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# Radiation spectrometer HardPix for Lunar Gateway

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IEAP CTU developed miniaturized Timepix-based radiation environment monitors onboard ISS and numerous satellite missions. For example, SATRAM onboard ESA Proba-V satellite is characterizing radiation environment in LEO for 9 years. The new generation of our radiation monitors HardPix is equipped with the newest Timepix3 and Timepix2 pixelated chips developed within the CERN Medipix collaboration and with onboard processing which substantially reduces the data transfer from the detector. HardPix is capable of identifying the particle species and measuring their energetic spectra together with the total ionizing dose in orbit, providing vital data about the radiation environment and risks for both humans and the equipment. Two HardPix units will be part of the ERSA onboard Lunar Gateway orbital station, a European suite of experiments monitoring radiation environment in deep space. HardPix spectrometers will provide information for forecasting radiation events and understanding how to build better spacecraft and protection for astronauts on and around the Moon, as well as other deep space environments such as on the way to Mars.

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