

## European Astronauts and Shuttle

ESA astronaut Paolo Nespoli from Italy is scheduled to be the next European astronaut launched into orbit onboard the STS-120 Shuttle Discovery mission in October 2007 as a member of the ISS 10A assembly mission. During the mission one of his major tasks will be as intravehicular activity (IVA) astronaut coordinating activities of the spacewalking astronauts during installation of the European-built Node 2 and relocation of the P6 truss section to the end of the port-side truss. Nespoli will also be undertaking a European experiment programme as part of the European Esperia mission.



ESA astronaut Paolo Nespoli participating in a post insertion/de-orbit training session at the Johnson Space Center on 9 April 2007. (Image: NASA)

The STS-120 Shuttle mission marks the continued construction of the International Space Station. It also pre-emptes the STS-122 mission in December, which will see the European Columbus laboratory attached to the ISS. This mission also has important significance from a European perspective as it will include two astronauts who are members of ESA's European Astronauts Corps, German ESA astronaut Hans Schlegel who will be a Mission Specialist for the ISS Columbus assembly mission and French ESA

astronaut Léopold Eyharts who will become a member of the ISS Expedition Crew, taking over from NASA astronaut Dan Tani, who is travelling to the ISS on the STS-120 Discovery flight.



ESA astronaut Léopold Eyharts during STS-122 training at the Johnson Space Center in May 2007. (Image: NASA)

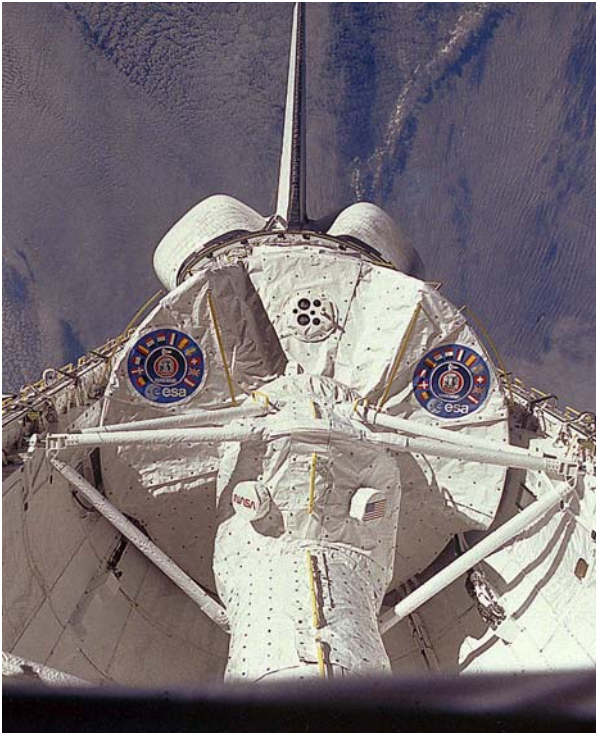
The flight of Nespoli comes in a long tradition of European astronauts who have flown on the Shuttle since ESA astronaut Ulf Merbold from Germany became the first European astronaut to fly on Shuttle in 1983.



Launch of STS-9 Spacelab-1 mission with ESA astronaut Ulf Merbold on 28 November 1983. (Image: NASA)

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Ulf Merbold became the first European to undertake a mission on the Space Shuttle (STS-9) on the 10-day Spacelab-1 mission between 28 November 1983 and 8 December 1983. Not only was this the first spaceflight of an ESA astronaut, it was the first flight of the European-built Spacelab and the first flight of a non-American on the Shuttle.



Spacelab-1 shown in the Shuttle cargo bay while in orbit. Crew access tunnel in foreground is shown leading to pressurised module. (Image: NASA)

Spacelab was the first purpose-built space laboratory developed by Europe under a cooperation agreement with NASA. It was a modular research laboratory that would fit inside the Shuttle's cargo bay and built by a consortium of European companies. During the Spacelab-1 mission over 70 scientific experiments were conducted in a variety of fields including Astronomy, Solar Physics, Space Plasma Physics, Earth Observation, Material Science, Technology and Life Sciences. Working in two teams of three, the crew worked 12-hour shifts, allowing for 24-hour operations.

Between 1983 and 1998, Spacelab flew on the Space Shuttle a total of 22 times. Seven of these missions included European astronauts: ESA astronaut Wubbo Ockels, and German Aerospace Research Establishment (which became DLR) astronauts Reinhard Furrer and Ernst

Messerschmid in 1985. Ulf Merbold undertook his second Spacelab flight in January 1992 (Spacelab IML-1 mission) followed two months later by Belgian astronaut Dirk Frimout. In 1993 DLR astronauts Hans Schlegel (currently an ESA astronaut and scheduled to fly on the STS-122 mission, which will transport the European Columbus laboratory to the ISS in December 2007) and Ulrich Walter, and in November 1994 ESA astronaut Jean-Francois Clervoy. Jean-Jacques Favier (CNES) became the last European astronaut to fly on a Spacelab mission on Shuttle between 20 June and 7 July 1996.



ESA astronaut Hans Schlegel collects fungi samples as part of the Spacelab D-2 mission in 1993. (Image: NASA)

Not only have Spacelab experiments made a major contribution to space science research, but also the knowledge and expertise gained by both ESA and NASA during the Spacelab missions has made a significant contribution to today's International Space Station programme.

Beyond the Spacelab missions, European astronauts have carried out a wealth of research and gained a wealth of experience aboard Shuttle in the past 20 years. Following the flight of Patrick Baudry on the Spartan-1 mission for CNES in 1985, there was a gap of seven years until the flight of ESA and Europe's most experienced astronaut to have flown on the Space Shuttle, Claude Nicollier having flown on Shuttle on four separate occasions.

Nicollier's first flight was on STS-46 in 1992 together with Italian Space Agency astronaut

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ESA astronaut Claude Nicollier who served on four separate Shuttle missions between 1992 and 1999. (Image: ESA)

Franco Malerba. This mission deployed the European Retrieval Carrier EURECA and the Tethered Satellite System TSS-1. Nicollier's second mission was on the first Hubble Space telescope servicing mission, STS-61 in December



ESA's European Retrieval Carrier (EURECA) being held by the Shuttle's robotic arm prior to deployment on STS-46 Shuttle mission in 1992. (Image: NASA)

1993. During the 11-day flight, the Hubble Space telescope was captured and restored to full capacity through a record of five spacewalks by four astronauts. His third flight was on STS-75 Columbia (22 February to 9 March 1996) together with ESA astronaut Maurizio Cheli and Italian Space Agency astronaut Umberto Guidoni. This mission was a 15-day flight, with principal payloads being the reflight of the Tethered Satellite System (TSS) and the third flight of the United States Microgravity Payload (USMP-3).

The TSS experiment produced a wealth of new information on the electrodynamics of tethers and plasma physics before the tether broke at 19.7 km, just shy of the 20.7 km goal. Scientists on the ground were able to devise a programme of research making the most of the satellite's free flight while the astronauts' work centered on research related to the USMP-3 Microgravity investigations.



ESA astronaut Jean-Francois Clervoy exercising on the Shuttle flight deck bicycle ergometer on the STS-84 mission, the 6<sup>th</sup> Shuttle flight to the Mir Space Station. Clervoy is a veteran of three separate Shuttle missions. (Image: NASA)

In December 1999 Nicollier was part of the STS-103 mission together with ESA astronaut Jean-Francois Clervoy who was on his third flight on the Shuttle. This was the third Hubble Space

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telescope mission. During this eight day mission, Nicollier carried out his first spacewalk or EVA, of 8 hours 10 minutes duration to install a new computer and one of three fine guidance sensors. He is the first European to obtain EVA experience on a Shuttle flight.

Between the third and fourth flights of Nicollier, four European astronauts undertook missions on the Shuttle. Jean-Francois Clervoy was on the 6<sup>th</sup> Shuttle flight to Mir in May 1997 and Jean-Loup Chrétien (CNES) on the 7<sup>th</sup> Shuttle/Mir flight (25 September 97 – 6 October 1997). Pedro Duque flew as Mission Specialist on the Space Shuttle Discovery, STS-95 mission (29 October to 7 November 1998). This nine-day mission was dedicated to research in weightlessness and the study of the Sun. Michel Tognini, currently Head of ESA's European Astronaut Centre, flew on the STS-93 mission, which took place from 22-27 July 1999. During this mission his primary task was to assist in the deployment of the Chandra X-Ray Observatory, and to conduct a spacewalk if needed. The Chandra X-Ray Observatory is designed to conduct comprehensive studies of the



ESA astronaut Gerhard Thiele preparing for underwater EVA training at the Johnson Space Center's Neutral Buoyancy Laboratory prior to launch of the STS-99 mission. (Image: ESA)

universe, and the telescope will enable scientists to study exotic phenomena such as exploding stars, quasars, and black holes.

With the passing of the millennium, Gerhard Thiele became the first European astronaut to fly on Shuttle. From 11-22 February 2000, Thiele participated as mission specialist in the STS-99 Mission. The Shuttle Radar Topography Mission (SRTM) was dedicated to the first, three-dimensional, digital mapping of the Earth surface on a nearly global scale. He was responsible for SRTM operations, including the deployment and retraction of the 200-foot high boom from Endeavour's cargo bay upon which one of the flight's radar systems was mounted. Thiele was also one of two spacewalking crew members, in the event contingency spacewalk would have been required during the flight.



Former ESA astronaut Umberto Guidoni on the flight deck of the Space Shuttle Endeavour during the STS-100 in April 2001. (Image: NASA)

From 19 April to 1 May 2001, Umberto Guidoni participated in the Space Shuttle's STS-100 mission, being the first European on board the International Space Station. On that flight, the Space Shuttle delivered elements and equipment required for the ongoing assembly of the International Space Station. In particular, it carried the Multi-Purpose Logistics Module (called Raffaello), provided by the Italian Space Agency and loaded with laboratory outfitting equipment, as well as the Space Station Remote Manipulator System (SSRMS), the Canadian robotic arm that is, and will be, used extensively to assemble the Space Station.

From 5-19 June 2002 Phillippe Perrin served as a mission specialist on the STS-111 mission onboard Space Shuttle Endeavour. The 14-day STS-111 mission exchanged the ISS Expedition Crew and delivered a Canadian-built mobile base

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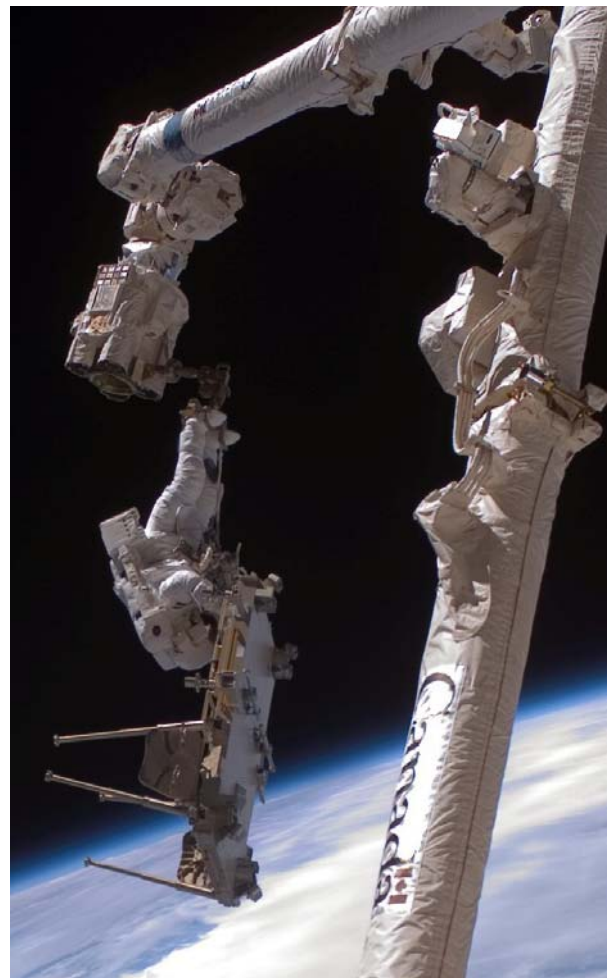
system for the Station's robotic arm. During the Mission Perrin carried out three successful spacewalks. On the first two Extravehicular activities, he helped to install the mobile base system and on the third, he performed a late-notice repair of the Station's robotic arm by replacing one of its joints. He spent a total of about 19 hours outside the station. During that mission, he was also arm operator and berthed the MPLM back into the orbiter payload bay towards the end of the mission.



ESA astronaut Thomas Reiter inserting radiation sensors in the European Matroshka experiment in December 2006 in the Zvezda Service Module on the ISS. (Image: NASA)

On 4 July 2006 ESA astronaut Thomas Reiter was launched to the ISS on the STS-121 Discovery flight. He became the first European and ESA astronaut to become a member of an ISS Expedition Crew remaining on the ISS for nearly six months. During his time on the ISS he carried out relevant ISS tasks as well as an ESA experimental programme as part of the European Astrolab mission.

Christer Fuglesang from Sweden was the last European astronaut launched into orbit onboard the STS-116 Shuttle Discovery mission in December 2006 as a member of the ISS 12A.1 assembly mission and undertaking the European Celsius mission. During the mission he undertook two spacewalks in connection with installation of the P5 truss section of the ISS and reconfiguration and activation of the ISS thermal control system and power supply. Thomas Reiter was on the return journey of the STS-116 flight with Fuglesang, which landed on 22 December 2006.



ESA astronaut Christer Fuglesang during the second EVA on the ISS 12A.1 assembly mission in December 2006. Attached by a footplate to the Station's robotic arm, Fuglesang is relocating a piece of EVA hardware to a different location on the ISS truss to clear the way for activities on the third EVA. (Image: NASA)