



International Space Station

[MISSION SUMMARY]

EXPEDITION 52 began in June 2017 and ends in September 2017. This expedition includes astrophysics, technology demonstrations, biology and biotechnology. One spacewalk is tentatively planned during Expedition 52.

THE CREW:

Soyuz MS-04 Launch: April 2017 • Landing: September 2017

Note: Whitson launched aboard the Soyuz MS-03 spacecraft in November 2016 and will remain aboard the space station through September 2017.

Soyuz MS-05 Launch: July 2017 • Landing: December 2017



Fyodor Yurchikhin (Roscosmos) – Commander

Born: Batumi, Adjar ASSR, Georgian SSR
Interests: collecting stamps and space logos, sports, history of cosmonautics and reading
Spaceflights: STS-112, Exps. 15, 24/25, 36/37, 51
Bio: <https://go.nasa.gov/2o9PO9F>



Randolph Bresnik (NASA) – Flight Engineer

Born: Fort Knox, Kentucky
Interests: travel, music, photography, weight training, sports, scuba diving, motorcycling, and flying warbirds
Spaceflights: STS-129
Bio: <https://go.nasa.gov/2rq5Ssm>
Twitter: @AstroKomrade



Jack Fischer (NASA) – Flight Engineer

Born: Louisville, Colorado.
Interests: spending time with my family, flying, camping, traveling and construction
Spaceflights: Expedition 51
Bio: <https://go.nasa.gov/2o9FY7o>
Twitter: @Astro2Fish



Sergey Ryazanskiy (Roscosmos) – Flight Engineer

Born: Moscow, Soviet Union
Interests: Numismatics, playing the guitar, tourism, sport games
Spaceflights: Exps. 37/38
Bio: <https://go.nasa.gov/2rpXf0K>
Twitter: @Ryazanskiy_ISS



Peggy Whitson (NASA) – Flight Engineer

Born: Mount Ayr, Iowa
Interests: weightlifting, biking, basketball and water skiing
Spaceflights: STS-111, STS – 113, Exps. 5, 16, 50, 51
Bio: <http://go.nasa.gov/2eo0V8r>
Twitter: @AstroPeggy



Paolo Nespoli (ESA) – Flight Engineer

Born: Milan, Italy
Interests: scuba diving, piloting aircraft, assembling computer hardware, electronic equipment and computer software
Spaceflights: STS-120, Exps. 26/27
Bio: <https://go.nasa.gov/2rq0tlk>

THE SCIENCE:

What are some of the investigations the crew is operating?

During Expedition 52, researchers will demonstrate more efficient solar arrays, study the physics of neutron stars, investigate a new drug to fight osteoporosis and study the adverse effects of prolonged exposure to microgravity on the heart.

■ Roll-Out Solar Array (ROSA)

Solar panels are an efficient way to generate power, but they can be delicate and large when used to power a spacecraft or satellites. They are often tightly stowed for launch and then must be unfolded when the spacecraft reaches orbit. The Roll-Out Solar Array (ROSA), is a solar panel concept that is lighter and stores more compactly for launch than the rigid solar panels currently in use. ROSA has solar cells on a flexible blanket and a framework that rolls out like a tape measure. The technology for ROSA is one of two new solar panel concepts that were developed by the Solar Electric Propulsion project, sponsored by NASA's Space Technology Mission Directorate.

The new solar panel concepts are intended to provide power to electric thrusters for use on NASA's future space vehicles for operations near the Moon and for missions to Mars and beyond. They might also be used to power future satellites in Earth orbit, including more powerful commercial communications satellites. The demonstration of the deployment of ROSA on the space station is sponsored by the Air Force Research Laboratory.

■ Neutron Star Interior Composition Explored (NICER)

Neutron stars, the glowing cinders left behind when massive stars explode as supernovas, are the densest objects in the universe, and contain exotic states of matter that are impossible to replicate in any ground lab. These stars are called "pulsars" because of the unique way they emit light – in a beam similar to a lighthouse beacon. As the star spins, the light sweeps past us, making it appear as if the star is pulsing. The Neutron Star Interior Composition Explored (NICER) payload, affixed to the exterior of the space station, studies the physics of these stars, providing new insight into their nature and behavior.

Neutron stars emit X-ray radiation, enabling the NICER technology to observe and record information about its structure, dynamics and energetics. In addition to studying the matter within the neutron stars, the payload also includes a technology demonstration called the Station Explorer for X-ray Timing and Navigation Technology (SEXTANT), which

will help researchers to develop a pulsar-based, space navigation system. Pulsar navigation could work similarly to GPS on Earth, providing precise position for spacecraft throughout the solar system.

■ Systemic Therapy of NELL-1 for Osteoporosis (Rodent Research-5)

When people and animals spend extended periods of time in space, they experience bone density loss, or osteoporosis. In-flight countermeasures, such as exercise, prevent it from getting worse, but there isn't a therapy on Earth or in space that can restore bone that is already lost. The Systemic Therapy of NELL-1 for osteoporosis (Rodent Research-5) investigation tests a new drug that can both rebuild bone and block further bone loss, improving health for crew members. Exposure to microgravity creates a rapid change in bone health, similar to what happens in certain bone-wasting diseases, during extended bed rest and during the normal aging process. The results from this ISS National Laboratory-sponsored investigation build on previous research also supported by the National Institutes for Health and could lead to new drugs for treating bone density loss in millions of people on Earth.

■ Fruit Fly Lab-02

Exposure to reduced gravity environments can result in cardiovascular changes such as fluid shifts, changes in total blood volume, heartbeat and heart rhythm irregularities, and diminished aerobic capacity. The Fruit Fly Lab-02 study will use the fruit fly (*Drosophila melanogaster*) to better understand the underlying mechanisms responsible for the adverse effects of prolonged exposure to microgravity on the heart. Flies are smaller, with a well-known genetic make-up, and very rapid aging that make them good models for studying heart function. This experiment will help to develop a microgravity heart model in the fruit fly. Such a model could significantly advance the study of spaceflight effects on the cardiovascular system and facilitate the development of countermeasures to prevent the adverse effects of space travel on astronauts.

THE MISSION PATCH:

Our planet is shown surrounded by an imaginary constellation shaped like a house, depicting the theme of the patch: "The Earth is our home." It is our precious cradle, to be preserved for all future generations. The house of stars just touches the Moon, acknowledging the first steps we have already taken there, while Mars is not far away, just beyond the International Space Station, symbolized by the Roman numeral "LII," signifying the expedition number. The planets Saturn and Jupiter, seen orbiting farther away, symbolize humanity's exploration of deeper space, which will begin soon. A small Sputnik is seen circling the Earth on the same orbit with the ISS, bridging the beginning of our cosmic quest till now: Expedition 52 will launch in 2017, sixty years after that first satellite. Two groups of crew names signify the pair of Soyuz vehicles that will launch the astronauts of Expedition 52 to the Station.



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