**Additional Information: Space Exploration**

Space Exploration Track at SciTech2026 is organized by AIAA Space Exploration Integration Committee (SEIC). Contact: Surendra.p.sharma@nasa.gov; 650-793-9689. Or Narayanan.r.ramachandran@nasa.gov; 256-544-8308.

We are soliciting abstracts, as well as pitches for community dialogue topics to be discussed in panel form on the following subtopics:

I. **Accelerating the Space Economy**: Dialogue on development of essential and enabling in-space infrastructure to stimulate and accelerate the growth of space economy and generate significant benefits to people on Earth. Public and private partnerships, space policy.

II. **Artificial Intelligence and Robotics for Space Exploration:** The role of artificial intelligence and robotics in enabling human and autonomous space missions, including topics such as exploration, logistics and precursor/test missions to the moon, Lagrange points, Near Earth Objects (NEOs), autonomous spacecraft, Mars rovers, and robotic servicing of space infrastructure.

III. **Commercial Space:** All aspects of commercial space including suborbital flights, commercial crew to ISS and private tourism flights, lunar lander missions such as payload missions and human flights such as HLS in partnership with NASA.

IV. **Enabling Technologies**: Advanced propulsion; cryogenic propellant storage and transfer; high-efficiency space power systems; life support systems and habitation systems; radiation shielding; entry, descent, and landing technology, EVA technology; advanced robotics; autonomous systems and avionics; high-data-rate communications; in-situ resource utilization; and lightweight structures and materials.

V. **Flight Systems**: Hardware specific development, new concepts, game changing technologies and simulations.

VI. **In-Space Infrastructure**: Near-term and long-term essential Cis-Lunar space infrastructure to facilitate easy and economical access to space, such as: Way-Points/Gateways/ Habitation Systems, Propellant depot, Communication hubs, Cis-Lunar transportation, Space Power Utilities and related infrastructure, Satellite Servicing, In-Situ Resource Utilization. Also, necessary dialogues on strategic locations and near-term, mid-term and long-term implementation strategy**.**

**VII.** **Impact of Space activities on Climate and Atmosphere:** Using state-of-the-art climate and air quality atmospheric models access the impact of space activities on climate, Earth's ozone layer, and atmosphere. It is essential that we use realistic launch and re-entry scenarios for this analysis.

**VIII.** **International Partnerships:** Space exploration perspectives and partnerships. Remote sensing and earth observations for assessing climate studies, unmanned flights to the moon and other extraterrestrial destinations, Lunar Gateway and lunar surface missions, etc.

IX. **Lessons Learned from Previous Human Exploration History as Applied to Modern Spaceflight:** Historic successes and failures in the above areas in the exploration and aerospace worlds can be applied to not only avoid future disaster or inefficiencies on modern space missions, but to enhance the likelihood of successful missions or

operations outcomes. The realms of exploration, flight test, and past space missions have all taught us important lessons we should be mindful of when designing future systems and mission plans.

X. **Life Sciences and Human Systems Integration: Humans in Space Logistics, Medical issues, Bio-Research:** Life sustaining essentials for space, enabling technologies, and medical break-through and analysis along with Human Systems Integration issues throughout the Systems Engineering and Mission Management Process from design to operations, etc. Astronaut digital twin approach for addressing long term mission medical needs, perspectives on space radiation and counter measures during in space transit and surface habitat systems, and artificial gravity necessity, concepts and approaches for extended duration space missions. Approaches to robust next-gen ECLSS systems for long duration exploration missions.

XI. **Longer Duration Space Missions (up 50+ years):** Hardware and management challenges, inter-generational knowledge and management transfer issues, available and future enabling technologies, and dialogue on need and benefits of such missions.

XII. **Lunar Exploration**: Essential commodities for sustained human presence, Enabling infrastructure, such propellant depots, communication hubs, power generation etc., technological robotic and human activities, such as in-space Resource Utilization (ISRU) etc, Facilities and research on mission to Mars and other planets from lunar surface, Consumer commodities developments, such as mining, power beaming to and from Earth, tourism etc.

XIII. **Mission Architectures**: Studies, systems analysis, and operational scenarios for human exploration missions beyond Earth orbit, including, but not limited to: In-Space infrastructure development scenarios, Lunar exploration and sustained human presence on the lunar surface, Mars expeditions, Missions to outer planets and other bodies.

XIV. **National Science Priorities**: Visionary roadmaps for sustained human presence in space, space exploration related space policy, community outreach. Science from the moon and perspectives on planned and completed asteroid missions. Planetary protection strategies for both the Earth and distant realms.

XV. **Space Policy**: Current topics of interest relevant to Space policy including next steps beyond Outer Space Treaty, incentivizing commercial enterprise for space endeavors, return on investment strategies, perspectives on claims and ownership, indemnification discussions, etc.

XVI. **Using ISS for Exploration**: Any activity related to mission testing/feasibility study requiring low g environment, analogue for steppingstone concept for Mars and other outer planets from Cis-Lunar space, processing low g environment, Analog for long-duration missions, and technology Demonstrations and operational concepts for exploration, and human physiological effects of low gravity.

**We have identified a couple of focus topics for SciTech 2026. The purview of these topics overlaps with the scope of other TCs and we frequently hold joint sessions in that case. Abstracts specific to these categories are solicited.**

1. **Space Nuclear Propulsion (all aspects of SNP – concepts, modeling, knowledge gaps, status of ongoing/future work, etc.)**
2. **Space Policy (Space policy TC)**

3. **Environment Control and Life Support System (ECLSS) for long duration exploration missions. (present strategy, concepts, testing and results)**

**Context and Goals:**

The SEIC serves as the focal point for promoting awareness and advancement of space exploration, both in the national and international community. The SEIOC is chartered to disseminate relevant information on leading-edge, current, new, emerging space exploration programs throughout the world, including, but not limited to, NASA, DoD, Commercial and International entities. SEIOC also serves as a technical and policy advisory group to relevant stakeholders on issues related to 1) General knowledge and awareness of exploration systems, 2) Technological needs and gaps, 3) Applications identification and activities, 3) Inter-disciplinary and inter-committee interactions, and 4) Political, management and international challenges.

The Space Exploration Integration Committee strives to**:**

1) Evaluate and recommend research and development, relevant progress, and technological challenges and gaps in support of the advancement of space exploration.
2) Focus attention on the present and future requirements for advancing progress in space exploration.
3) Promote awareness and understanding of leading-edge, current, new, and emerging space exploration programs throughout the world among relevant scientific and technological stakeholders at home and abroad.
4) Advance understanding of exploration systems, technological needs and gaps, applications, inter-disciplinary and inter-committee interactions, and political management and international challenges and opportunities as related to space exploration.
5) Work with domestic stakeholders and international partners in brokering the resolution of issues affecting space exploration and, when appropriate provide educational and advisory support.
6) Assist the AIAA, through its Technical Committees, in developing programs for meetings and other technical venues, and in providing the Institute with authoritative opinion and/or recommendations in the chartered areas of concern.