HAMLET

Human Model MATROSHKA for Radiation Exposure Determination of Astronauts

KEEPING PEOPLE SAFE IN SPACE

Outside of the Earth's atmosphere, space radiation could become dangerous to humans, depending on space flight location, duration and the Sun's activity. Future interplanetary human space missions need to be able to estimate the risks such as radiation which may harm astronauts. With the HAMLET project, Europe reinforces its worldwide leadership in this important health field of space dosimetry.

Space is a dangerous place for humans. **Astronauts face a high radiation exposure** both inside the International Space Station (ISS), and when undertaking space walks outside its realms.

The European Space Agency's (ESA) facility MATROSHKA (MTR) lead by the German Aerospace Center (DLR) is dedicated **to determining the radiation loads that astronauts face** both in and outside the ISS. Launched in January 2004, the project is currently in its fourth experimental phase.

Aiming at optimal scientific exploitation, the project HAMLET will bring together a European expert-committee, consisting exclusively of members of the MTR consortium, to process and compile the MTR data.

The MTR project uses over 6,000 radiation detectors that determine the depth and organ dose distribution of radiation in the body. It is the largest international research initiative performed in the field of **space dosimetry**, combining the expertise of leading research institutions all over the world. Consequently it generates a huge pool of data of immense value, which the HAMLET project further exploits.

The aim is to build a three-dimensional model of the radiation dose distribution in an astronaut's body, based on the experimental input obtained in the MTR project, as well as on radiation transport calculations. In this respect, the project goes beyond essential data analysis and incorporates a modelling approach to guide new experimental measurements and strengthen the predictive capacity of such models.

The scientific achievements springing from this research contribute to **radiation risk estimations for future interplanetary human space missions**. The synthesis of the data, which is foreseen to considerably extend previous knowledge, constitutes a major accomplishment by which Europe can reinforce worldwide leadership in this special branch of space radiation research.

Dr. Günther **REITZ**
IS PROJECT COORDINATOR

European Space Agency (ESA) astronaut Thomas Reiter, Expedition 14 flight engineer, works with the European Matroshka-R Phantom experiment in the Zvezda Service Module of the International Space Station.
Source: © HAMLET

Questions & Answers

What do you want to achieve with this project?

Bringing together leading European experts in the field of space dosimetry, HAMLET aims at the effective scientific exploitation of experimental data on the radiation dose distribution inside a human phantom as part of the ESA MATROSHKA facility exposed onboard the ISS.

Why is this project important for Europe?

In view of future human space exploration, HAMLET ensures European excellence in evaluating the effects of space radiation on humans and thereby assessing their radiation risk. Focusing European expertise will enable future generations to travel where nobody has gone before.

How does your work benefit European citizens?

Experimental assessment of this complex radiation environment will increase the knowledge of organ dose distribution, support the benchmarking of radiation transport codes and the development of radiation detectors, with a direct spin-off for heavy-ion cancer therapy in Europe.

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PROJECT INFORMATION

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