



Contribution ID: 81

Type: Oral

A-STEP, the AstroPix Sounding rocket Technology dEmonstrator Payload: Multi-detector performance

Friday 16 May 2025 09:00 (25 minutes)

A gamma-ray observatory with high sensitivity in the MeV range (100 keV - 100 MeV) and with good spectral and polarimetric capabilities will bring unprecedented insights into many astrophysical domains such as cosmic ray production and propagation, nucleosynthesis processes and transient and extreme phenomena, and will be key in addressing fundamental physics questions such as the nature of dark matter. However, observing in this energy range is challenging because of high instrumental backgrounds and low photon interaction cross-section around 10 MeV as the dominant interaction transitions from Compton scattering to pair production, making event reconstruction challenging. Such an instrument will need a detector technology capable of detecting photons in both the Compton and pair regime. AstroPix is a high voltage CMOS monolithic active pixel sensor developed for future gamma-ray space telescopes. It is designed to achieve low-power (~ 2 mW/cm²), high spectral resolution (~ 5 keV at 122 keV) measurements in a multi-layer silicon tracker. An instrument called AstroPix Sounding rocket Technology dEmonstration Payload (A-STEP) will test three layers of 2x2 AstroPix detectors during a suborbital rocket flight in March 2026.

This will demonstrate the operation of AstroPix detectors in a space environment for the first time, and improve the technology readiness level of these detectors for future astrophysical and nuclear physics applications. In this talk, we overview the payload state of development and the instrument design and performances.

Eligibility for "Best presentation for young researcher" or "Best poster for young researcher" prize

Yes

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Session Classification: R&D of novel approaches and instruments