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SEP Protons in GEO with the ESA MultiFuntional Spectrometer

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The Multi-Functional Spectrometer (MFS) is a radiation monitor that together with CTTB (Component Technology Test Bed) make the AEEF-TDP8 (ESA Alphasat Environment and Effects Facility - Technology Demonstration Payload 8). The two units are installed on the X panel of the Alphasat satellite as a hosted payload. MFS is an instrument specifically designed to characterise the Space Radiation environment while CTTB was built to monitor the effect of radiation on electrical components (GaN transistors, Memories and Optical Transceivers) in geostationary orbit. The mission lifetime of AEEF/TDP8 is 3 years with possible extension to 5 years and TDP8 is expected to be acquiring
scientific data during the whole period. On ground, correlation between radiation environment and radiation effects can be established.
Before launch, MFS was submitted to proton and electron beam tests at Paul Scherrer Institute in Switzerland in 2010. The main purpose was the validation and calibration of the MFS proto-flight model together with the estimation of particle energy resolution and identification capability. A full Geant4 simulation with the MFS in-flight configuration was built and used to validate the results from ground tests.
The full detector simulation has proved to be a valuable tool for the unfolding of MFS channel counts into particle spectra based on a Single Value Decomposition (SVD) method. Results for Proton and Electron spectra measured with the MFS in GEO will be presented, in particular for the case of SEP events registered in 2014 during periods of maximum solar activity of solar cycle 24.

Alphasat is a large telecommunications satellite primarily designed to expand Inmarsat's existing global mobile telecommunication network, launched in July 2013. It was built by Airbus DS through a public–private partnership (PPP) between the European Space Agency (ESA) and Inmarsat. Alphasat is based on Alphabus, the large European telecom platform developed by Airbus DS and Thales Alenia Space under a joint contract with ESA and France's CNES space agency.

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Collaboration

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