THE DOSIS – EXPERIMENT ONBOARD THE COLUMBUS LABORATORY OF THE INTERNATIONAL SPACE STATION – OVERVIEW AND FIRST MISSION RESULTS

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Besides the effects of the microgravity environment, and the psychological and psychosocial problems encountered in confined spaces, radiation is the main health detriment for long duration human space missions. The radiation environment encountered in space differs in nature from that on earth, consisting mostly of high energetic ions from protons up to iron, resulting in radiation levels far exceeding the ones encountered on earth for occupational radiation workers. Accurate knowledge of the physical characteristics of the space radiation field in dependence on the solar activity, the orbital parameters and the different shielding configurations of the International Space Station ISS is therefore needed. The DOSIS (Dose Distribution inside the ISS) experiment, under the project and science lead of DLR, aims for the spatial and temporal measurement of the radiation field parameters inside the European Columbus laboratory onboard the International Space Station. This goal is achieved by applying a combination of passive (Thermo- and Optical luminescence detectors and Nuclear track etch detectors) and active (silicon telescope) radiation detectors. The passive radiation detectors – so called passive detector packages (PDP) are mounted at eleven positions within the Columbus laboratory – aiming for a spatial dose distribution measurement of the absorbed dose, the linear energy
transfer spectra and the dose equivalent with an average exposure time of six months. Two active silicon telescopes – so called Dosimetry Telescopes (DOSTEL 1 and DOSTEL 2) together with a Data and Power Unit (DDPU) are mounted within the DOSIS Main Box at a fixed location beneath the European Physiology Module (EPM) rack. The DOSTEL 1 and DOSTEL 2 detectors are positioned at a 90 angle to each other for a precise measurement of the temporal and spatial variation of the radiation field, especially during crossing of the South Atlantic Anomaly (SAA). The DOSIS hardware was launched with the Space Shuttle Endeavour to the International Space Station on 15 July 2009 and installed by European Astronaut Frank de Winne on 18 July 2009. The first PDP set was downloaded after an exposure time of 124 days in November 2009 and a second PDP set was installed in November 2009. The active part of the instrument suit is working since July 2009. The presentation will give an overview about the DOSIS experiment as well as first results from the passive and active radiation detector measurements.

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