

ESA Astronaut Experiment Programme

ESA Astronaut Experiment Programme

During the Alissé mission to the ISS Christer Fuglesang will be undertaking a number of diverse experiments for the European Space Agency and other partner organisations. The experiments are principally in the area of human physiology with one experiment in the area of education covering radiation monitoring. The ESA experiments are funded from the European ELIPS Programme.

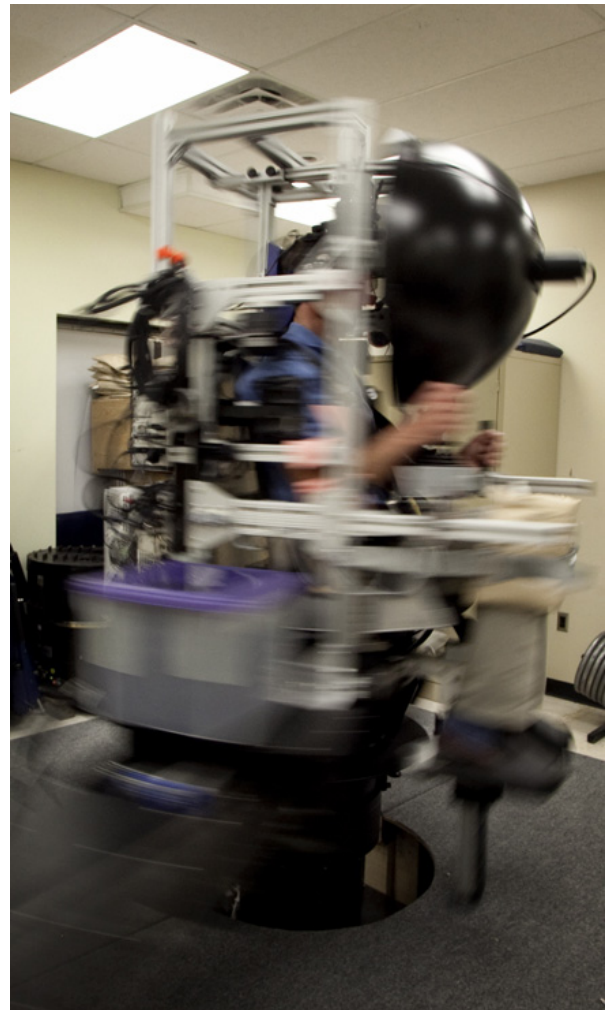
ZAG

ZAG, which stands for Z-axis Aligned Gravitoinertial force is an ESA investigation into the effect that weightlessness has on an astronaut's perception of motion and tilt as well as his level of performance before and immediately after spaceflight. Different tests will take place pre- and post flight including an analysis of the astronaut's motion perception and eye movements whilst using a track-and-tilt chair. It will also be evaluated whether a tactile vest improves perception and performance during these tests.

Science Team: G. Clement (FR), S. Wood (US), M. F. Reschke (US), P. Denise (FR).



ESA astronaut in a track-and-tilt chair (Image: R. Schederin)



ESA astronaut in a track-and-tilt chair in motion (Image: R. Schederin)

Otolith

The working of our balance system and our eyes are strongly interconnected and understanding their adaptation to weightlessness is important for maintaining an astronaut's capacity for carrying out tasks in space. The otolith organs in the inner ear play an important role in our balance system as detectors of vertical and horizontal acceleration. This ESA experiment will make an assessment of otolith function before and after short-term spaceflight. This includes an assessment of otolith-ocular response to determine neural pathway communication

ESA Astronaut Experiment Programme

between the otoliths and the Central Nervous System; an indication of function of the saccule, which transmits neural impulses of head movements to the brain; and evaluating the symmetry of information generated by an the otoliths using an estimation of the astronaut's subjective visual vertical.

Science Team: A. Clarke (DE), S. Wood (US), F. Wuyts (BE).



The Particle Flux Demonstrator

Particle Flux Demonstrator

The Particle Flux Demonstrator will be used to measure the flux and flow of charged particles (cosmic rays) passing through the International Space Station (ISS). This will vary to the greatest degree with the variation of the latitude at which the station is flying. On the ISS, the majority of detected particles will be protons, but it is possible to select much rarer charged ions, too. The

portable device will be used to demonstrate the basic properties of the ionizing radiation environment aboard the ISS. This experiment forms part of an educational experiment at high school and university levels. Several education institutions, in Sweden, Norway and Denmark, will be taking part in this experiment using cosmic rays detectors to take readings on Earth during the ISS flyovers. The Particle Flux Demonstrator was built by the Swedish Royal Institute of Technology (KTH) with support from the Swedish National Space Board.

Science Team: Mark Pearce (SE)

Sleep-Wake Actigraphy and Light Exposure During Spaceflight

This experiment sponsored by NASA will examine the effects of space flight on the sleep of the astronauts during space shuttle missions. Relatively little is known of the prevalence or cause of space flight induced insomnia in short-duration missions. Fuglesang will wear a small, light-weight wrist worn device called an Actiwatch to monitor his sleep-wake activity patterns and light exposure for the entire duration of their mission.

Science Team: C. Czeisler (US), L. Barger (US), K. Wright, Jr. (US), J. Ronda (US)

Spinal Elongation

The NASA sponsored Spinal Elongation investigation provides quantitative data about the amount of change that occurs in the seated height of astronauts due to spinal elongation in space. The projections of seated height will provide data for future spacecraft design. Spinal measurements and photographs will be taken of Fuglesang at pre-defined intervals during flight.

Science Team: S. Rajulu (US)

Visual Performance

This NASA-sponsored assessment of Vibration Effects on Visual Performance During Launch will determine visual performance limits during the vibrations and g-loads on the Space Shuttle during launch and ascent. Using placards, Fuglesang and other crew members will have to indicate minimum readable font size. This experiment will help set vibration limits for visual performance during launch.

Science Team: K. Holden (US), S. Thompson (US), D. Ebert (US), B. Adelstein (US), P. Root (US), J. Jones (US)