

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Space Environmental Effects and Spacecraft Protection (6)

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RADIATION MONITORING IN LOW EARTH ORBIT USING PLANET SATELLITES  
CONSTELLATION

**Abstract**

Over the past six years, Planet have launched the biggest satellite imaging constellation in human history. Planet satellites are orbiting in low Earth orbit and are mostly built with commercial off the shelf components. Some of those components incorporate features that can be used to monitor their health. Over the past year, Planet teams have been evaluating how those features present onboard Planet satellites could be leveraged to study the low earth orbit Space environment, with a specific focus on radiation environment due to high energy particles.

To evaluate which component could give insight on the radiation environment, Planet team have been conducting multiple tests at a cyclotron facility and screened components that were the most likely to be affected by high energy particles. The result of that test campaign drove the team to focus on the FPGA integrated circuits (Field Programmable Gate Array).

Following the first phase, additional high energy proton beam tests were conducted to correlate errors counts detected by the device to the proton fluxes received by the components. Then, a custom algorithm was developed to extract that information and correlate it to the proton flux. The proton monitoring algorithm was tested at system level and is now being pushed to on-orbit assets.

The goal of the project is to determine whether this existing feature already present on the computing platform can be leveraged to track proton activity in low Earth orbit. This information could be used to get a better understanding of the low Earth orbit Space Environment as well as to drive actions intended to prevent damage from proton events on satellites.