SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
ON TRACK - UNDERGRADUATE AND POSTGRADUATE SPACE EDUCATION (2)

Author: Dr. Natacha Callens
European Space Agency (ESA), Spain

Dr. Javier Ventura-Traveset
European Space Agency (ESA), Spain
Mr. Eduardo Zornoza García-Andrade
European Space Agency (ESA), Spain
Dr. Carlos Gómez-Calero
European Space Agency (ESA), Spain

ESA PARABOLIC FLIGHT, DROP TOWER AND CENTRIFUGE HANDS-ON ACTIVITIES

Abstract

The aim of the European Space Agency (ESA) Education Office is to motivate young people to study science, engineering and technology subjects and to ensure a qualified workforce for ESA and the European space sector in the future.

This paper will introduce three new ESA Education Office hands-on activities called "Fly Your Thesis!", "Drop Your Thesis!" and "Spin Your Thesis!". These educational programmes give respectively access to aircraft parabolic flight, drop tower and centrifuge campaigns to European students. They offer university students the unique opportunity to design, build, and eventually perform, in microgravity or hypergravity, a scientific or technological experiment which is linked to their syllabus.

During the "Fly Your Thesis!" campaigns, the students accompany their experiments onboard the A300 Zero-G aircraft, operated by the company Novespace, based in France, for a series of three flights of 30 parabolas each, with each parabola providing about 20s of microgravity. The first campaign involved four student teams and took place in autumn 2009. A second one is foreseen for 2011.

"Drop Your Thesis!" campaigns are held in the ZARM Drop Tower in Germany. The installation delivers 4.74s of microgravity in dropping mode and 9.3s in the catapulting mode. The first campaign was held in October 2009 and involved one student team. The second campaign is foreseen for autumn 2010. Research topics such as fluid physics, fundamental physics, combustion, biology, material sciences, heat transfer, astrophysics or chemistry can greatly benefit from using microgravity platforms.

"Spin Your Thesis!" campaigns take place in the Large Diameter Centrifuge (LDC) facility, at ESTEC in the Netherlands. This facility offers an acceleration from 1 to 20 times Earth's gravity. The use of hypergravity allows completing the scientific picture of how gravity has an impact on a system over the whole acceleration spectrum, but can address as well specifically problems which require these high g-levels. A wide range of hypergravity experiments can be performed in the LDC facility, including biological, biochemical, microbiological, opto-physical, physical, material and fluid sciences, geology or plasma physics. The first student campaign is foreseen for spring 2010 and will involved four student teams.

ESA Education Office financially supports the cost of the campaigns, part of the hardware development, as well as necessary travel and accommodation of the selected student teams. An ELGRA (European Low Gravity Research Association) mentor, i.e. a scientist specialized in gravity-related research, supports each student team throughout these educational programmes.