SPACE

ADVACAM

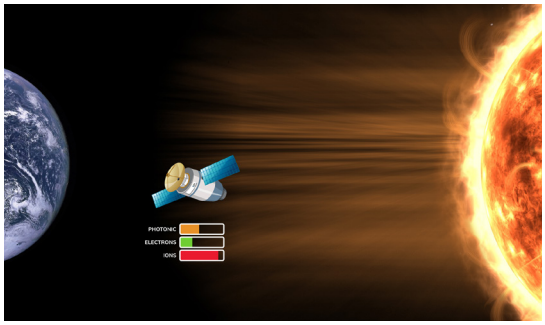
Imaging the Unseen

NEXT LEVEL SPACE WEATHER MONITORING

Cost-reducing technology for your satellite: Implemented for radiation mapping on the ISS, Gateway lunar station, and Orion Spaceship.

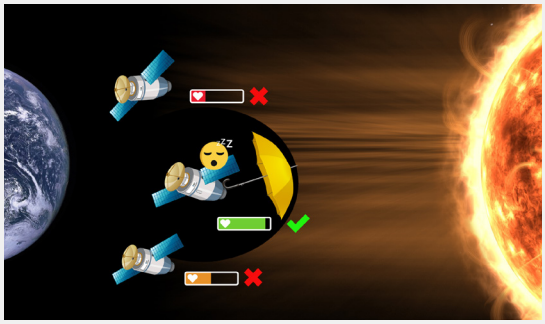
Introducing 4 NEW LEVELS of Space weather monitoring

ADVACAM is introducing a previously unseen technology for space weather predicting. This technology provides timely warnings against increased solar activity, which can pose risks to the health of astronauts and disrupt the functionality of sensitive onboard electronics in satellites and spacecrafts.



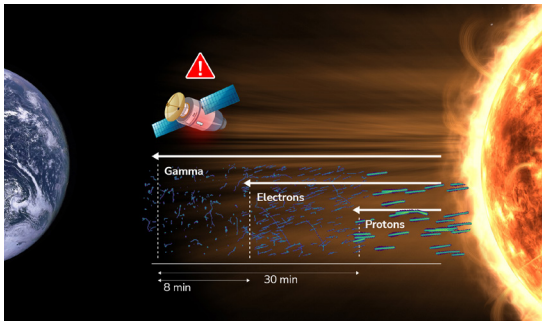
LEVEL 1: Total Radiation Dose Monitoring

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 operational lifetime of satellites.



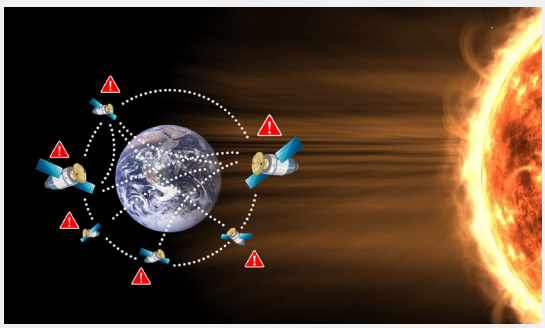
LEVEL 2: Adaptive Protective Measures

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: Space Weather Forecasting

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.

Space Applications

Safety to the next-gen satellite internet

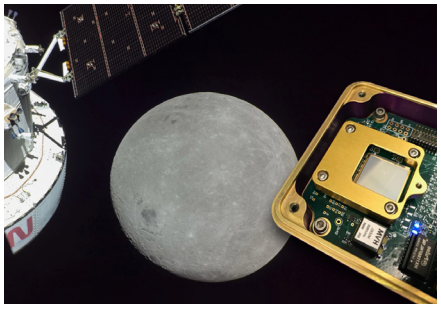
ADVACAM is ready to provide tailor-made solutions for commercial space applications. The JoeySat, launched in 2023, is a demonstration satellite that introduces advanced features to be included in OneWeb's next generation of satellite internet constellation. It also houses a high-resolution radiation monitor developed by ADVACAM. It is able to detect, classify, and track cosmic rays and space radiation in orbit.

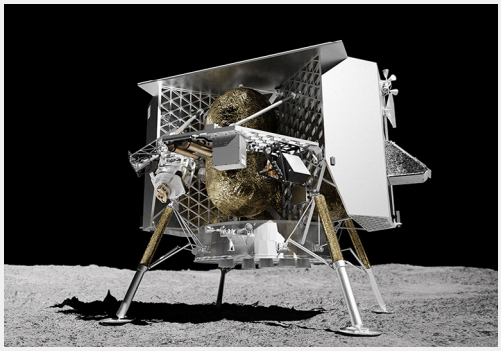
Protecting astronauts at the ISS

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.





Peregrine Lunar Lander by Astrobotic

Designed to be the first cosmic radiation detector providing real-time data about radiation directly from the Moon's surface. The heart of the LETS sensor was the lightweight, energy-efficient, and versatile Timepix particle detector module, developed and manufactured by ADVACAM. However, due to a propulsion system failure, the mission ended with the lander's demise in Earth's atmosphere.

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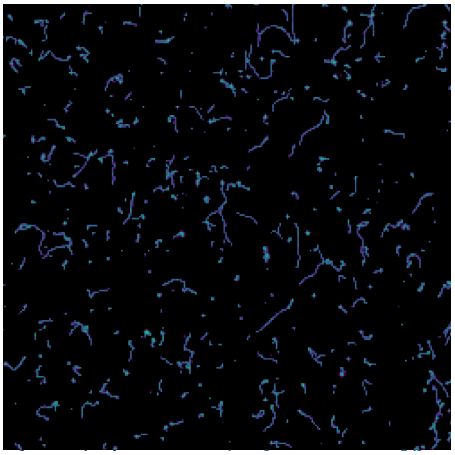
MiniPIX SPACE as a Satellite Component

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

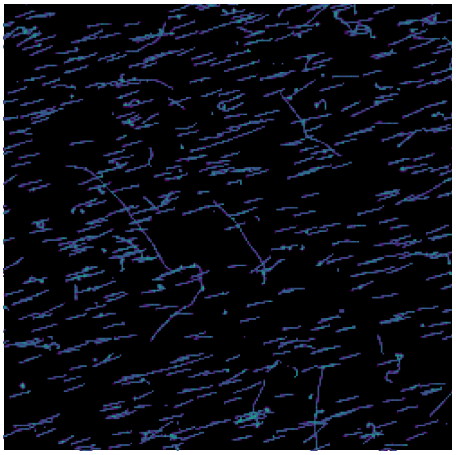
Sensor Material:	Si, CdTe or CZT
Readout Chip:	Timepix3/Timepix2
Frame rate:	16 fps/99 fps
Number of Pixels:	256 x 256
Pixel Pitch:	55 µm
Dimensions:	90 x 32 x 11 mm
Weight:	< 140 g
Power consumption:	< 3 W
Certifications:	ISO 8 clean room, ICD, Space Heritage, ECSS

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

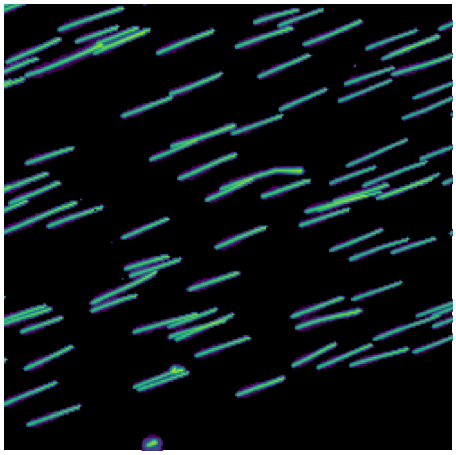
Gamma rays: arrived FIRST



Electrons: arrived SECOND



Protons: arrived THIRD



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