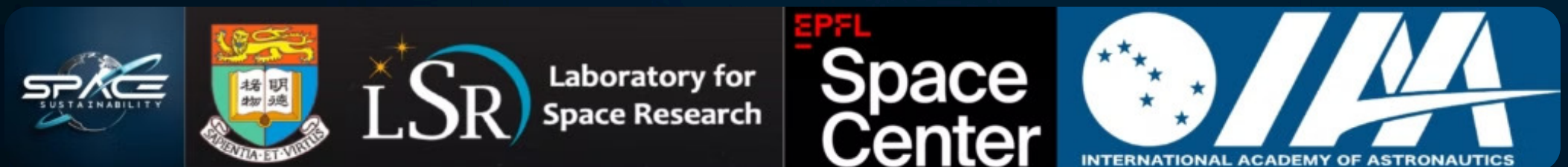


Space Debris and Sustainability Conference



Conference Welcome and Details

Welcome to the Space Debris and Sustainability Conference, where the brightest minds in space exploitation, sustainability, and technology converge to discuss the serious issue of Space Situational Awareness.

Our multi-day event is a premier international gathering of delegates from more than 20 countries who are passionate about the future of space and keeping our low earth orbit environment in particular usable for the future.

The meeting offers access to the latest trends, insights, and opportunities for space sustainability.

Join us as we explore the solutions.

About

- **Date:** Dec 2 2024 - Dec 4 2024
- **Time:** 9 AM - 6 PM (Lunch Break 12 PM - 1:30 PM)
- **Venue:** The University of Hong Kong Main Campus
- **Conference Room:** Room CPD-3.04, Run Run Shaw Tower, HKU

Special Welcome Presentation

Aarti Holla-Maini



Director, United Nations Office for Outer Space Affairs - UNOOSA

Aarti Holla-Maini is the Director of the United Nations Office for Outer Space Affairs (UNOOSA). With over 25 years in satellite communications, she previously served as Secretary General of the European Satellite Operators Association (ESOA). Aarti advocates for global connectivity and sustainable development through space technology, focusing on policy development and international collaboration.

Co-Hosts



Co-Organisers



Hosts for the Conference

Prof. Quentin Parker (Host - LSR-HKU; co-SOC and LOC Chair)



Director, Laboratory for Space Research, The University of Hong Kong, Hong Kong (S.A.R)

Prof. Quentin Parker, Director of the Laboratory for Space Research at HKU, is a renowned astronomer specialising in planetary nebulae and large-scale sky surveys. He actively supports initiatives addressing space debris and satellite interference, which affect space sustainability and the quality of astronomical observations, through international collaborations, promoting the sustainable use of outer space.

Prof. Jean-Paul Kneib (Host - EPFL; co-SOC Chair; Invited Speaker)



Executive Director, Espace de l'Innovation Spatiale et Cosmologie - ESC Space Innovation, Switzerland

Prof. Jean-Paul Kneib is Executive Director of ESC Space Innovation in Switzerland. A renowned astrophysicist specialising in cosmology and gravitational lensing, he leads initiatives promoting innovation in space sciences and engineering. Previously, he was the director of the Laboratory of Astrophysics at EPFL.

Prof. Olivier Contant (Host - IAA; Invited Speaker)



Executive Director, International Academy of Astronautics - IAA, Paris

Prof. Olivier Contant is Executive Director of the International Academy of Astronautics (IAA) in Paris. With a career in aerospace engineering and academia, he promotes international cooperation in astronautics. Prof. Contant coordinates global efforts among scientists and engineers dedicated to space exploration and technology development.

Invited Speakers



Mr. Christophe Bonnal

MaiaSpace, France

Christophe Bonnal is an expert at MaiaSpace in France with decades of experience at the French Space Agency (CNES). Specialising in space debris and launch systems, he contributes to international efforts on space debris mitigation, working with organisations like the International Academy of Astronautics (IAA) and the Inter-Agency Space Debris Coordination Committee (IADC).



Dr. Federico Di Vruno

SKAO Spectrum Manager; Co-Director, International Astronomical Union Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference

Dr. Federico Di Vruno is the Spectrum Manager at the Square Kilometre Array Observatory (SKAO) and Co-Director of the IAU Centre protecting the dark and quiet sky. He specialises in radio astronomy and spectrum management, working to mitigate satellite interference with astronomical observations, crucial for preserving the radio frequency environment.



Mr. Chuck Dickey

Founder and Principal Member, Three Country Trusted Broker (TCTB), LLC

Chuck Dickey is the founder and a principal member of Three Country Trusted Broker, USA. After leaving Lockheed Martin Space at the end of 2018 where he was Deputy General Counsel, Chuck formed TCTB to remediate high mass orbital debris in LEO on behalf of China, Russia and the U. S. TCTB submitted contracting Proposals to the three countries in May 2019, and has written three papers describing TCTB and its mission.

Invited Speakers

Prof. Gregg Li



CEO and Founder, Orion Astropreneur Space Academy - OASA, Hong Kong SAR

Prof. Gregg Li is CEO and Founder of Orion Astropreneur Space Academy (OASA) in Hong Kong SAR. An academic and entrepreneur, he advises organisations on innovation, governance, and technology. With a background in management consulting, Prof. Li promotes strategic alliances that drive technological advancement and economic growth in Asia.

Ms. Isabelle Mierau



Space Debris Decentralised Autonomous Organisation - DAO

Isabelle Mierau is involved with Space Debris DAO, focusing on space sustainability. She works on innovative solutions to address space debris, using blockchain technology to create a decentralised platform for global collaboration. Isabelle advocates for responsible space activities, aiming to mitigate risks posed by orbital debris.

Dr. Anthony Neoh



Co-Chairman, Asian Academy of International Law, Hong Kong

Dr. Anthony Neoh is Co-Chairman of the Asian Academy of International Law in Hong Kong. A distinguished lawyer and scholar, he was Chairman of the Hong Kong Securities and Futures Commission and Chief Advisor to the China Securities Regulatory Commission. Dr. Neoh has significantly influenced financial regulation and legal education in Asia.

Invited Speakers



Prof. Thomas Schildknecht

Bern Astronomical Institute; Director, Swiss Optical Ground Station and Geodynamics Observatory - SwissOGS

Prof. Thomas Schildknecht is an astronomer at the Bern Astronomical Institute and Director of SwissOGS. Specialising in space debris research and optical observations, he contributes to space surveillance and tracking. His work is essential for space traffic management and the sustainability of space activities, providing valuable data on space debris.

Mr. Victor Strelets



Chairman, International Telecommunication Union Radiocommunication Sector Study Group 4 - ITU-R SG4, Russia

Victor Strelets is Chairman of ITU-R Study Group 4, representing Russia in the International Telecommunication Union. He leads the group responsible for satellite services' radio communication standards. With expertise in satellite communications, Victor works on spectrum management issues, developing global technical standards for efficient satellite communications.

Dr. Meng Su



Senior Scientist, Feilong Aerospace & Technology, China

Dr. Meng Su is a senior scientist at Feilong Aerospace & Technology in China. With a background in astrophysics, he focuses on developing aerospace technologies and satellite systems. Dr. Su's research in high-energy astrophysics has been published in leading scientific journals, contributing to China's advancements in the aerospace sector.

Organising Committee Members

Scientific Organising Committee – SOC

- Prof. Jean-Paul Kneib (co-Chair, EPFL, Switzerland)
- Prof. Quentin A. Parker (co-Chair, HKU-LSR, HKSAR)
- Dr. Tim Flohrer (ESA)
- Ms. Victoria Samson (USA)
- Prof. Thomas Schildknecht (Switzerland)
- Dr. Susmita Mohanty (India)
- Mr. Jing Liu (China)
- Mr. Christophe Bonnal (France)
- Dr. Frederico Di Vruno (UK)
- Prof. Chiara Manfletti (Germany)

Local Organising Committee – LOC

- Prof. Quentin A. Parker (Chair)
- Dr. Andreas Ritter (IT support)
- Dr. Partha Sarathi Pal
- Dr. Safoura Tanbakouei
- Mr. Andy Kong
- Dr. Sayed Abdolreza Sadjadi
- Ms. Scorpio Wong
- Ms. Haoyang Yuan
- Ms. Katie Strattman
- Mr. Rishank Diwan
- Ms. Clara Lo (International Conference Liaison, OASA)

Program

Main Conference

Major Themes and Questions

1. The scale of the threat, risks and costs – modelling, monitoring, measuring
2. Mitigation – what processes/technologies are available/under development?
3. Data collection and data sharing – vital aspects of addressing the issue
4. International regulation of LEO – progress, pitfalls, policy compliance & co-operation
5. Public awareness and threat unregulated LEO access poses to ground-based astronomy
6. Economics of active debris remediation – burden or market?

Day 0, Sunday, December 1st

Evening Reception and Early Registration: 7:00 PM - 9:30 PM

- HKU Senior Common Room, 15th Floor
- HKU K.K. Leung Building
- Food + Drinks + Entertainment (Jazz Trio)
- Can pick-up Conference Badge, Junk Boat Tickets and Dinner Tickets
- Welcome Kit will be distributed at registration desk on Day 1, Morning

Day 1 Schedule, Monday, December 2nd

Registration Desk: 8:15 - 12:30

- Pick-up Conference Badge, Junk Boat Tickets, Dinner Tickets and Welcome Kit

Theme #1 The scale of the threat of space debris

Session Chair: Isabelle Mierau, Space Debris, DAO (Germany)

Welcome Address and Introduction

9:00 Prof. Qiang Zhou (Dean of Faculty of Science, University of Hong Kong)

9:05 Prof. Olivier Contant (Host - IAA)

9:10 Prof. Jean-Paul Kneib (Host - EPFL)

9:15 Prof. Quentin Parker (Host - HKU-LSR)

Opening Keynote Address

09:20 Aarti Holla-Maini (Director, UNOOSA, United Nations)

09:30 Prof. Olivier Contant (Executive Director, IAA, Paris, France; Invited Speaker)

The International Academy of Astronautics and Space Debris: Present and Future

10:00 Prof. Quentin Parker (HKU-LSR, Hong Kong)

Space debris: An existential threat to the sustainability of the low earth orbit ecosystem

10:15 Dr. Rachita Agrawal (Indraprastha University, India)

Design For Debris Demise: Developing Sustainable Approaches In Outer Space

Coffee break: 10:30 - 11:00

Theme #1 (Continued) The scale of the threat of space debris

Session Chair: Isabelle Mierau, Space Debris, DAO (Germany)

- 11:00 Prof. Jean-Paul Kneib (Exec. Director, ESC – Space Innovation, Switzerland; Invited Speaker)
Space Sustainability and Global Coordination
- 11:20 Dr. Susmita Mohanty (Founder, Dir. General Spaceport Sarabhai, India)
ISS Debris Dodges: A Retrospective
- 11:35 Prof. Yehia Abdel-Aziz (Aton Space Technology, UAE)
Space Surveillance and Tracking to Cover the Gap in Space Situational Awareness in all longitudes of Africa and the Middle East
- 11:50 Dr. Emanuelle David (EPFL Space Centre, Switzerland)
The Space Sustainability Rating: Lessons Learned and Exploring Incentives for Responsible Space Operations
- 12:05 Moderated Panel Discussion Session (25mins)
Panel: To Be Decided

Group Photo: 12:30

Lunch break: 12:40 - 14:00

Theme #2 Mitigation & solutions? – technologies available/under development

*Session Chair: Federico Di Vruno, SKAO Spectrum Manager
(Manchester University, UK)*

- 14:00 Prof. Thomas Schildknecht (Bern Astronomical Institute, Director of SwissOGS; Invited Speaker)
Space Debris Research - Providing the Scientific Foundation for Sustainable Use of Outer Space
- 14:20 Dr. Chen Zhang (Purple Mountain Observatory, China)
Research progress on space debris from PMO
- 14:35 Aila Raquel (CEO Alya Nanosatellites Constellation, Brazil)
The Fractal: A Sustainable and Innovative Model for Space Missions
- 14:50 Haohua Niu (SYSU, China)
A risk assessment model of low-orbit satellite constellation based on network disassembly
- 15:05 Kitty Tang (Kolor Think Tank, Hong Kong)
Spacetechn Innovations for Space Sustainability
- 15:20 Egemen Demirer (Sakarya University, Turkey)
Recycling and reuse of space debris: Collection of satellite and rocket parts in orbit for use as raw materials in space stations
- 15:35 Dr. Meng Su (Feilong Aerospace & Technology Ltd, Hong Kong; Invited Speaker)
Monitoring Space Debris with a Space Telescope for Astronomy Research

Coffee Break: 16:00 - 16:30

Theme #2 (Continued) Mitigation & solutions? – technologies available/under development

Session Chair: Federico Di Vruno, SKAO Spectrum Manager (Manchester University, UK)

- **16:30 Christophe Bonnal (MaiaSpace, France; Invited Speaker)**
Atmospheric reentry of orbital objects – Can "Design-For-Non-Demise" be the optimal solution?
- **16:50 Dr. Adriana Marais (NITheCS, South Africa)**
SHEPHERD asteroid retrieval technology demonstrator in Earth orbit
- **17:05 Dr. Lee Sunghee (CONTEC, South Korea)**
Analysis of Efficient Surveillance Systems for the Sustainable Use of Space
- **17:20 Xukang Xie (SYSU, China)**
STGA: A Mega-satellite Constellations Safety Assessment Model Based on Spatio-temporal Graph Neural Network and Attention Mechanism
- **17:35 Moderated Panel Discussion Session (25mins)**
Panel: To Be Decided

END of Day 1: 18:00

Organised Evening Social Activity:

- Junk Boat trip on HK Harbour
- Departure 7:30 pm, Central Pier 9
- Catered with canapes and drinks (soft and alcoholic)
- Limited Places - \$100 HKD nominal cost

Day 2 Schedule, Tuesday, December 3rd

Registration Desk: 8:30 - 12:00 (Delegates receiving support can pick-up their assistance at this time)

Theme #3 Data collection and data sharing

Session Chair: Thomas Schildknecht, University of Bern (Switzerland)

- 09:00 Chuck Dickey (Founder and Principal Member, TCTB, USA; Invited Speaker)
Data Collection and Data Sharing – A Framework for Action
- 09:20 Stefano Lopresti (CISAS, Padova, Italy)
Analysis Of Sub-Millimeter Debris Distribution Patterns In LEO Using A Passive Sensor
- 09:35 Daniel Lubian Arenillas (OKAPI, Germany)
Federated space traffic coordination for transparent and efficient data sharing during conjunctions
- 09:50 Dr. Pei Chen (Beihang University, China)
Space-Ranger: Low-cost Embedded Space Payloads for Debris Surveillance
- 10:05 Purin Tanirat (GISTDA, Thailand)
Framework and Development of Space Surveillance and Tracking at GISTDA

Coffee break: 10:20 - 11:00

Theme #3 (Continued) Data collection and data sharing

Session Chair: Thomas Schildknecht, University of Bern (Switzerland)

- 11:00 Victor Strelets (ITU, Russia; Invited Speaker)
Strengthening the role of the International Telecommunication Union in matters of long-term sustainable development of outer space
- 11:20 Dr. Yukihiro Kitazawa (Nihon University, Japan)
Discussions on improvement on Space Sustainability Rating for implementation of APAC
- 11:35 Moderated Panel Discussion Session (25mins)
Panel: To Be Decided

12:00 - 1400: Extended Lunch break (~2hr)

Incorporating a special "SpaceBiz" presentation lunch

- Organised by OASA
- Sponsored by the LSR

"SpaceBiz"

Welcome to SpaceBiz Dialogues - Overcoming Market Challenges: Financing and Innovating!

- Date: 3 Dec 2024 (Tue)
- Time: 12:00-2:00pm HKT (Live-streaming starts at 12:30 pm HKT)
- Location: Room CPD-3.04, Run Run Shaw Tower, The University of Hong Kong (HKU)
- Format: HYBRID (In-person and online)
- Language: English
- Admission: \$138 per person for in-person participation (including light lunch)

Key Discussion Topics

- The Escalating Crisis: Risks of Space Debris
- Gaps in Insurance and Risk Assessment
- The Financing Conundrum: Who Pays for Space Cleanup?
- Regulatory and Governance Challenges: A Framework in Need of Reform
- Innovation Bottlenecks: Bridging the Technology and Commercial Gaps

Registration: **[SpaceBiz Dialogues - Overcoming Market Challenges: Financing and Innovating](https://shorturl.at/BHlaY)** (<https://shorturl.at/BHlaY>).

Theme #4 International regulation of LEO – progress and pitfalls

Session Chair: Jean-Paul Kneib, EPFL (Lausanne, Switzerland)

● 14:00 Dr. Anthony Neoh (Co-Chairman, Asian Academy of International Law, Hong Kong; Invited Speaker)

Space Debris: How international law helps and how domestic law hinders

● 14:20 Prof. Yun Zhao (Specialist in Space Law, HKU, Hong Kong)

Space Sustainability and international cooperation

● 14:35 Valentin Uvarov (TCTB, Russia)

Space debris remediation and space traffic coordination: legal and organisational problems

● 14:50 Dr. Benjamin Guyot (Space SA, CEO, Switzerland)

Space Traffic Coordination

● 15:05 David Hoantee Peng (ASU, USA)

Bounty Systems and Space Graveyards: A Coordinated Approach to Managing Space Debris

● 15:20 Dr. Federico Di Vruno (SKAO Spectrum Manager, UK; Invited Speaker)

The effect of UEMR, Unintended Electromagnetic Radiation, specifically from satellite systems, and how it may impact radio astronomy

● 15:35 Moderated Panel Discussion Session (25mins)

Panel: To Be Decided

16:00 - 16:30: Coffee break

Theme #5 Public awareness & threat unregulated LEO access poses to ground-based astronomy

Session Chair: Susmita Mohanty, Dir. General Spaceport Sarabhai (India)

- 16:30 Dr. Frederico Di Vruno (SKAO Spectrum Manager, UK; Invited Speaker)
Large satellite constellations, astronomy and the night sky. Challenges, regulation and mitigation measures
- 16:50 Dr. Stephan Hellmich (EPFL, Versoix, Switzerland)
EPFL's contribution to the protection of the dark and quiet skies
- 17:05 Jennifer Manner (NTIA, USA)
Shared Responsibility for Space Safety and Management
- 17:20 Dr. Emma Tolley (EPFL, Switzerland)
Dark and Quiet Skies for Radio Astronomy
- 17:35 Moderated Panel Discussion Session (20mins)
Panel: To Be Decided

END of Day 2: 17:55

Conference Dinner: 7:00 PM

- 14th Floor of HKU K.K. Leung Building
- Cantonese-style Banquet + Chinese Music and Dance

Day 3 Schedule, Tuesday, December 4th

Theme #6 Economics of active debris remediation - burden or market?

Session Chair: Christophe Bonal, International Academy of Astronautics (Paris)

- **09:00 Prof. Gregg Li (CEO & Founder, OASA, Hong Kong; Invited Speaker)**
A Process Methodology by OASA to Stimulate Discussions, Dialogues, and Foster Investment – The OASA Space Biz Dialogues
- **09:20 Angelina Frolova (EPFL, Lausanne, Switzerland)**
Voluntariness and Locus of Control in Market Adoption of Sustainable Space Technologies
- **09:35 Takumi Hashizume (MUFG Bank, Sustainable Business Div., Japan)**
Sustainability and Finance in Space Sector
- **09:50 Dr. Ciara McGrath (University of Manchester, UK)**
Visions of a Holistically Sustainable Space Future
- **10:05 David Piesse (Vulcain, Hong Kong)**
Mitigating Space Debris Risk using Causal Reasoning and Transfer to Insurance Markets
- **10:20 Most Farjana Sharmin (South Asian University, India)**
Competition on LEO, and its possible consequence or impact on newcomers or aspiring space-faring countries

Coffee break: 10:35 - 11:00

Theme #6 (Continued) Economics of active debris remediation – burden or market?

Session Chair: Christophe Bonal, International Academy of Astronautics (Paris)

- 11:00 Isabelle Mierau (Institute Legal Transformation Economic Incentives for Space Sustainability, Berlin, Germany; Invited Speaker)
Pathways towards Zero Debris: Legal Transformation, Economic Incentives and the Role of Young Space Professionals
- 11:20 Dr. Dmitriy Grishko (Bauman Moscow State Technical Univ., Russia)
ADR progress from demonstration to large-scale operations
- 11:35 Poster Sparkler Session (2 mins per poster for 8 posters)
- 11:50 Moderated Panel Discussion Session (20mins)
Panel: To Be Decided

Conference Summary Session

- 12:10: Conference Summary Statements for each Theme: 6x5 mins
- 12:40: END of Main Conference

Lunch: 12:40 PM - 2:00 PM

Supplementary Workshop

Cooperative Remediation Workshop

December 4th: 2:00 to 6:00 pm

Agenda for an extended half-day session of the Space Debris and Sustainability Conference as organised by the Three Countries Trusted Broker group TCTB.

The Cooperative Remediation Workshop

Join HKU and TCTB for a groundbreaking exercise to explore possibilities for collaboration among Russia, China and the USA for remediation of Massive Derelicts.

Major Themes and Questions

A panel of international experts will describe the serious and urgent problem we face from very large, uncontrolled space debris in clustered high-LEO orbits, known as “Massive Derelicts”. Questions to be addressed include why Massive Derelicts are the most dangerous debris in space, whether technology is ready for the challenge, the cost of remediation, what are the legal, political and economic challenges preventing remediation of these objects, and how can these hurdles be overcome.

TCTB will benchmark key cooperative principles for the Workshop, and then student teams, with Conference attendee volunteers acting in an advisory role, will separate into three teams representing China, Russia and the USA. Led by TCTB facilitators, teams will explore whether consensus can be reached on key principles, lighting a path towards future cooperative missions. A post-conference paper prepared by TCTB will discuss Workshops findings.

Detailed Agenda

Problems and Principles

2:00-2:30 “Massive Derelicts: The Problem and Technical Considerations”

- **Moderator:** V. Uvarov, TCTB
- **Panelists:** Dr. Darren McKnight (video tape), Dr. Dmitriy Grishko, Dr. Jui Ling, Dr. Meng Su, Dr. Igor Usovik (video tape)
- **Theme:** Why are Massive Derelicts the most dangerous debris in space? What are the technical challenges? What technologies seem most promising? What is the business case for remediation?

2:30-3:00 “Legal, Political and Economic Hurdles: Cooperative Principles”

- **Moderator:** G. Wang, TCTB
- **Panelists:** I. Christensen (video tape), SWF, C. Dickey, TCTB
- **Theme:** What are the major legal, political and economic hurdles to remediation? What will it cost? Are there historical models for cooperation among Russia, China and the USA? Are there any current prospects for cooperation? Assuming governments could agree to explore cooperation, what principles would they have to agree on?

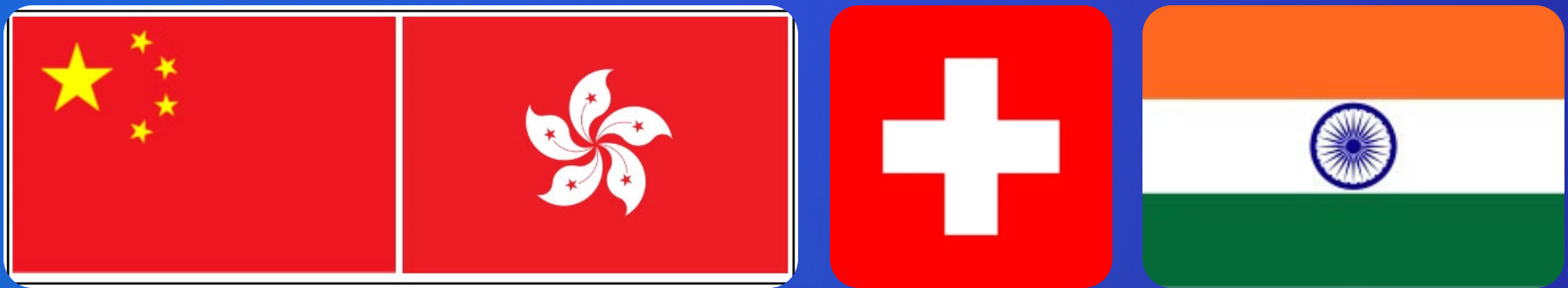
3:00-5:00 “Workshop”

- Three teams of students, with volunteer advisors from Conference attendees, will simulate negotiations among Russia, China and the USA on selected principles of cooperation.
- Facilitated by TCTB (V. Uvarov, C. Dickey, G. Wang)
- Teams to develop positions on key principles of cooperation, including cost and risk sharing, object selection, and a procurement plan. TCTB facilitators working with each team and across all teams will guide teams through the principles in search of consensus.

5:00-6:00 – Workshop Report

- Discussion
- Next Steps: TCTB
- Teams will reconvene together to discuss areas of disagreement and consensus, led by TCTB. TCTB will prepare a Workshop paper after the Conference discussing the results and possible implications for cooperation.

Countries of Participants



Sponsors

