



# International Space Station

## [ MISSION SUMMARY ]

**EXPEDITION 61** began in October 2019 and ends in February 2020. This expedition will include research investigations focused on biology, Earth science, human research, physical sciences and technology development, providing the foundation for continuing human spaceflight beyond low-Earth orbit to the Moon and Mars.

### THE CREW:



**Luca Parmitano (ESA) – Commander**

**Born:** Paternò, Italy  
**Interests:** Weight training, swimming, biking and running  
**Spaceflights:** Exp. 36/37, Exp. 60  
**Bio:** <https://go.nasa.gov/2SuquJe>  
**Twitter:** @Astro\_Luca



**Alexander Skvortsov (Roscosmos) – Flight Engineer**

**Born:** Schelkovo, Russia  
**Spaceflights:** Exp. 23/24, Exp. 39/40, Exp. 60  
**Bio:** <https://go.nasa.gov/2SLK4kq>



**Christina Koch (NASA) – Flight Engineer**

**Born:** Grand Rapids, Michigan  
**Interests:** Backpacking, rock climbing, paddling and sailing  
**Spaceflights:** Exp. 59/60  
**Bio:** <https://go.nasa.gov/2QCRHbX>  
**Twitter:** @Astro\_Christina



**Jessica Meir (NASA) – Flight Engineer**

**Born:** Caribou, Maine  
**Interests:** Skiing, hiking, running cycling, soccer and SCUBA diving  
**Spaceflights:** First flight  
**Bio:** <https://go.nasa.gov/20IErQd>  
**Twitter:** @Astro\_Jessica



**Andrew Morgan (NASA) – Flight Engineer**

**Born:** Morgantown, West Virginia  
**Interests:** Distance running, swimming, weightlifting and reading space and military history  
**Spaceflights:** Exp. 60  
**Bio:** <https://go.nasa.gov/2Su7ESF>  
**Twitter:** @AstroDrewMorgan



**Oleg Skripochka (Roscosmos) – Flight Engineer**

**Born:** Nevinnomyssk, Russia  
**Spaceflights:** Exp. 25/26, Exp. 47/48  
**Bio:** <https://go.nasa.gov/2UHHCCR>

### THE SCIENCE:

What are some investigations the crew is operating?

During Expedition 61, crew members will make improvements to the Alpha Magnetic Spectrometer in an effort to extend its life and support its mission of looking for evidence of dark matter, they will provide input on how a vest designed to protect vital organs from radiation fits as they perform daily tasks, they will operate an exploration rover on Earth from space to test for future Lunar or Martian exploration and will work to understand cotton root systems to enable the development of cotton cultivars more robust in the face of drought and pests.

## ■ AMS-02

Stars, planets and the molecules that make them are only about five percent of the total mass in the universe — the rest is either dark matter or dark energy, but no one has ever seen this material or been able to study it. What's more, the big bang theory holds that the universe should be made of equal parts matter and antimatter, but scientists have never detected naturally occurring antimatter. The Alpha Magnetic Spectrometer - 02 (AMS-02) looks for evidence of these mysterious substances, along with very high-energy radiation coming from distant stars that could harm crew members traveling to Mars.

## ■ AstroRad Vest

Comfort and Human Factors AstroRad Radiation Garment Evaluation (CHARGE) (AstroRad Vest) tests a special vest designed to protect astronauts from radiation caused by unpredictable solar particle events (SPEs). Astronauts will provide input on the garment as they wear it while performing daily tasks, including how easy it is to put on, how it fits and feels, and the range of motion it allows. Garment developers can use this input to improve design, and use of the vest may protect crew members on missions to the Moon and Mars.

## ■ ANALOG-1

Space is such a harsh place for humans and machines that future exploration of the solar system may likely involve sending robotic explorers to “test the waters” on uncharted planets before sending humans. The Investigation of the Use of an Advanced Human-Robotic Interface in Enhancing the Performance of Teleoperated Robotic Field Geology (ANALOG-1) technology project investigates how an astronaut on the space station can operate an exploration rover on a Moon-like terrain

on Earth, collect rock/soil samples, and remotely investigate them – an analog scenario for future lunar or Martian exploration.

## ■ Targeting Improved Cotton through Orbital Cultivation

It is estimated that more than 25 million tons of cotton are produced around the world each year. While the economic and personal benefits of cotton are well understood, the environmental impacts of cotton production are significant. It is estimated that producing one kilogram of cotton requires thousands of liters of water. Additionally, the intensive use of agricultural chemicals in cotton farming and production can have health impacts on workers and surrounding ecosystems. This experiment will improve the understanding of cotton root systems and associated gene expression that may enable the development of cotton cultivars to be more robust in the face of drought and pests.

## ■ AzTechSat-1

Inter-satellite communication is critical to human space exploration. The AzTechSat-1 primary focus is to conduct inter-satellite communication demonstrations between AzTechSat-1 and the Globalstar Satellite Constellation. These demonstrations will further mature this capability with potential applications for deep space SmallSat missions. AzTechSat-1 will accomplish this primary focus area by using two onboard communication systems - Globalstar STINGR modem and an UHF/VHF amateur band radio. The Globalstar STINGR modem has an embedded L-Band radio and a GPS, through which the modem's crosslink communication is a patch antenna. This is the first international collaboration program between NASA and the Mexican Space Agency.

## THE MISSION PATCH:

The Expedition 61 patch represents an exciting and dynamic time aboard the International Space Station as it constantly advances towards a limitless future in space. The overall patch view is from an approaching vehicle in pursuit of the space station. The sun is the most prominent, central element in the patch as the source of energy and life for the Earth, the station and our entire solar system. As the present focus of human spaceflight, the space station is centered in the emblem while barely eclipsing the sun with its tiny shadow, reminding of us that human exploration is a small part of our quest to understand the universe. Fifteen of the sun's rays represent the 15 original partner members of the space station program, while the 16th ray represents an open invitation for continued collaboration with new partners. The four yellow rays form the cardinal directions of a compass, symbolizing the innate human drive to explore. The advancing terminator represents the dawn of a new day on Earth. The name ring appears to float through space and has no single orientation, emphasizing the variety of viewpoints assembled in an international crew unified under one mission. Nine rays extend beyond the name ring to represent the nine human missions that have braved exploration beyond low-Earth orbit, thus encouraging us to drive boundlessly out into our solar system.



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