

Mission Overview

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ESA astronaut Christer Fuglesang from Sweden will undertake his second mission in space when he is launched to the International Space Station (ISS) on the European Alissé Mission from the Kennedy Space Center in Florida on board Space Shuttle Discovery. A principal focus of the mission will be Fuglesang's spacewalk activities as a Mission Specialist on the STS-128 Space Shuttle flight undertaking ISS assembly mission 17A. Fuglesang will also be undertaking experiment, educational and public relations activities as part of the Alissé Mission.



Launch of ESA's Columbus laboratory to the International Space Station on 7 February 2008 aboard STS-122 Space Shuttle Atlantis. ESA astronauts Hans Schlegel and Léopold Eyharts were crew members on the mission. (Image: NASA)

The 13-day mission marks the continued supply and assembly of the International Space Station as well as many important milestones for the European Space Agency, European astronauts, and European science and industry. ESA astronaut Christer Fuglesang will undertake two of the three mission EVAs as well as overseeing cargo transfers from the Multi-Purpose Logistics Module that will be transported to the ISS in the Shuttle's cargo bay. The mission will include vital preparations for the arrival of the European-built Node 3 in February

2010, important EVA maintenance tasks, bring necessary experiment equipment to the ISS including a European-built MELFI freezer and the Material Science Laboratory, return important payloads back to Earth including the European Technology Exposure Facility, which has been located on the outside of ESA's Columbus laboratory for 1½ years. The mission will also exchange an ISS Expedition crew member.

The focal points of the mission are as follows:



ESA astronaut Christer Fuglesang taking part in one of the STS-116 mission spacewalks on 14 December 2006. (Image: NASA)

ISS Assembly/ Maintenance Spacewalks:

Three EVAs or spacewalks are scheduled to take place during the mission of which Christer Fuglesang will undertake spacewalks 2 and 3 together with NASA astronaut John Olivas. Spacewalk 1 will be undertaken by Olivas and NASA astronaut Nicole Stott. The main tasks of the EVAs are to:

Run external cabling in advance of the installation of the European-built Node 3 Module: Node 3, which was built in Europe under a barter agreement between ESA and NASA, is

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scheduled to be launched to the ISS in February 2010. In preparation for its arrival Fuglesang and Olivas will run necessary electricity and data cabling from the S0 truss section to the Node 1 left-side docking port where Node 3 will be attached;

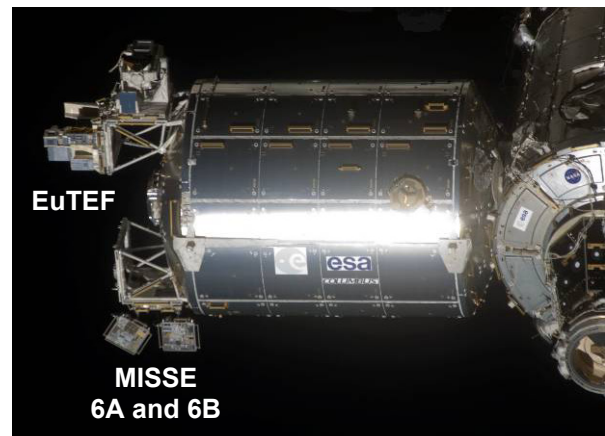
Install a new Ammonia Tank Assembly on the P1 truss section: The Station's ammonia tanks help with thermal regulation on the ISS. The task of installing a new tank will take place across two EVAs. On EVA 1 the old Ammonia Tank Assembly will be removed. During EVA 2, the new tank will be installed by Fuglesang and Olivas and the old tank stowed in the Shuttle's cargo bay for return to earth;



Ammonia Tank Assembly attached to the support structure that will be transported in Discovery's cargo bay for the STS-128 flight. Photo taken as workers attach a crane to the support structure at the Kennedy Space Center on 9 July 2009 (Image: NASA)

Return the European EuTEF payload to earth: The European Technology Exposure Facility, which has been located on the external payload platform of ESA's Columbus laboratory since February 2008 will be brought back by the Space Shuttle after 1½ years of extensive scientific activity in orbit. This fully-automated, multi-user payload facility carries a suite of 13 experiments that required exposure to the open space environment. The experiments cover a variety of disciplines including material science, physics, astrobiology, astronomy, and space technology;

Return the NASA MISSE payload to earth: During the EVA to remove EuTEF, NASA's Materials on the ISS Experiments (MISSE) will also be removed from the external surface of Columbus. These experiments evaluate the effect of the space environment on a large variety of exposed materials and have been receiving power from Columbus since installation;



ESA's Columbus laboratory attached to the European-built Node 2 on the International Space Station on 11 June 2008 and showing the locations of the European EuTEF facility and NASA's MISSE experiments (Image: NASA)

Install a Rate Gyro Assembly: Fuglesang and Olivas will remove a broken Rate Gyroscope and install a new one. This device is part of the US motion control systems to help with ISS orientation;

Install Payload Attachment System: During EVA 3 a Payload Attachmet System will be installed on the S3 truss section.

Additional EVA tasks include cable configuration and replacing a failed electronics box.



STS-121 Space Shuttle Discovery prior to docking with the ISS on 6 July 2006. The mission transported an MPLM (clear to see in Shuttle cargo bay) as well as ESA astronaut Thomas Reiter to become the first European ISS Expedition crew member (Image: NASA)

Delivery of important experiment facilities, equipment and supplies in the European-built Multi-Purpose Logistics Module:

Fuglesang will be responsible for overseeing the correct transfer of cargo from the Multi-Purpose Logistics Module (MPLM) and making sure it ends up in the right location on the ISS. The MPLMs are pressurised cargo containers that travel in the

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Shuttles cargo bay and capable of holding over 9 tonnes of cargo. 'Leonardo' the name of the MPLM used for this mission will transport a variety of standard ISS resupply items as well as the following items of interest:



ESA astronaut Frank De Winne inserting samples into a MELFI freezer in the Kibo laboratory on the ISS on 6 June 2009. (Image: NASA)

The European-built Minus Eighty Laboratory Freezer for ISS (MELFI) 2. This freezer can maintain a temperature of -80 degrees Celsius to preserve biological and medical specimens until they can be brought back to Earth. Built under an agreement between ESA and the Japanese Aerospace Exploration Agency (JAXA) it will be installed in the Japanese Kibo laboratory on the International Space Station.

Materials Science Laboratory

ESA's Materials Science Laboratory facility is the principal facility within NASA's Materials Science Research Rack in which it will be transported to the ISS. This is the first materials research rack on the ISS and will be located in the US Laboratory. The Materials Science Laboratory will carry out a variety of materials research in weightlessness.

Atmospheric Revitalization System for the European-built Node 3: The Atmospheric Revitalization System rack, will be installed in the European-built Node 3 when it arrives at the Station

early next year. The Atmospheric Revitalization System helps to remove carbon dioxide and trace contaminants from the cabin atmosphere and monitors the composition of the air.

A New Treadmill for the European-built Node 2: to act as an important exercise device for the ISS Crew. The new treadmill called COLBERT has a different vibration suppression system and wider running band to that currently used on the ISS.

Experiment Facilities/Consumables: In addition to the Materials Science Research Rack that will hold ESA's Materials Science Laboratory, NASA's Fluids Integrated Rack for experiments with fluids, will be transported to the ISS in the MPLM and installed in the American Destiny module. ESA's SODI-IVIDIL experiment, which will investigate the effects of vibrations on liquid diffusion, will also be uploaded on the STS-128 Shuttle flight along with important physiology experiment consumables.



ESA astronaut André Kuipers trying out a Crew Quarters mock up at the European Astronaut Centre in Cologne Germany (Image: ESA)

New Crew Quarters: This new sleeping compartment is a necessary addition with the increase to a permanent six-person ISS crew. It will be installed in the Japanese Kibo laboratory;

Exchange one member of the ISS Expedition 20 Crew:

NASA astronaut Timothy Kopra, who is scheduled to arrive at the ISS on Shuttle flight STS-127, will

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be replaced as an ISS Expedition 20 Flight Engineer by NASA astronaut Nicole Stott after she arrives at the ISS on the STS-128 flight.



Nicole Stott (left) and Timothy Kopra during training at the Johnson Space Centre on 22 October 2008. (Image: NASA)

Undertake experiment activities:

During his mission, Fuglesang will be subject of a number of experiments for the European Space Agency in the areas of human physiology. He will also be the subject of additional Non-ESA experiment activities again in the area of human physiology as well as an education experiment based on cosmic radiation and the ISS. An exhaustive ESA research programme will also be ongoing but largely carried out by the ISS Expedition crew. The arrival of the Materials Science Laboratory will also open the door for increased physical (namely materials) science research on the ISS

Additional Information:

STS-128 Shuttle Crew: ESA astronaut Christer Fuglesang forms part of a seven-member Shuttle crew along with NASA astronauts Rick Sturckow (commander), Kevin Ford, (pilot) and Jose Hernandez, John Olivas, Nicole Stott, and Patrick Forrester, all mission specialists. For the return journey Stott will be replaced by Timothy Kopra.

Second spaceflight for Fuglesang: This is the second spaceflight for Christer Fuglesang. In December 2006 he undertook the European Celsius mission. A principal part of this mission was as a mission specialist on the STS-116 Shuttle flight during which he undertook two EVAs for installation of the P5 truss section and rewiring the International Space Station to its assembly complete configuration. He also undertook an

additional EVA to help free the Station's P6 solar array which had become jammed during retraction. As with his first flight, Fuglesang is flying under an Early Utilisation Agreement between ESA and NASA, which included two ESA astronaut flight opportunities along with securing ISS utilisation rights for the European science community in advance of the launch of the Columbus laboratory.



STS-128 Crew. Back row from left: Jose Hernandez, John Olivas, Christer Fuglesang and Patrick Forrester. Front row from left: Kevin Ford, Nicole Stott, and Rick Sturckow. (Image: NASA)

Two ESA astronauts on the Station: For Fuglesang's second mission he will again be meeting up with an ESA astronaut who is on the ISS as a member of the ISS Expedition Crew, this time with ESA astronaut Frank De Winne. On Fuglesang's previous mission the ESA astronaut in question was Thomas Reiter.



ESA astronaut Christer Fuglesang (right) shaking hands with ESA astronaut and ISS expedition Expedition 14 crew member Thomas Reiter after he arrives at the ISS on 11 December 2006 (Image: NASA)

Most cumulative EVA time for a European astronaut: Fuglesang will have around 30 hours of cumulative EVA time at the end of the mission making him the European astronaut with the most cumulative time on spacewalks.

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ESA Mission Name and Logo

ESA Alissé Mission Logo



Mission Logo

The logo for the Alissé mission, designed by AOES in the Netherlands, features the wing of a bird enclosing images of the ISS and Space Shuttle Discovery, in which Christer Fuglesang will fly to the ISS, either side of two sets of horizontal lines.

These horizontal lines hold different symbolism for different aspects of the mission. First, the two sets of lines symbolise the two spacewalks undertaken by Christer Fuglesang during the mission. The bird's wing adds to this symbolism of the spacewalks as Fuglesang will seem to be flying around the ISS almost like a bird without the constraints of gravity.

The horizontal lines further evoke the wind alize, the wind after which the mission has been named, and through which the Shuttle will symbolically fly in the logo to reach the ISS. The two sets of lines can be seen to symbolise the Shuttle and ISS on their separate orbits as the Shuttle approaches the ISS for docking, and with the logo incorporating the colours of ESA, these two sets of lines represent the two ESA astronauts that will be present on the Station during the mission, Christer Fuglesang and Frank De Winne.

Mission Name

The winning name for Fuglesang's mission was proposed by Jürgen Modlich from Baierbrunn, Germany and selected from around 190 suggestions received. The reasoning behind his suggestion refers to the 15th century explorers who used the trade winds to follow Christopher Columbus across the oceans to the New World. One of the most famous trade winds is the alizé (also known as alize), a steady north-easterly wind that blows across central Africa to the shores of America.

By changing the letters 'iz' to 'iss', the target of today's space explorers, the ISS, is encompassed in the mission name: Alissé. In our new world, to reach Columbus (ESA's laboratory on the ISS) you must follow the wind up to the skies and meet people from other continents on the International Space Station.

Taken as four individual lines, the horizontal lines indicate the four space agencies of the astronauts that will be present on the Station during the mission: ESA, NASA Roscomos and the Canadian Space Agency. The birds wing and the symbols it encompasses also suggests how a bird looks down upon the earth, whilst floating on the alize wind, is similar to how the astronauts will be looking down upon Earth from the ISS and the Shuttle. The mission logo includes an official ESA logo at the top, with the left-hand icon of the ESA logo suggesting the moon as a future step for ESA, with respect to its exploration goals, built on its current and past missions to the ISS. The name of the mission is written at the bottom of the mission logo with the letters ISS highlighted to suggest where the mission will take place.

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STS-128 Mission Patch (Image: NASA)

The STS-128 patch symbolises the 17A mission and represents the hardware, people and partner nations that contribute to the flight. The Space Shuttle Discovery is shown in the orbit configuration with the European-built Multi-Purpose Logistics Module (MPLM) Leonardo in the payload bay. This will be the fourth time that Leonardo has flown on Discovery.

Earth and the International Space Station wrap around the NASA Astronaut Office symbol reminding us of the continuous human presence

in space. The names of the STS-128 crew members border the patch in an unfurled manner. Included in the names is the expedition crew member who will launch on STS-128 and remain on board ISS, replacing another Expedition crew member who will return home with STS-128.

The banner also completes the NASA Astronaut Office symbol and contains the U.S. and Swedish flags representing the countries of the STS-128 crew.

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Key Mission Data

SHUTTLE CREW:

Shuttle Commander:

Frederick Sturckow (NASA)

Shuttle Pilot:

Kevin Ford (NASA)

Mission Specialist:

Christer Fuglesang (ESA)

Mission Specialist:

Jose Hernandez (NASA)

Mission Specialist:

John Olivas (NASA)

Mission Specialist:

Patrick Forrester (NASA)

ISS Flight Engineer (Ascent):

Nicole Stott (NASA)

ISS Flight Engineer (Descent):

Timothy Kopra (NASA)

SPACECRAFT:

Shuttle Orbiter:

Discovery

MISSION:

ESA Mission Designation

Alissé

Shuttle Mission Designation:

STS-128

ISS Assembly Flight Designation:

17A

Primary Payload:

Multi-Purpose Logistics Module (MPLM)

Secondary Payload (Ascent):

Ammonia Tank Assembly

Secondary Payload (Descent):

European Technology Exposure Facility (EuTEF), MISSE 6A and 6B, Old Ammonia Tank Assembly.

Principal Payload Racks (MPLM):

Minus Eighty Degrees Laboratory Freezer for the ISS (MELFI-2), Material Science Laboratory in the Material Science Research Rack; Node 3 Atmospheric Revitalization System; Fluids Integrated Rack, COLBERT Treadmill, Crew Quarters:

LAUNCH and LANDING SITES:

Launch Site:

Launch Pad 39A, Kennedy Space Center Florida, USA.

Primary Landing Site:

Kennedy Space Center, Florida, USA

Secondary Landing Sites:

**Edwards Air Force Base, California, USA
White Sands Space Harbor, New Mexico, USA**

MISSION PARAMETERS:

Scheduled Launch Date:

Late August 2009

Launch Window:

10 minutes

Initial Orbit Altitude:

226 kilometres

ISS Altitude:

~350 kilometres

Inclination:

51.6°

Mission Duration:

13 days

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Christer Fuglesang's Official Flight Kit

Christer Fuglesang will be taking a number of small symbolic items on his mission. The symbols originate from institutions and organizations from all over Sweden, from north to south and will be returned to them after his mission.

The Wargentín medal of the Royal Swedish Academy of Sciences: The Academy has a distinguished history for, among other things, choosing Nobel laureates in physics and chemistry. This commemorative coin, which became the Wargentín medal was minted in 1783 on the death of Pehr Wilhelm Wargentín, astronomer and permanent secretary of the Academy from 1743 - 1783.



The Wargentín medal (left) and the Polhem medal (right)

The Polhem Medal of The Swedish Association of Graduate Engineers: The Association emphasises the important role of engineers in different ways. One of these ways is by awarding the prestigious Polhem Prize every second year, established in memory of Sweden's great inventor, Christopher Polhem (1661–1751). The gold medal being flown will be awarded in 2011 to commemorate 350 years since Polhem's birth.

The medal for the Nobel Peace Prize (replica) for the Norwegian Space Board: A replica of the Nobel Peace Prize will be flown for Norsk Romsenter, the Norwegian Space Board. The medal is an overwhelming symbol of peace, with the winner nominated by the Norwegian Parliament, the Stortinget' each year.

Life jacket for The Swedish Sea Rescue Society: The Swedish Sea Rescue Society (Svenska Sällskapet för Räddning af Skeppsbrutna) is a non-profit volunteer organisation, dedicated to sea rescue that have existed since 1907. The life jacket that they supplied belongs to a teddy bear, which can be given to children during sea rescue missions.

Silver spoon for the Sami Parliament of Sweden: The Sami culture is a unique part of Swedish heritage. Ever since the middle ages the Sami has used silver, as the metal was considered durable and valuable. Silver spoons that borrowed their shape from spoons made of horn were very sought after objects.



From left to right: A Sami spoon, a chess piece from the Swedish Chess Academy, and a Dalecarlia horse.

Neutralino soft toy for CERN

The neutralino is a hypothetical particle that is predicted to explain the supersymmetry theory in fundamental physics and a prime candidate to explain so-called dark matter. This autumn CERN's new proton accelerator will finally produce collisions at record energies, and may find evidence that the neutralino really exists, and to determine it's mass.

Other symbolic items Fuglesang will be taking include a chess piece for the Swedish Chess Academy, chess being one of his favourite games; a flag from Fuglesang's favourite football team Djurgårdens IF; a Swedish Olympic Committee standard; a Royal Opera pennant; a map of Gothenburg for the Science festival; a Dalecarlia horse, a tourist symbol of Sweden and a mini frisbee from Fuglesang's own personal collection.



Swedish Olympic Committee standard (left) and a Royal Opera pennant (right)