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Radiation Fields, Effects and Risks in Human Space Missions (4)

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SUMMARY OF THE EXPERIENCE WITH THE FIRST USE OF MEDIPIX-BASED RADIATION MEASUREMENTS ON THE ISS

Abstract

Five Medipix-Based active radiation monitoring devices designed to study the capabilities of this active pixel radiation detector technology for use in monitoring the space radiation environment both for general area monitoring and personal dosimetry have been successfully operated on the ISS since October 16, 2012. They have generally performed as expected and have been exceedingly reliable in operation. Several known issues were successfully addressed including the operation of automatic self-regulation of the exposure time of each integrated data frame as the devices experienced fluence changes of up to 3 orders of magnitude, the correction of the doseand dose equivalent measurements for the differences between Si and tissue equivalent material, and the accurate measurement of the LET of each individual traversing particle. In addition, the ability of the devices to assess the orientation of the axis of motion on a track-by-track basis has allowed the detailed evaluation of the directionality of the incident radiation during such events as South Atlantic Anomaly passes. Some challenges remain and are the subject of ongoing analyses that will also be presented. In addition, the next generation of this technology should be available in prototype form by the late spring of 2013 and an accelerator campaign is planned for the

initial evaluation of their performance. Innovations such as zero dead time readout and enhanced front end performance for very large charge depositions, along with substantially improved power-saving capabilities to support long duration battery-powered operation have been included in their design. Devices using this technology are planned for deployment in the new Orion crew module, and for evaluation of the radiation environment on the future inflatable habitation modules.