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P1.63: SpacePix Radiation Monitor: Data from the First Year of Operation in Orbit

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Czech technological satellite VZLUSAT-2 was launched to Sun-synchronous orbit in January 2022 onboard with Space Dosimetry System Demonstrator (2SD). The 2SD system contains SpacePix Radiation Monitor (SXXRM) and Soft X-ray Monitor (SXM) subdetectors based on monolithic pixel detector technology.

SXXRM is a multi-layer pixel detector with SpacePix2[1] ASICs designed to determine the type of a particle, its energy and trajectory. The sandwich structure of SXXRM with five layers of SpacePix ASICs interleaved with copper absorbers, allows sampling of the Bragg curve and particle energy estimation. The SXXRM is capable of identifying protons, electrons and heavy ions and is used for radiation monitoring. The SXM detector is based on XChip-03 ASIC [2].

SpacePix2 is a radiation tolerant monolithic active pixel detector with a 64×64 pixel matrix fabricated in 180 nm SoI process. The dimensions of the pixels are 60×60 μm, and the sensitive area is 3.84×3.84 mm. The dynamic range of the SpacePix2 is 2 ke- to 60ke- in the pixel front-end and 300 ke- to 30 Me- in the sensor backside layer. The analog signal from pixels generated by an impinging particle is processed by charge sensitive amplifier and digitalized by 10-bit SAR ADCs. Readout digital part offers 400 MHz LVDS or 50 MHz SPI interface. The total current consumption is 43 mA.

The poster presents measured data from the first year of operation in Sun-synchronous orbit, demonstrating the capabilities of the detector.

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