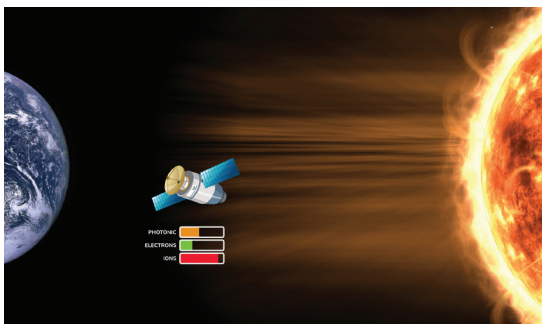
ADVACAM

Imaging the Unseen

NEXT LEVEL SPACE WEATHER MONITORING

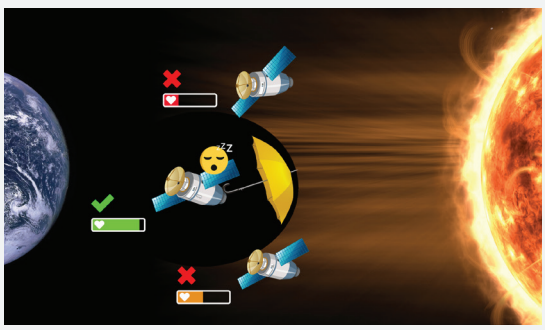
Cost reducing technology for your satellite implemented on the ISS, Gateway lunar station and Orion Spaceship

Cosmic Weather Forecasting with Miniaturized Low-power Particle Camera



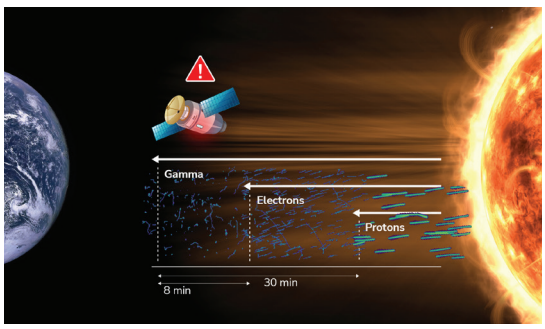
LEVEL 1: Monitoring Total Radiation Dose

High-energy particles can penetrate a spacecraft, posing a significant risk to both the crew and the equipment. The ability of our detectors to monitor the total dose is therefore crucial, for example, for planning mission durations or satellite lifespans.



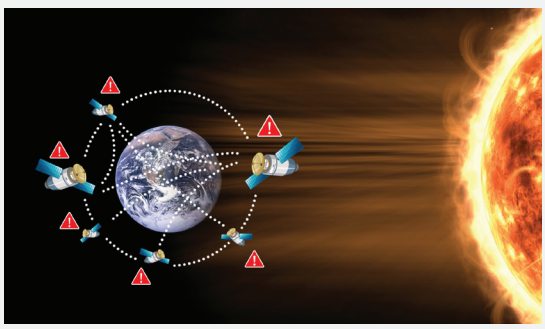
LEVEL 2: Adaptive Protective Measures

ADVACAM's detectors can also determine the direction of incoming radiation, its energy, and particle type. These unique features allow for timely adaptation to incoming threats. The idea is to activate protective systems like shielding or "safe mode" only when detectors see truly dangerous radiation. Just as people take an umbrella when they see dark clouds.



LEVEL 3: Cosmic Weather Forecast

By identifying particle types, our cameras support cosmic weather prediction. Lighter particles arrive from the Sun to Earth several minutes earlier than the heavier, more energetic, and harmful ones. This creates a valuable window for activating protective measures. Alert against truly dangerous particles can come with a thirty-minute lead.



LEVEL 4: Satellite Constellation Warning System

In the last decade, large satellite constellations have emerged. Equipping them with our detector could create a warning system. Satellites detecting dangerous activity could alert others, ensuring timely preparation against potential threats when entering radiation-exposed areas.

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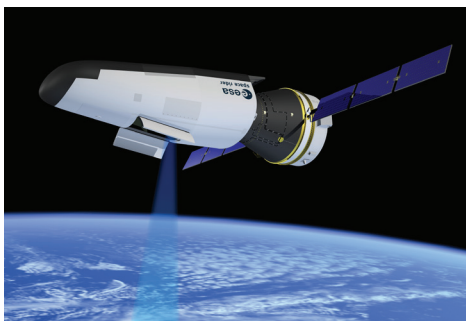
Space Applications

Space Rider: European reusable orbital truck

The Space Rider is an uncrewed robotic laboratory with ADVACAM cameras on board. Experiments inside its cargo bay will allow technology demonstration and benefits research in pharmaceutics, biomedicine, biology, and physical science. At the end of its mission, Space Rider will return to Earth with its payloads and land on a runway to be unloaded and refurbished for another flight.

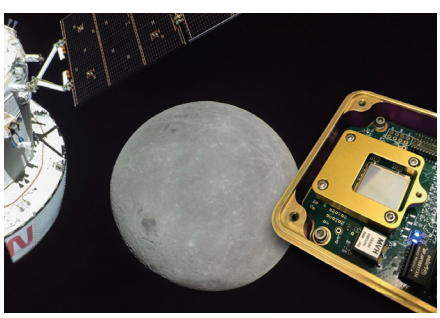


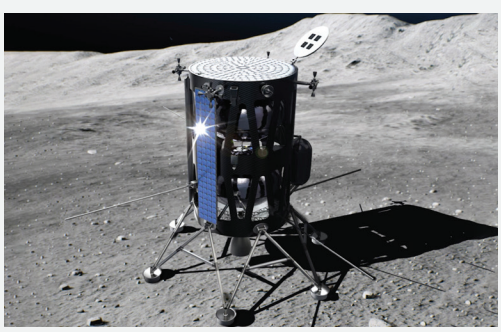
Protecting astronauts at the ISS

In 2017, ADVACAM delivered its first device to the ISS. The Miniature Particle Tracker (MPT) proved its proficiency in detecting the directional characteristics of charged particle energy spectra. Another set of ADVACAM's compact MiniPIX Timepix cameras was launched in 2019. These devices are operational across ISS modules, including the US Lab, Cupola, Columbus, JPM, Node 1, and Node 3 as part of the Radiation Environment Monitor 2 (REM2).

Artemis I: Back to Moon with our chips

The primary objective of the mission was a Moon flyby to test the Orion spacecraft, which included NASA's Hybrid Electronic Radiation Assessor (HERA). This radiation monitor, designed by NASA and equipped with ADVACAM's pixel detector, was fully integrated into the spacecraft. HERA provided onboard analysis and displayed radiation dose rates, linked to a threshold warning system.





Landing on the Moon

Carefully customized MiniPIX „Space" detector will measure the radiation field on the Moon's pole. ADVACAM's detectors are part of The Intuitive Machines landing module, which will be launched with the SpaceX Falcon 9 rocket in the third quarter of 2023. Measurements will help to understand how to protect crew and equipment from the negative effects of cosmic rays.

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Detectors from our lineup suitable for Space Applications

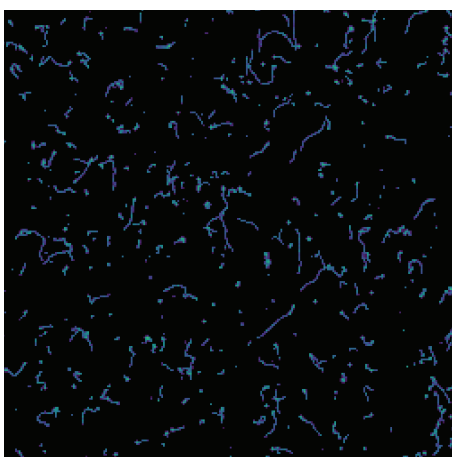
MINIPIX SPACE

Compact, durable, space-ready radiation camera with advanced Timepix3 particle tracking. Vacuum-compatible, robust, temperature-stabilized; proven in space conditions.

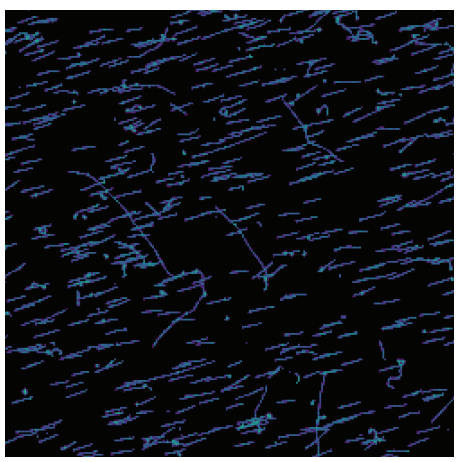
Sensor Material:	Si, CdTe or CZT
Sensor Thickness:	According to customer preference
Frame rate:	16 fps
Number of Pixels:	256 x 256
Pixel Pitch:	55 µm
Readout Chip:	Timepix3
Power consumption:	2 W
Certifications:	ISO 8 clean room, ICD, Space Heritage, ECSS

Examples of sunstorm particles tracked by a TPX3 detector with 500 µm Silicon sensor

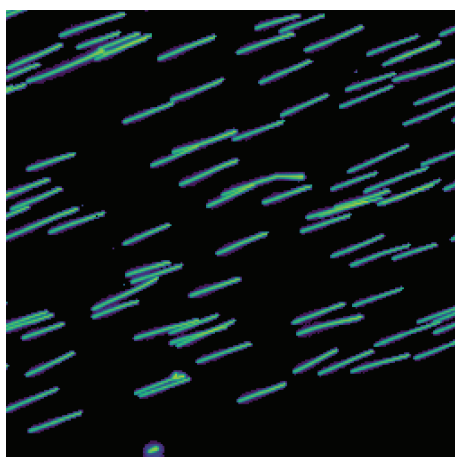
Gamma rays: arrived FIRST



Electrons: arrived SECOND



Protons: arrived THIRD



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