I/ATLAS: A Window into Another Planetary System	Yoonsoo Bach (online)
12:25-14:00	Lunch Break at -1F Building A	

Afternoon Session: Space Missions: Recent, Ongoing and Future

Chaired by: Eri Tatsumi

14:00-14:25	Tianwen-2 Mission: From Ground-Based Study to Sample Return	Pengfei Zhang
14:25-14:50	The Comet Interceptor Mission	Colin Snodgrass
14:50-15:15	DESTINY+: Multiple Asteroid Flybys to Apophis and Phaethon	Tomoko Arai (online)
15:15-15:45	Coffee Break at Earth Hall Entrance	
15:45-16:10	An Overview of Martian Moons eXploration MMX	Kiyoshi Kuramoto (online)

16:10-16:35	Hayabusa2: From Remote Sensing to Sample Return	Koki Yumoto
Discussion Session: Synthesis – Grand Challenges and Our Book Chapters Chaired by: Hiroyuki Kurokawa		
16:35-17:35	All Participants	
17:35-17:45	Closing Remarks	

PRACTICAL INFORMATION

Venue

The workshop will be held in the Earth Hall (A0401), 4th Floor, Building A, National Space Science Center (NSSC, CAS).

Address: No. 1 Nanertiao, Zhongguancun, Haidian District, Beijing, 100190

北京市海淀区中关村南二条一号

中国科学院国家空间科学中心 A 座九章大厦 4 层地球厅

Zoom Meeting Connection

Meeting ID: 858 5609 5351

Meeting Password: 140675

Lunches

Lunches 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 by ISSI-BJ and held at the entrance of the Earth Hall.

Emergency Contacts

Ms. Lijuan En +86-136 9912 1288

Ms. Xinyi Ma +86-138 6113 5849

WIFI Access

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27 October Dinner

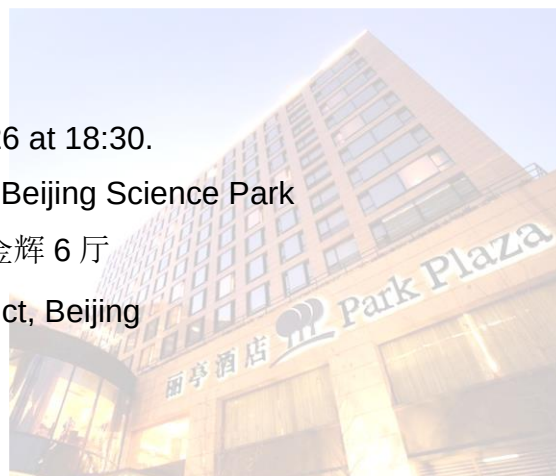
Dinner offered by ISSI-BJ on 27 October, 2026 at 18:30.

Restaurant: Amber 6, 2nd Floor of Park Plaza Beijing Science Park

北京市海淀区丽亭华苑酒店 2 层金辉 6 厅

Address: No. 25 Zhichun Road, Haidian District, Beijing

北京市海淀区知春路 25 号



Accommodation

ISSI-BJ covers six-night accommodation, including breakfast for one non-local participant. 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 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 “DAYUNCUNLU” (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.



PARTICIPANTS LIST

No.	Name	Affiliation
Convenors		
1	Hiroyuki Kurokawa	The University of Tokyo, Japan
2	Jeong-Eun Lee	Seoul National University, Republic of Korea
3	Haolan Tang	University of Science and Technology of China, China
4	Eri Tatsumi	Instituto de Astrofísica de Canarias, Spain
On-site Participants		
5	Yuri Aikawa	The University of Tokyo, Japan
6	Xue-Ning Bai	Tsinghua University, China
7	Shantanu Basu	Canadian Institute for Theoretical Astrophysics, University of Toronto, Canada
8	Dennis Bodewits	Auburn University, USA
9	Christoph Burkhardt	Max Planck Institute for Solar System Research, Germany
10	Lucas Cieza	Universidad Diego Portales, Chile
11	Ruobing Dong	Peking University, China / University of Victoria, Canada
12	Xiaolong Dong	ISSI-BJ, China / National Space Science Center, CAS, China
13	Maria Drozdovskaya	University of Bern, Switzerland
14	Linn Eriksson	American Museum of Natural History, USA
15	Kenji Furuya	Institute of Physical and Chemical Research (RIKEN), Japan
16	Jingya Hu	University of Science and Technology of China, China
17	Masateru Ishiguro	Seoul National University, Republic of Korea
18	Martin Jutzi	University of Bern, Switzerland
19	Hiroshi Kobayashi	Nagoya University, Japan

20	Yamei Li	University of Science and Technology of China, China
21	Beibei Liu	Zhejiang University, China
22	Michaël Marsset	European Southern Observatory, Germany
23	Hideko Nomura	National Astronomical Observatory of Japan, Japan
24	Bojan Novaković	Centro de Estudios de Física del Cosmos de Aragon (CEFCA), Spain
25	Satoshi Okuzumi	Institute of Science Tokyo, Japan
26	Jaime E. Pineda	Max Planck Institute for Extraterrestrial Physics, Germany
27	Patrick Sheehan	National Radio Astronomy Observatory, USA
28	Colin Snodgrass	University of Edinburgh, UK
29	Driss Takir	Tohoku University, Japan
30	François Tissot	California Institute of Technology, USA
31	Takahiro Ueda	National Astronomical Observatory of Japan, Japan
32	Jonathan Williams	University of Hawaii at Manoa, USA
33	Yao-Lun Yang	Institute of Physical and Chemical Research (RIKEN), Japan
34	Teng Ee Yap	California Institute of Technology, USA
35	Tetsuya Yokoyama	Institute of Science Tokyo, Japan
36	Andrew Youdin	University of Arizona, USA
37	Jinfei Yu	The University of Tokyo, Japan
38	Koki Yumoto	Institute of Space and Astronautical Science (ISAS), Japan / Paris Observatory, France
39	Pengfei Zhang	Institute of Geochemistry, CAS, China
Remote Participants		
40	Chrysa Avdellidou	University of Leicester, UK
41	Dana Anderson	United States Naval Academy, USA
42	Tomoko Arai	Chiba Institute of Technology, Japan
43	Yoonsoo Bach	Korea Astronomy and Space Science Institute, Republic of Korea

44	Audrey Bouvier	University of Bayreuth, Germany
45	Jürgen Blum	Technische Universität Braunschweig, Germany
46	Jin Beniyama	Observatoire de la Côte d'Azur, France / The University of Tokyo, Japan
47	Damanveer S. Grewal	Yale University, USA
48	Merel van't Hoff	Purdue University, USA
49	Kiyoshi Kuramoto	Hokkaido University, Japan
50	Ming-Chang Liu	University of California, Los Angeles (UCLA), USA
Local Observers		
51	Jun Du	National Space Science Center, CAS, China
52	Dijun Guo	National Space Science Center, CAS, China
53	Minge Liu	National Space Science Center, CAS, China
54	Yuchen Xu	National Space Science Center, CAS, China

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