

# ESA ASTRONAUT SELECTION 2021



**Your way to space**

*#SpaceCare*



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This document contains videos and links to web pages for more information. Click on the  and  icons to discover more information. Links to recommended images, videos and animations are provided towards the end of this information kit. An internet connection is required to access the webpages.

The background of the page is a stylized illustration of space. In the top left, there are yellow solar panels. In the center, the Earth is shown in a stylized green and blue color palette. Above the Earth, the Moon is depicted with a cratered surface. The background is a dark blue space filled with small white stars. On the right side, there is a white and grey illustration of an astronaut's hand holding a gold coin. Below the hand, the text 'EUROPEAN SPACE AGENCY' is partially visible in a light blue font.

For the first time since 2008, ESA is seeking new astronauts to join a journey of discovery for the benefit of Earth.

This collection of infographics gives a small insight into the role of an ESA astronaut, selection requirements, astronaut training, what ESA does and – most importantly – how you can apply!

**Are you ready?  
Read on for your way to space.**

EUROPEAN SPACE AGENCY

## WHO CAN APPLY?

There are many paths to becoming an astronaut...  
 ESA is seeking candidates with a Master's degree  
 (or higher) and a minimum of three years'  
**experience in:**



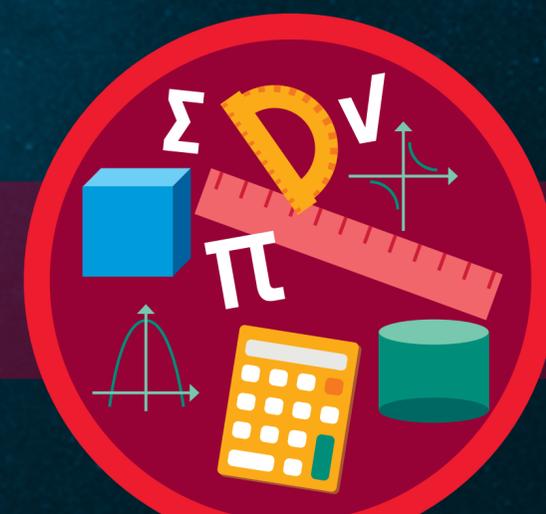
**Natural Sciences**



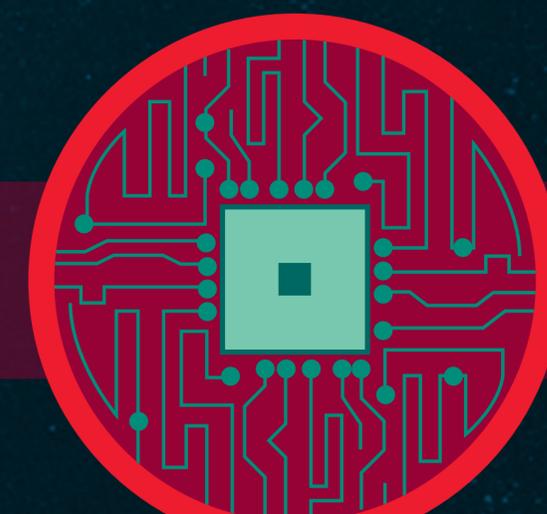
**Medicine**



**Engineering**



**Mathematics**



**Computer Sciences**

Applications from all **qualified candidates**,  
 irrespective of gender, sexual orientation, ethnicity,  
 beliefs, age, or other characteristics, are welcome.

ESA is also issuing a **special call** for candidates  
 with physical disabilities to apply to its astronaut  
 reserve. Discover this new opportunity on the  
 ESA astronaut selection website.

# REQUIREMENTS TO APPLY

All aspiring astronauts must fulfil requirements described in the vacancy notice.  
These include, but are not limited to:

Citizen of an ESA Member or Associate Member State.



Master's degree (or higher) in: natural sciences (including physical sciences, Earth, atmosphere or ocean sciences, biological sciences, medicine), engineering, mathematics, computer sciences; or an experimental test pilot degree.

Three years' relevant professional post-graduate experience, showing progressive increase in responsibilities.

Fluent in English (minimum CEFR C1). Knowledge of additional languages (minimum CEFR B1-B2) is an asset.

Strong motivation and ability to cope with irregular working hours, frequent travel, and long absences from home, family and regular social life.

Flexible with regards to place of work (inside or outside Europe).

Calm under pressure.

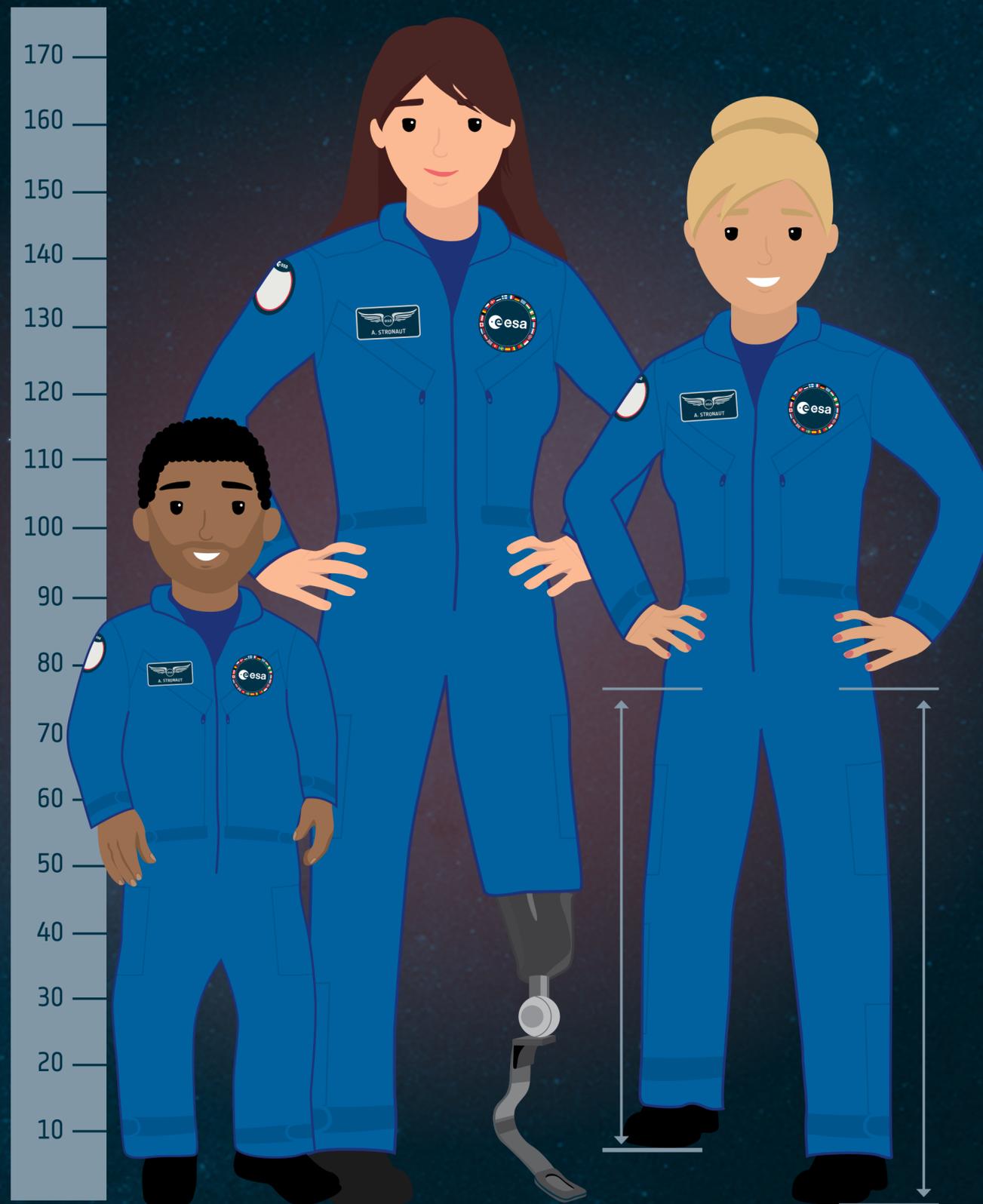
Willing to participate in life science experiments.



# PARASTRONAUT PROJECT

As part of ESA's commitment to enhance inclusiveness and fair representation, the Agency is launching the parastronaut feasibility project to assess the conditions for including **astronauts with disabilities** to work in space. This project is a new endeavour for Europe and a global first.

The feasibility project aims at offering **professional spaceflight opportunities** to a wider pool of talents. Starting with selected disabilities to have a thorough understanding of the potential challenges in terms of safety and operations in space, the scope of disabilities may then be extended aiming at broader inclusion.



The selected candidate(s) will work with ESA to assess and optimise the conditions allowing people with physical disabilities to **work and live in space**.

The educational and psychological requirements for these candidates are the same as for the ESA astronaut selection. However, with respect to **physical requirements**, this feasibility project will allow the inclusion of candidates with the following disabilities:

- a lower limb deficiency, as follows:
  - Single or double foot deficiency through ankle
  - Single or double leg deficiency below the knee
- a pronounced leg length difference
- a short stature (<130 cm)

# SELECTION PROCESS



The situation regarding COVID-19 may change this schedule.

## HOW TO APPLY

**1** Applications open  
31 March 2021  
and close 18 June 2021

**2** Submit a complete  
application online through  
the **ESA careers website**  
before the vacancy closes

**3** Create an account  
and answer an online  
questionnaire

**4** Upload all documents specified in the vacancy notice:

- a Europass CV (in English)
- a motivation letter (in English)
- a copy of your passport
- a medical certificate issued by an aviation medical examiner showing you are medically certified for a Private Pilot Licence or higher. You do not need to actually hold a pilot licence.

Please take care when applying. All incomplete, late, or incorrectly submitted applications will be disregarded without exception.



# THE EUROPEAN SPACE AGENCY: SPACE FOR EVERYONE

Established in 1975, ESA now has 22 Member States and cooperates with many others. These countries are home to more than 500 million European citizens. If you're one of them, then we're working for you.

Our mission is the peaceful exploration and use of space for the benefit of everyone. We watch over Earth, develop and launch inspiring and unique space projects, fly astronauts and push the boundaries of science and technology, seeking answers to the big questions about the Universe.

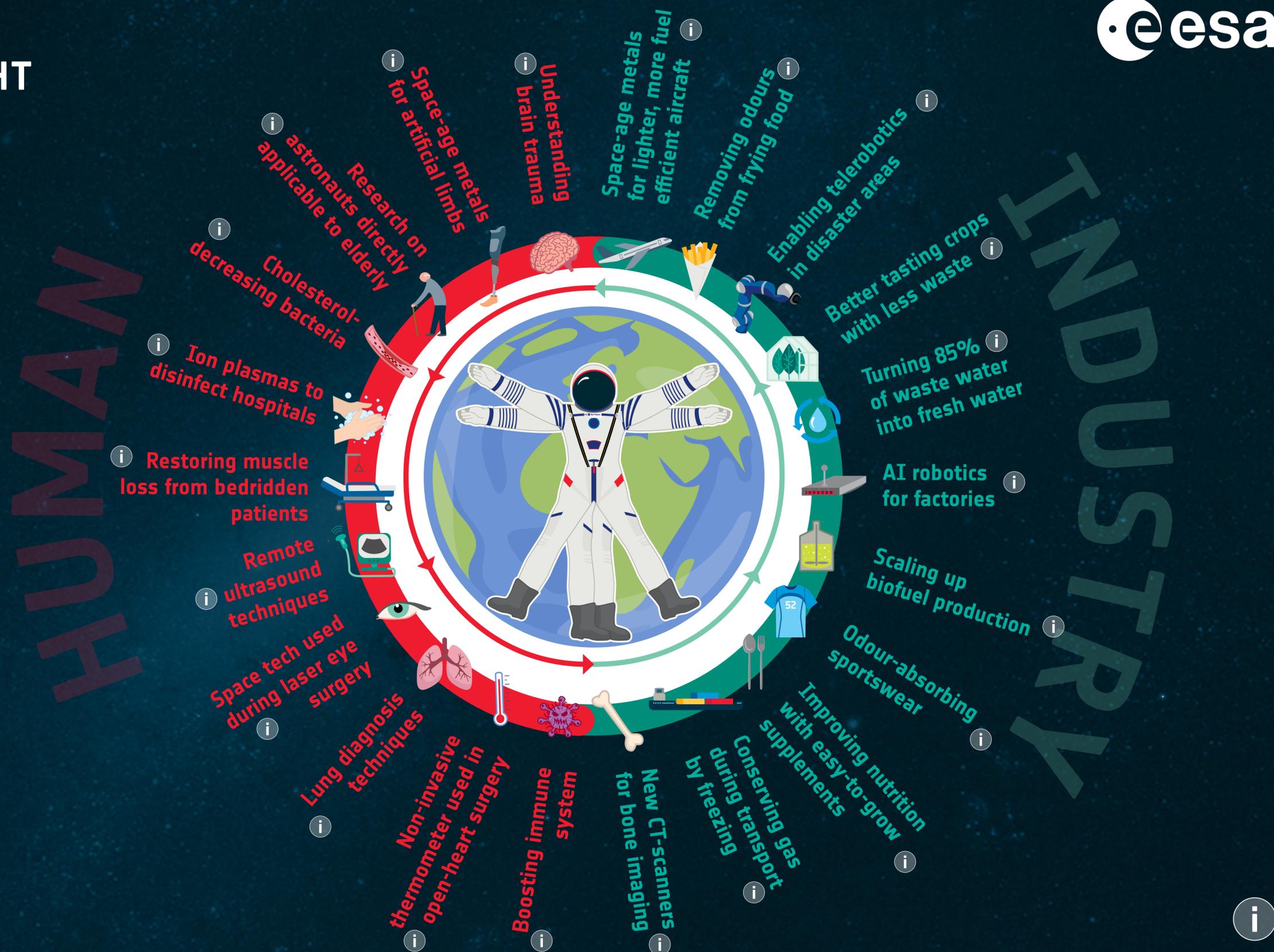
We are a family of scientists, engineers and business professionals from all over Europe, working together in a diverse and multinational environment.



# BENEFITS OF SPACEFLIGHT

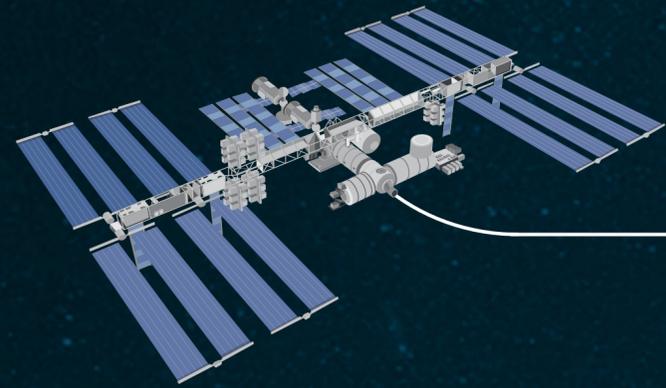
Human and robotic spaceflight contributes to a **circular economy**. Our research and technology developments improve energy efficiency, automation, robotics and artificial intelligence, as well as habitation, recycling, waste management and additive manufacturing processes and technology.

Click on the benefits to the right for more information about each subject and how it is helping people on Earth.



# ESA ASTRONAUTS

## European astronauts on the International Space Station



Umberto Guidoni



STS-100  
April – May 2001

Claudie Haigneré



Andromède  
October 2001

Roberto Vittori



Marco Polo  
April – May 2002

Philippe Perrin



STS-111  
June 2002

Frank De Winne



Odyssea  
October – November 2002

Frank De Winne



OasISS  
May – December 2009

Léopold Eyharts



STS-122  
February – March 2008

Hans Schlegel



STS-122  
February 2008

Paolo Nespoli



Esperia  
October – November 2007

Christer Fuglesang



Celsius  
December 2006

Thomas Reiter



Astrolab  
July – December 2006

Roberto Vittori



Eneide  
April 2005

André Kuipers



DELTA  
April 2004

Pedro Duque



Cervantes  
October 2003

Christer Fuglesang



Alissé  
August – September 2009

Paolo Nespoli



MagISStra  
December 2010 – May 2011

Roberto Vittori



DAMA  
May 2011

André Kuipers



PromISse  
December 2011 – July 2012

Luca Parmitano



Volare  
May – November 2013

Alexander Gerst



Blue Dot  
May – November 2014

Samantha Cristoforetti



Futura  
November 2014 – June 2015

Andreas Mogensen



Iriss  
September – October 2015

Tim Peake



Principia  
December 2015 – June 2016

You?



Matthias Maurer



Cosmic Kiss  
Autumn 2021

Thomas Pesquet



Alpha  
April 2021

Luca Parmitano



Beyond  
July 2019 – February 2020

Alexander Gerst



Horizons  
June – December 2018

Paolo Nespoli



Vita  
July – December 2017

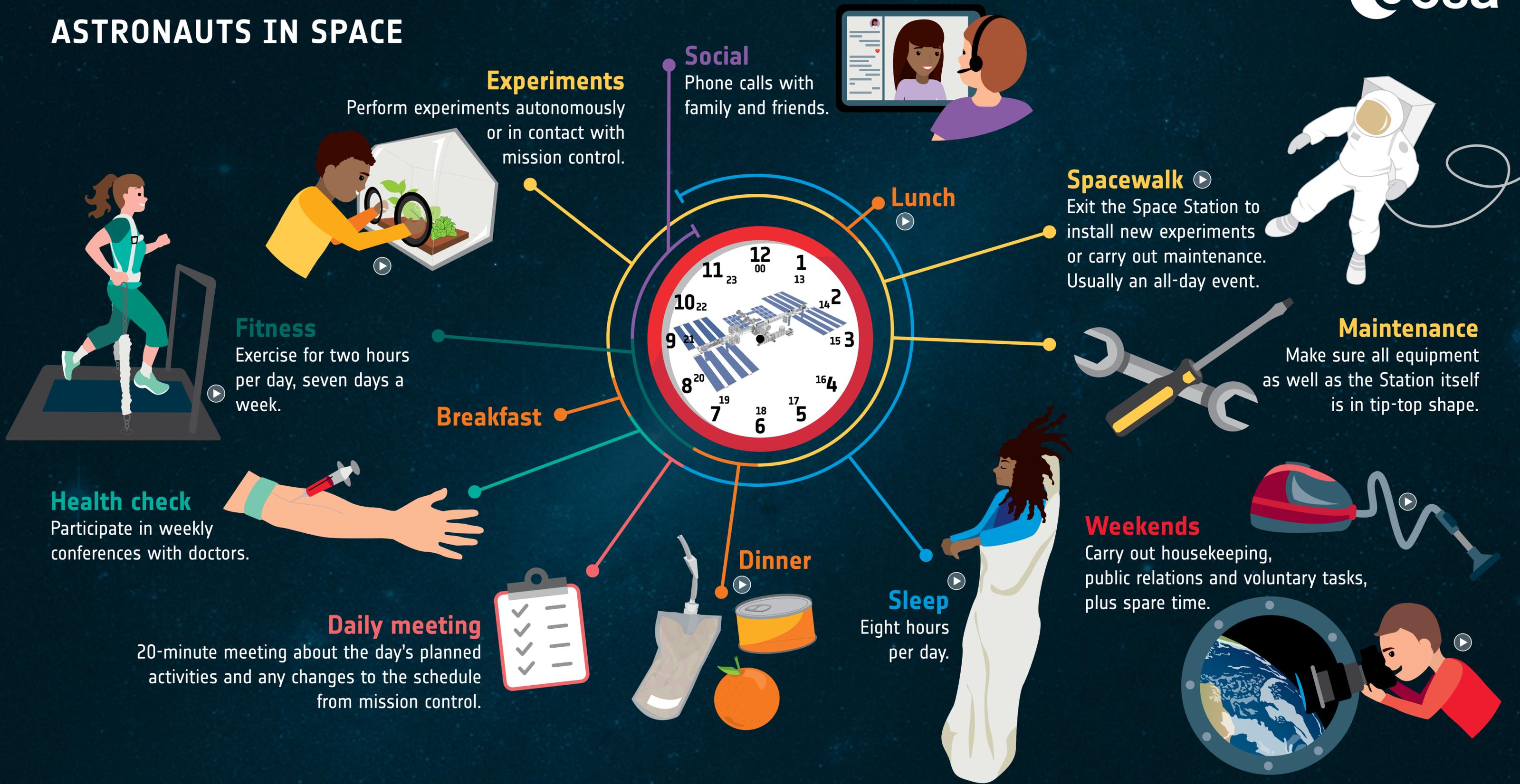
Thomas Pesquet



Proxima  
November 2016 – May 2017



# ASTRONAUTS IN SPACE



**Fitness**  
Exercise for two hours per day, seven days a week.

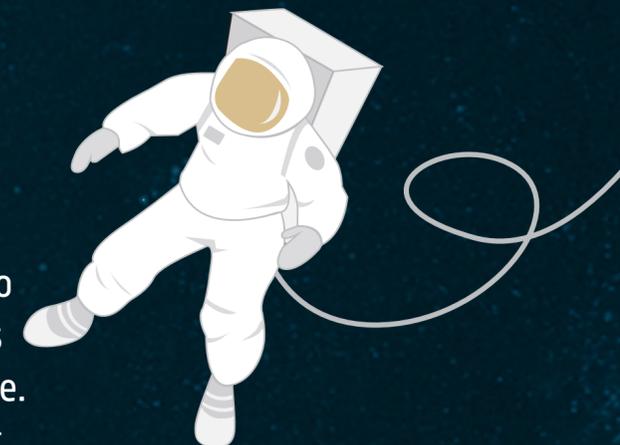


**Experiments**  
Perform experiments autonomously or in contact with mission control.

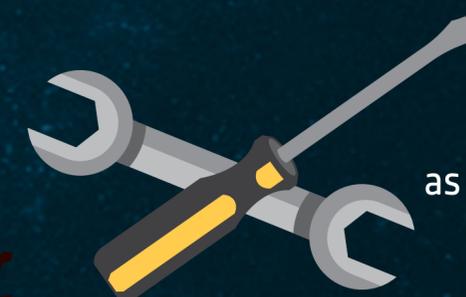


**Social**  
Phone calls with family and friends.

**Lunch**



**Spacewalk**  
Exit the Space Station to install new experiments or carry out maintenance. Usually an all-day event.



**Maintenance**  
Make sure all equipment as well as the Station itself is in tip-top shape.

**Health check**  
Participate in weekly conferences with doctors.



**Breakfast**

**Daily meeting**  
20-minute meeting about the day's planned activities and any changes to the schedule from mission control.



**Dinner**

**Sleep**  
Eight hours per day.



**Weekends**  
Carry out housekeeping, public relations and voluntary tasks, plus spare time.

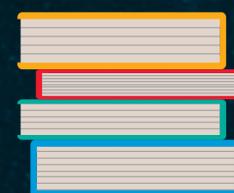
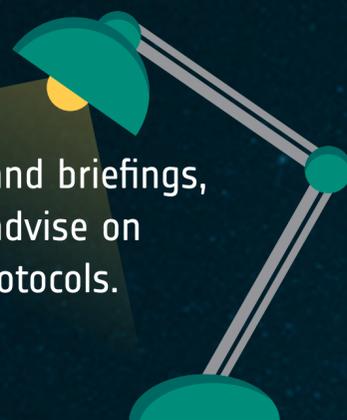


# ASTRONAUTS ON EARTH

Tasks ESA astronauts perform when they are not in space.

## Office work

Attend meetings and briefings, serve on boards, advise on procedures and protocols.



## Training

Refresher sessions, language classes, medical training, mission-specific training.

## Public relations and media

Give interviews, host visits, record special messages, social media.



## Mission support

Lead team in charge of ESA astronaut operations and crew support.

## Travel

Travel for events, conferences, training and longer-term postings with partner agencies.



## Mission control

Guide astronauts through spacewalks and spacecraft operations by radio from mission control.



## Education and outreach

Attend special events, speak with young people about ESA and space topics.

## Exercise

Maintain an adequate level of fitness through sport and exercise.



## Special assignments

Participate in analogue missions such as NASA's NEEMO and ESA's CAVES and Pangaea training.

# SUPPORT TEAM

Space exploration is a team effort, requiring many functions. Here are a few other roles that help ensure mission success.

## Eurocoms

Europe's specialist communicators and biomedical engineers are the voice link between astronauts in space and ground control teams on Earth.

## Crew support

The wellbeing of astronauts and their families is supported by a dedicated crew operations team.

## Medical experts

Flight surgeons, exercise specialists, administrators and other experts take care of an astronaut's health.

## Scientists and researchers

Principal investigators and their teams develop and support the experiments astronauts perform in orbit.

## Trainers

Astronaut trainers prepare crew members to carry out tasks and experiments in space.

## Planners

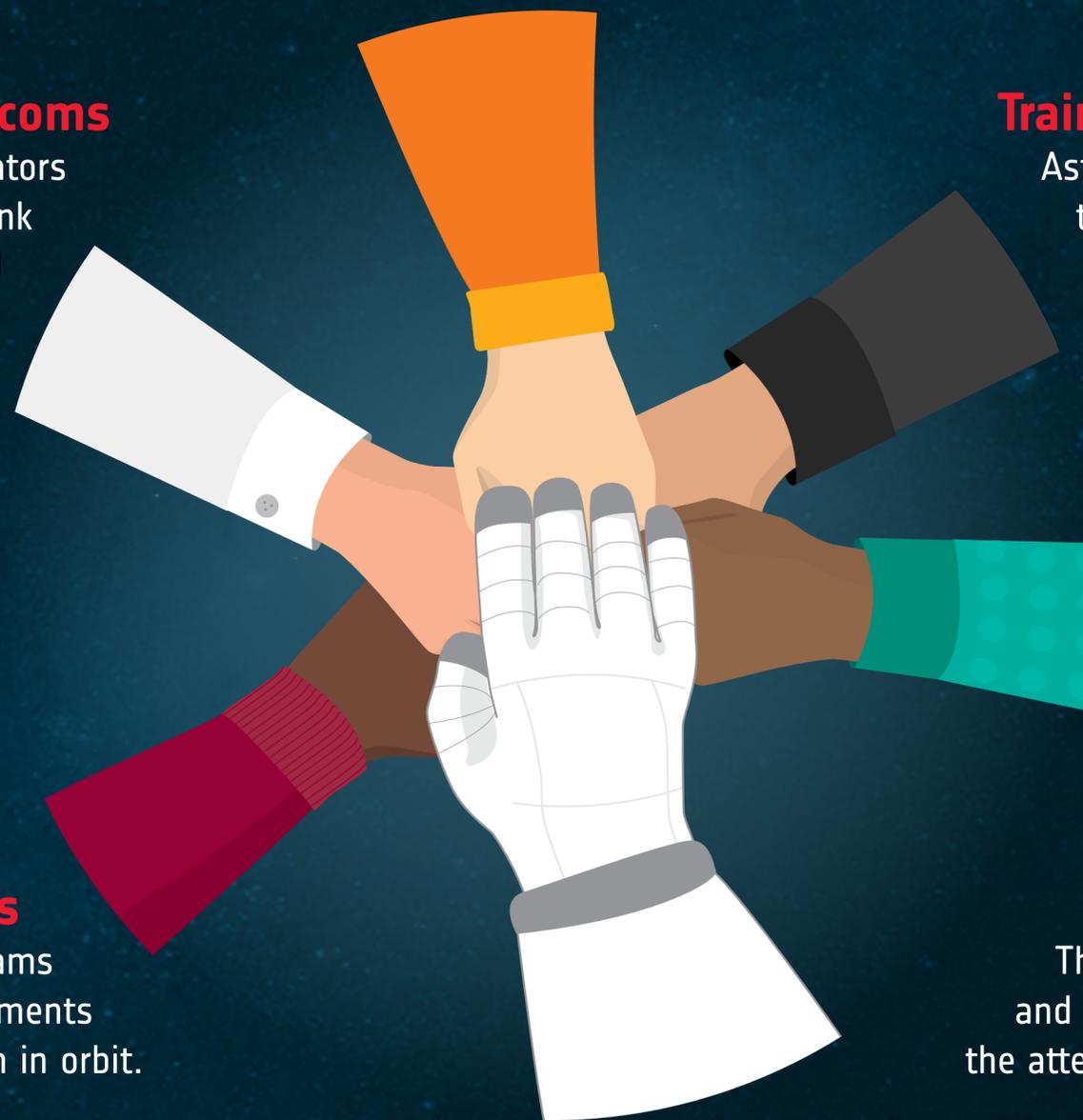
An astronaut's time is a precious resource, planners make sure this is scheduled for use in the most efficient way.

## Flight directors

The team at ESA's Columbus Control Centre make sure astronauts work safely in Europe's space laboratory, and command and control systems from the ground.

## Public relations, media and communications

This team brings the fascinating science and operations of astronaut missions to the attention of the public.



# PHASES OF TRAINING

Astronaut training is constantly evolving. However, there are **three key phases** for European astronauts.

## BASIC TRAINING

One year, at European Astronaut Centre

Introduction to:

- ESA
- International space programmes
- Engineering and science fundamentals
- Space systems and vehicles

- Basic astronaut skills
- Russian language
- Survival skills

## PRE-ASSIGNMENT TRAINING

Length varies, at all partner sites

Gain in-depth knowledge:

- Resource and data operations, robotics
- Navigation
- Maintenance
- Spacewalks

- Medical practices and payloads
- At this stage astronauts also support operations for ongoing missions

## INCREMENT TRAINING

Around two years, at multiple locations

Once assigned a spaceflight:

- Prepare for assigned mission
- Focus on specific tasks and experiments to be performed in space



# TRAINING LOCATIONS

**Canadian Space Agency**  
Robotics Training Centre  
Montreal, Canada

**NASA**  
Johnson Space Center  
Houston, United States

**SpaceX**  
Dragon training  
Hawthorne,  
United States

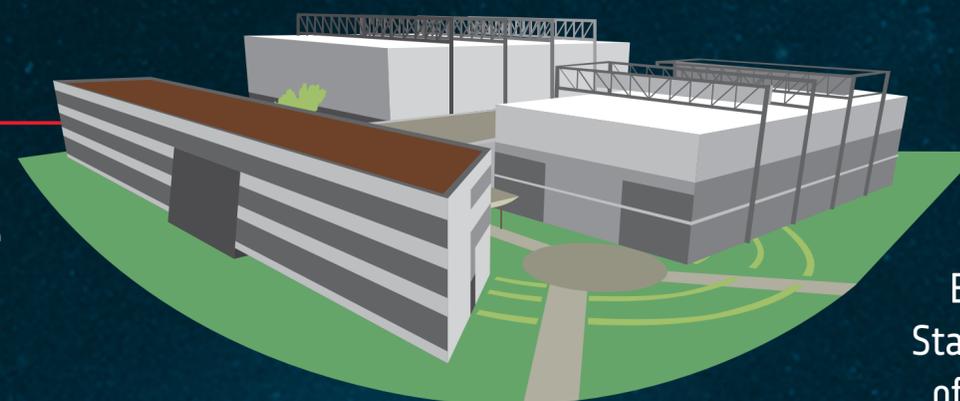
**NASA**  
Kennedy Space Center  
Florida, United States

**ESA**  
European Astronaut Centre  
Cologne, Germany

**Roscosmos**  
Yuri Gagarin Cosmonaut Training Centre  
Star City, Russia

**Roscosmos**  
Baikonur Cosmodrome  
Baikonur, Kazakhstan

**JAXA**  
Tsukuba Space Center  
Tsukuba Science City, Japan



**European Astronaut Centre**  
Home to ESA's astronaut corps, it trains Europeans to fly to the International Space Station, while preparing for an exciting future of space exploration beyond low Earth orbit.

**200+**  
People involved in astronaut training across the globe.



**30+**  
Astronauts from all over the world train each year at ESA's astronaut centre.



## CAVES

CAVES stands for Cooperative Adventure for Valuing and Exercising human behaviour and performance Skills. The three-week course prepares astronauts to work safely and effectively in **multicultural teams** in an environment where safety is critical – in caves.



The cave environment provides many space-relevant conditions, including **isolation** from the outside world, confinement, minimal privacy, technical challenges, as well as limited equipment and supplies for hygiene and comfort. Participants must adapt to living and working together in a unique environment to meet scientific and exploration objectives.

Constant attention to **safety rules**, procedures and equipment is critical to the successful completion of the mission.

# PANGAEA

The Pangaea course provides European astronauts practical knowledge of **geology of Earth, Moon and Mars** to prepare them to work with planetary scientists and engineers in the next exploration missions.

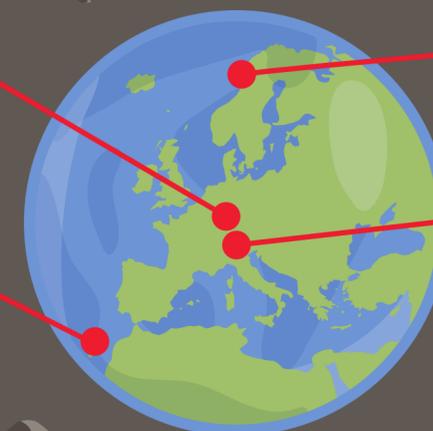
Astronauts train to work together with robots, scientists and engineers on Earth, using the best field geology and planetary observation techniques.



The course is split into several parts over a year, in these locations:

**Earth and lunar geology**  
Nördlinger Ries crater,  
Germany

**Geological field training  
and astrobiology**  
Lanzarote, Spain

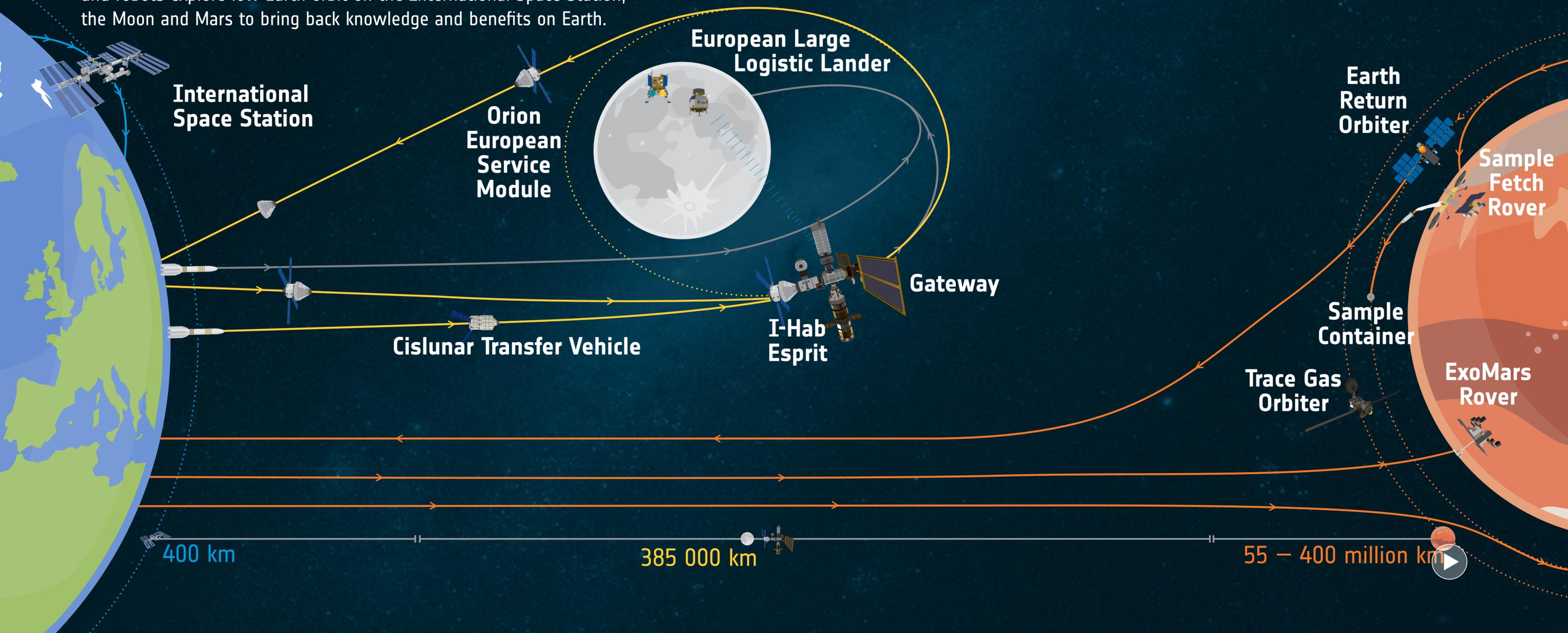


**Moon highland terrain**  
Lofoten, Norway

**Martian sedimentary  
geology and surface  
processes**  
Bletterbach canyon, Italy

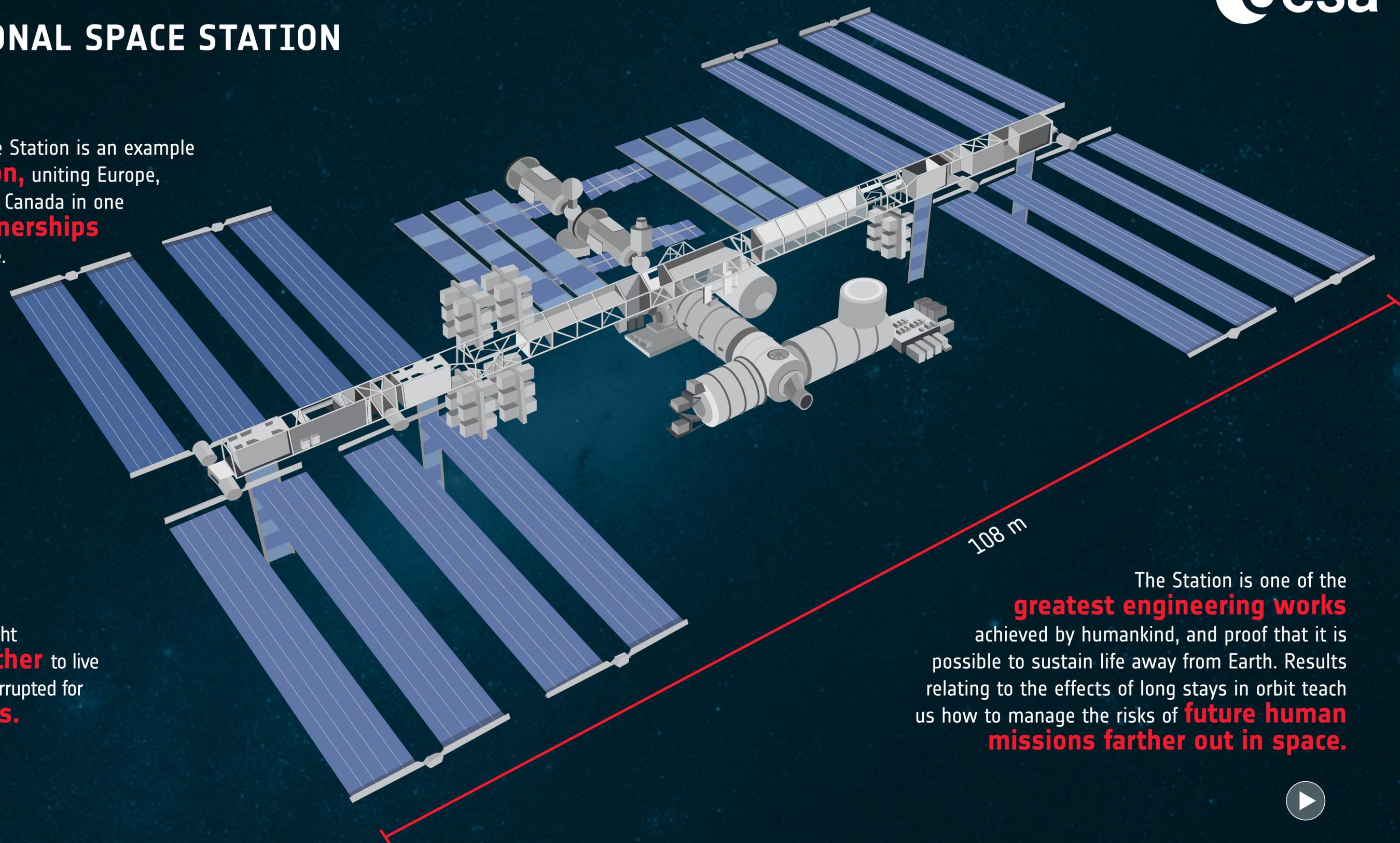
# ESA'S HUMAN AND ROBOTIC EXPLORATION DESTINATIONS

ESA's Human and Robotic Exploration programme will see astronauts and robots explore low Earth orbit on the International Space Station, the Moon and Mars to bring back knowledge and benefits on Earth.



# INTERNATIONAL SPACE STATION

The International Space Station is an example of broad **cooperation**, uniting Europe, USA, Russia, Japan and Canada in one of the **largest partnerships** in the history of science.



The endeavour has brought **humankind together** to live and work in space uninterrupted for **over two decades**.

The Station is one of the **greatest engineering works** achieved by humankind, and proof that it is possible to sustain life away from Earth. Results relating to the effects of long stays in orbit teach us how to manage the risks of **future human missions farther out in space**.



# GATEWAY

The lunar Gateway will be assembled and operated in a highly elliptical **orbit around the Moon.**

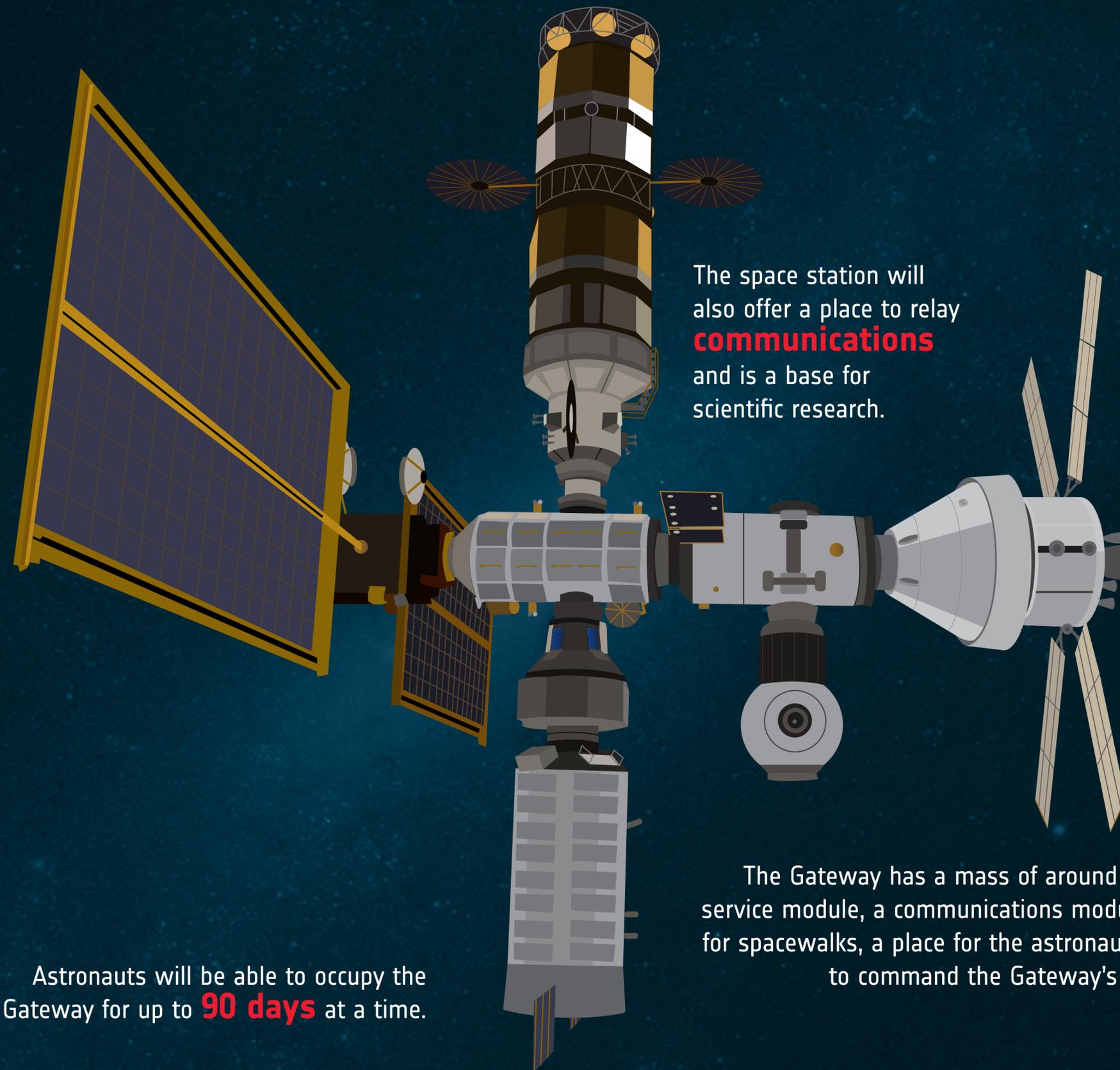
It will be a staging post for missions to the Moon and Mars. It will provide shelter and a place to stock up on supplies for astronauts en route to more **distant destinations.**

Astronauts will be able to occupy the Gateway for up to **90 days** at a time.

The space station will also offer a place to relay **communications** and is a base for scientific research.

Astronauts will use the **Orion spacecraft** to travel to the Gateway.

The Gateway has a mass of around **40 tonnes** and will consist of a service module, a communications module, a connecting module, an airlock for spacewalks, a place for the astronauts to live and an operations station to command the Gateway's robotic arm or rovers on the Moon.



## ORION EUROPEAN SERVICE MODULE

Orion is a NASA spacecraft set for missions to **the Moon, Mars and beyond.**

ESA has designed Orion's European Service Module – **the powerhouse** that will supply the spacecraft with electricity, propulsion, thermal control, air and water.

This is the first **collaboration between ESA and NASA** on a transportation vehicle that will carry astronauts farther into space than ever before.



# ROCKETS

## Going to space

Getting to space requires a **rocket launch**. These are the rockets that ESA astronauts could be launched on.

The Russian Soyuz, commercial SpaceX Crew Dragon and Boeing Starliner fly to the **International Space Station**.

The Space Launch System rocket will launch the **Orion spacecraft** on Artemis missions to the Gateway and the Moon.



50 m

 Roscosmos  
 Soyuz FG  
 Soyuz MS spacecraft



70 m

 SpaceX  
 Falcon 9  
 Crew Dragon



52 m

 Boeing  
 Atlas V  
 Starliner



110 m

 NASA  
 Space Launch System  
 Orion



 Organisation  
 Rocket  
 Spacecraft



# ESA MEMBER STATES

ESA is an **international organisation** with 22 Member States. By coordinating the financial and intellectual resources of its members, it can undertake programmes and activities far beyond the scope of any single European country.



## Member States

- Austria
- Belgium
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Luxembourg
- The Netherlands
- Norway
- Poland
- Portugal
- Romania
- Spain
- Sweden
- Switzerland
- United Kingdom

## Associate Members

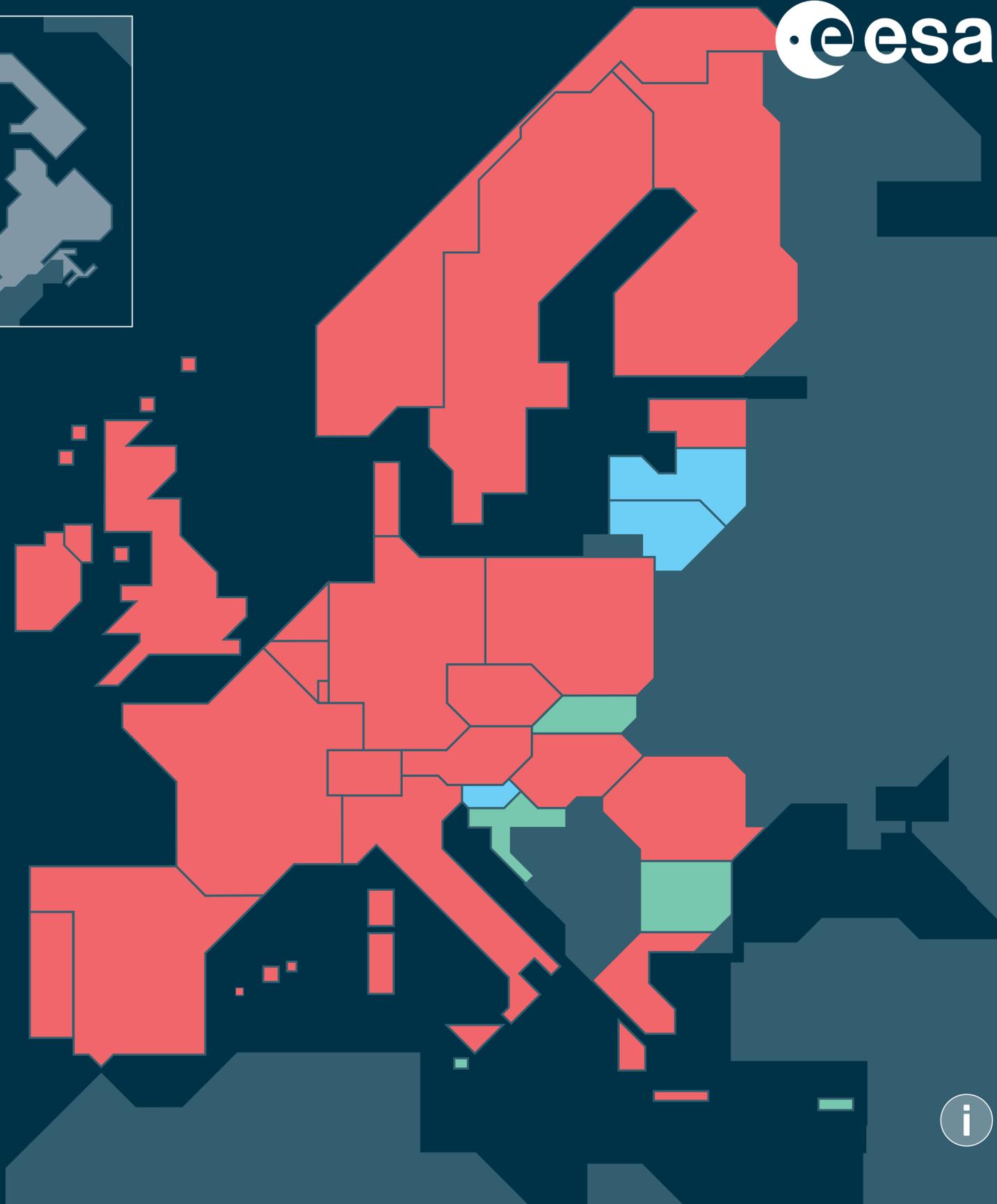
- Latvia
- Lithuania
- Slovenia

## Long-standing Cooperating State

- Canada

## Cooperating States in Europe

- Bulgaria
- Croatia
- Cyprus
- Malta
- Slovakia



# ESTABLISHMENTS AND FACILITIES

**EUROPE'S SPACEPORT**  
Guaranteeing European access to space.

**ESA ECSAT**  
Applying space to daily life.

**ESA ESAC**  
ESA's window on the Universe.

**ESA HQ**  
Guiding Europe's activities in space.

**ESA ESEC**  
Innovating in space security and education.

**ESA ESRIN**  
Keeping watch over our planet.

**ESA ESOC**  
Where space missions come alive.

**ESA EAC**  
Europe's hub of astronaut activity.

**ESA ESTEC**  
ESA's technical and research heart.

# INFOGRAPHICS



Your way to space



Who can apply?



Requirements to apply



Parastronaut project



Selection process



How to apply



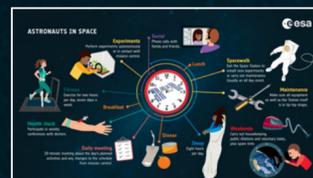
The European Space Agency: space for everyone



Benefits of spaceflight



ESA astronauts



Astronauts in space



Astronauts on Earth



Support team



Phases of training



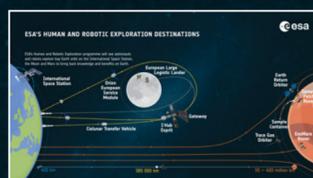
Training locations



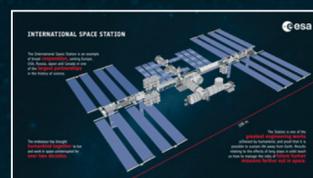
CAVES



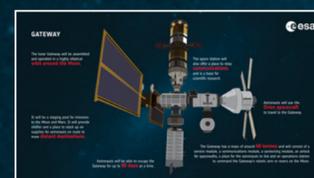
Pangaea



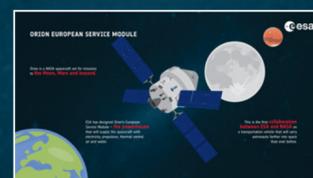
ESA's human and robotic exploration destinations



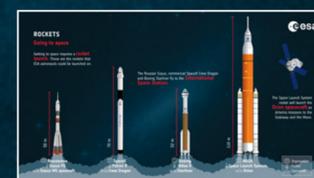
International Space Station



Gateway



Orion European Service Module



Rockets



ESA Member States



Establishments and facilities

# IMAGES



Ten years of ESA's 2009 class of astronauts



Running experiments



Spacewalk



Orion



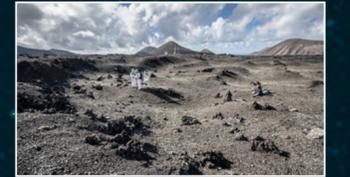
Gateway



Spacewalk training



CAVES course



Pangaea course



ESA astronauts, class of 2009



Science



Spacewalk



Orion



Gateway



Training



CAVES course



Pangaea course



ESA astronauts, class of 2009



Science



Spacewalk



Orion European Service Module



Gateway concept



Training



CAVES course



Pangaea course

# VIDEOS



International Space Station: 20 years in 60 seconds



A decade of European space science on Columbus



Human spaceflight and robotic exploration future



Visions of human spaceflight and robotic exploration



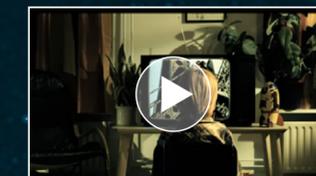
Alpha mission training – Thomas Pesquet



Blue Dot mission summary – Alexander Gerst



Tour of the Columbus laboratory with Tim Peake



Destination: low Earth orbit



New eyes – Thomas Pesquet



Wall of the world – Alexander Gerst



Space medicine: staying fit in space



Space medicine: staying healthy in space



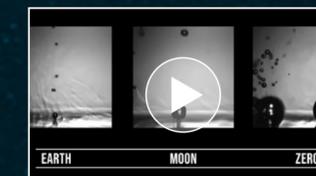
Science: Foams



Science: fluid mixtures



Science: growing blood vessels



Science: boiling



Space Station science with Samantha Cristoforetti



Three months of science in space with Alexander Gerst



Dizziness experiment with Tim Peake



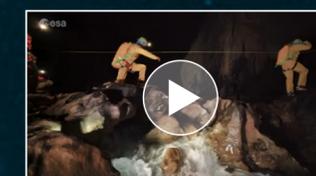
Sloshing liquids with Thomas Pesquet



Gyroscopes in space with Tim Peake



Training for a spacewalk with Matthias Maurer



CAVES 2019



Pangaea-X

# WEBSITES



ESA



ESA astronaut selection



Careers at ESA



ESA astronauts



The European astronaut corps



European Astronaut Centre



International Space Station



Orion



Gateway



Human and robotic exploration



Luca Parmitano



Alexander Gerst



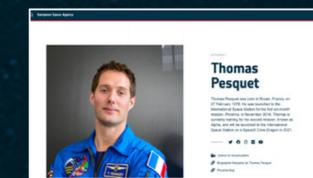
Samantha Cristoforetti



Andreas Mogensen



Tim Peake



Thomas Pesquet



Matthias Maurer



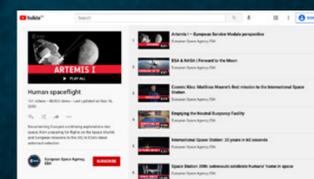
ESA exploration blog



CAVES and Pangaea blog



Lunar web documentary



Human and Robotic Exploration on YouTube



CAVES videos



ESA videos for professionals: Fit for space



ESA Explores podcast



ESA Brand Centre — ESA Patch

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