



# International Space Station

## [ MISSION SUMMARY ]

**EXPEDITION 45** Expedition 45 began September 11, 2015 and ends December 22, 2015. This expedition includes human research, biology and biotechnology, astrophysics research, physical science investigations and education activities. Two spacewalks are tentatively planned during Expedition 45.

### THE CREW:

**Soyuz TMA-16M Launch: March 27, 2015 • Landing: September 11, 2015**

*Note: Kelly and Kornienko will remain aboard until March 2016. One taxi flight will occur during this mission.*

**Soyuz TMA-17M Launch: July 22, 2015 • Landing: December 22, 2015**



**Scott Kelly (NASA) – Flight Engineer**

**Born:** Orange, New Jersey  
**Interests:** racquetball, running, water sports and weight lifting  
**Spaceflights:** STS-103, STS-118, Exps. 25 and 26  
**Bio:** <http://go.nasa.gov/SbcMZD>  
**Twitter:** @StationCDRKelly  
**Instagram:** stationcdrkelly



**Sergey Volkov (Roscosmos) – Flight Engineer (SIR-gay VOLL-koff)**

**Born:** Chuguyev, Kharkov Region, Ukraine  
**Interests:** sports, tennis, windsurfing, reading and museums  
**Spaceflights:** Exps. 17, 28 and 29  
**Bio:** <http://go.nasa.gov/10s4JYn>  
**Twitter:** @Volkov\_ISS  
**Instagram:** volkov\_iss



**Mikhail Kornienko (Roscosmos) – Flight Engineer (Kor-knee-EHN-koh)**

**Born:** Syzran, Russia  
**Interests:** mountaineering  
**Spaceflights:** Exps. 23 and 24  
**Bio:** <http://go.nasa.gov/Tg0ksk>



**Kjell Lindgren (NASA) – Flight Engineer (CHELL LIND-grehn)**

**Born:** Taipei, Taiwan  
**Interests:** amateur astronomy, church activities, movies, photography, reading, running  
**Spaceflights:** Exps. 44 and 45 mark his first missions  
**Bio:** <http://go.nasa.gov/1zx1vd4>  
**Twitter:** @astro\_kjell



**Oleg Kononenko (Roscosmos) – Flight Engineer (AH-leg Koh-no-NEHN-koh)**

**Born:** Chardzhou, Turkmenia  
**Interests:** reading books, sports  
**Spaceflights:** Exp. 17  
**Bio:** <http://go.nasa.gov/1Pp0RUM>



**Kimiya Yui (JAXA) – Flight Engineer (KIH-mee-yah YOO-we)**

**Born:** Nagano, Japan  
**Interests:** cycling, flying  
**Spaceflights:** Exps. 44 and 45 mark his first missions  
**Bio:** <http://go.nasa.gov/1cncCde>  
**Twitter:** @Astro\_Kimiya

### THE SCIENCE:

**"What are some of the investigations the crew is working on?"**

During Expedition 45, crew members will install equipment and conduct experiments that help researchers study dark matter and cosmic rays, investigate the interactions of flames on the motion and ignition of droplets, and assess the effects of spaceflight on chromosomal telomeres. Investigations like these demonstrate how space station crews help advance NASA's journey to Mars while making discoveries that can benefit all of humanity.

## ■ CALorimetric Electron Telescope (CALET)

This astrophysics mission uses specialized equipment to search for dark matter and measure cosmic rays to observe sources of high energy phenomena in the galaxy. CALET seeks to discover the answers to many high-energy astrophysics questions including the origin of cosmic rays, how cosmic rays accelerate and move across the galaxy, and the existence of dark matter and its relation to nearby cosmic ray sources. Once scientists take an inventory of the highest-energy radiation in space, they may be able to characterize the radiation environment experienced by humans and encountered by space electronics. This may help determine risk of exposure to this type of radiation.



MASA /PHOTO

*The HTV5 CALorimetric Electron Telescope (CALET) Flight Crew Interface Test (FCIT). CALET will search for signatures of dark matter and provide the highest energy direct measurements of the cosmic ray electron spectrum.*

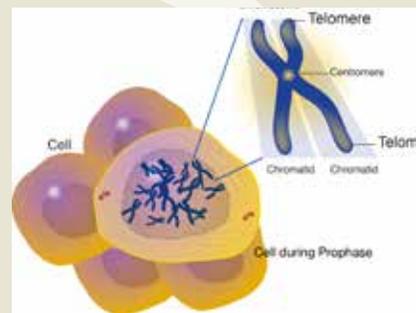
## ■ Flame Extinguishment Experiment-2 JAXA (FLEX-2J)

Fires burn differently in space, where fuels form spherical droplets and flames burn in a rounded form, rather than straight up. The Flame Extinguishment Experiment-2 JAXA (FLEX-2J) studies the interactions

of flames on the motion and ignition (or non-ignition) of millimeter-sized droplets. Results can provide fundamental insight into the physics of fuel burning, which improves computer models designed to reduce emissions and improve fuel consumption efficiency in space and on Earth.

## ■ Assessing Telomere Lengths and Telomerase Activity in Astronauts (Telomeres)

Telomeres are "caps" on the ends of chromosomes that protect them from fraying, much like the end of a shoelace, and an enzyme, called telomerase, maintains their length. Telomeres shorten over time, and the rate at which this occurs can be increased by stress, leading to accelerated aging, cardiovascular disease, cancer, and an impaired immune system. The Telomeres investigation collects crew member blood samples to determine how telomeres and telomerase are affected by space travel. This research will help investigators better evaluate the impact of future space flight, specifically related to changes in telomere length and telomerase activity, and potential related health effects.



CREDITS: DARRYL LEIA, NATIONAL HUMAN GENOME RESEARCH

*A telomere is the end of a chromosome that protects the interior of a chromosome from damage during cell division. Each time a cell divides, telomeres become shorter. Eventually, telomeres become so short that the cell dies or becomes cancerous*

## THE MISSION PATCH:

The Expedition 45 crew will conduct its journey of exploration and discovery from a summit rising from a foundation that was built by past generations of pioneers, scientists, engineers and explorers. This foundation is represented by the book of knowledge at the bottom of the patch. Curves radiate from the book representing the flow of knowledge - and the hard work, sacrifice and innovation that makes human spaceflight possible. The pages written during Expedition 45 will serve to benefit humanity on Earth and in space. The International Space Station is represented by a single bright star soaring over the Earth, illuminating a path to future, more distant destinations.



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