

## IAF HUMAN SPACEFLIGHT (HSF) COMMITTEE

### Introduction

The IAF Human Spaceflight (HSF) Committee will organize the Human Spaceflight Symposium (B3) at IAC 2024 in Milan, comprising a total of eleven sessions. The symposium invites papers on all aspects of ongoing and planned human spaceflight including the design, development, operations, utilization, and future plans of space missions involving humans. The scope covers private and government past, present and planned space missions and programmes in LEO and beyond. The Symposium also features discussions on preparations for the launch of new HSF capabilities and collaborative efforts of human and robotic systems and technologies. Special emphasis is applied to the peaceful use of HSF, fostering international cooperation, and the socio-economic benefit for all mankind, and positive returns for terrestrial use-cases.

- Governmental Human Spaceflight Programmes (Overview)
- Commercial Human Spaceflight Programmes
- Utilization & Exploitation of Human Spaceflight Systems
- Flight & Ground Operations aspects of Human Spaceflight - Joint Session of the IAF Human Spaceflight and IAF Space Operations Symposia
- Astronaut Training, Accommodation, and Operations in Space
- Human and Robotic Partnerships in Exploration - Joint session of the IAF Human Spaceflight and IAF Exploration Symposia
- Advanced Systems, Technologies, and Innovations for Human Spaceflight
- Human Space & Exploration
- Human Spaceflight Global Technical Session
- Interactive Presentations - IAF HUMAN SPACEFLIGHT SYMPOSIUM Session A & Session B
- Late-Breaking Abstracts

### Summary: Human Spaceflight in 2024 to date

- The Axion Ax-3 launched to space on 18 January 2024 for a 21-day commercial orbital mission, including Turkey's first astronaut, Alper Gezeravci
- On 27 February, ISRO announced its 4 astronaut-designates, 3 of whom will form the crew for the first Gaganyaan mission, and two of whom have been assigned to the upcoming Ax-4 mission, with Shubanshu Shukla as prime crew, and Prashanth Balakrishnan Nair serving as back-up. The first uncrewed Gaganyaan orbital test flight is slated for no earlier than December 2024
- NASA's SpaceX Crew-8 successfully launched to ISS March 4, 2024, including 3 NASA astronauts and 1 Russian cosmonaut
- Soyuz MS-25 launched Roscosmos cosmonaut Oleg Novitsky, NASA astronaut Tracy Caldwell-Dyson, and Belarus Space Agency spaceflight participant Maryna Vasileuskaya to the ISS on March 23, 2024
- A Long March 2F rocket carrying the Shenzhou XVIII spacecraft with three astronauts aboard blasted off from the Jiuquan Satellite Launch Center in Northwest China on April 25, 2024. This is the 32<sup>nd</sup> flight mission of China's manned space program and the third crewed mission during the application and development stage of China's space station.
- Virgin Galactic retired its Unity spacecraft after its 7<sup>th</sup> and final commercial spaceflight on 8 June, 2024. Virgin Galactic's new spacecraft, Delta has now entered manufacturing, and is expected to come online as early as 2026
- The International Institute for Astronautical Sciences announced its all-female commercial research crew, which will be its second suborbital commercial research spaceflight, to fly with Virgin Galactic aboard its Delta. The crew includes Dr. Norah Patten, who will become Ireland's first astronaut, Dr. Shawna Pandya (she is a member of the IAF Human Spaceflight Committee), who will become Canada's first commercial female

astronaut, and Kellie Gerardi, who has previously flown as an IAS astronaut

- Blue Origin completed two more suborbital commercial spaceflights with NS-25 and NS-26, including the launch of Ed Dwight, who officially became the oldest astronaut to launch to space at age 90
- Artemis 2 preparations continue for the joint CSA-NASA crew, with a targeted launch date no earlier than September 2025
- Axiom has announced that its Ax-4 mission has a targeted launch date of Spring 2025, including what will become India's second astronaut, Shubhanshu Shukla, and Hungary's third astronaut, Tibor Kapu
- Boeing Starliner completed its inaugural crewed test flight to the International Space Station with NASA Astronauts Suni Williams and Butch Wilmore. Owing to ongoing technical issues with helium leaks and critical thrusters going offline, Starliner returned to Earth uncrewed, extending Williams and Wilmore's mission from 8 days to a targeted return date of February 2025 onboard of SpaceX's Crew Dragon spacecraft
- The Polaris Dawn all-civilian mission completed the first private spacewalk aboard the SpaceX Crew Dragon, marking the highest altitude humans have been to since Apollo at 1400km. This mission also marked the highest altitude any female astronauts have been to, with Crew Medical Officer Anna Menon and Mission Specialist Sarah Gillis, and the youngest astronaut to partake in a spacewalk (Sarah Gillis)
- On September 11, 2024, Expedition 71/2 saw the launch of Roscosmos cosmonauts Alexey Ovchinin and Ivan Vagner, and NASA astronaut Don Pettit to the International Space Station aboard a Soyuz MS-26, creating a new record for the greatest number of humans in orbit at 19, surpassing the previous record of 17
- We continue to see an increase in the number of commercial transport and resupply entities supporting human spaceflight, including SpaceX, Sierra Space, H-Star, and The Exploration Company
- The number of potential commercial LEO destinations continues to increase, with Axiom, Blue Origin, Voyager Space, Above Space, Vast, and Gravitics all proposing commercial space stations

## Highlights

- The Polaris Dawn Mission successfully completed the first commercial spacewalk on September 12, 2024 in the new SpaceX commercial EVA suits. This spacewalk was also a successful demonstration of an EVA conducted in the absence of an airlock.
- The launch of Soyuz MS-26 on September 12, 2024,

created a new record for the greatest number of humans in orbit at once, at 19, surpassing the previous record of 17 humans in space created the year prior



*A member of the Polaris Dawn all civilian mission completes the taking part in the first private EVA (credit: SpaceX)*

- Cosmonaut Oleg Kononenko, now the world's most experienced spaceman (5 flights, 1111 days in space), first-time flier Nikolai Chub and NASA veteran Tracy Dyson (3 flights, 373 days in space) undocked from the International Space Station and returned to Earth on September 23, 2024, closing out a record-setting mission (374 days) with a picture-perfect landing in Kazakhstan. With the Soyuz crew back home, NASA and SpaceX are gearing up to launch astronaut Nick Hague and cosmonaut Alexander Gorbunov to the station aboard a Crew Dragon capsule on September 26, 2024
- Artemis II is currently scheduled for a lunar fly-by no earlier than September 2025
- Deep space is vast and infinite, while humanity's quest for knowledge is limitless. The follow-up Chang'e-7, Chang'e-8, Tianwen-2, and Tianwen-3 are in progress as planned. China will further conduct various forms of international exchanges and cooperation in the aerospace field, associated with both human and robotic spaceflight, based on equality, improving human welfare and promoting the construction of a global community of shared future for mankind in outer space.

## Future Outlook

- Trends and areas of focus:
  - Increased interagency and commercial collaboration for future missions
  - Increased human presence in space
  - Increasing commercial destinations in LEO
  - Increasing commercial activities and applications in orbital spaceflight
  - Renewed commercial and agency interest in human lunar exploration

- Increased interest in developing the cis-lunar economy

### **Committee activities**

- Establishment of the subcommittee focused on Space Habitats
- Establishment of a Young professional working group to develop diversity, inclusion and the next generation of professionals for human spaceflight

