Overview
ALFRED, or Active Luminescence for x-Ray Emission Detection, is developing an anti-coincidence shield to support the NASA SuperHEROES balloon-borne X-ray telescope.

X-ray telescopes must be able to distinguish between a target astrophysical source and background radiation.

The mission goal is to develop an anticoincidence shield architecture that can effectively remove background.

X-Ray Target Event
- XRD detects present spectrum

Background X-Rays
- ACD shield detects background spectrum

Instrument Monitoring
- Maintains thermal control
- Records status

Data Processing and Storage

Gondola Telemetry
- Send Status

Figure 1: Instrument Overview

Methodology

- Design an active shield
  - Geant4 particle simulations
- Design anti-coincidence electronics
  - Data collection and timing between detectors
- Develop mechanical housing for instrument
  - Support mission in balloon environment
  - Support passive X-ray shielding
- Collect and telemeter data
  - Write and debug flight software
- Ensure robustness of design
  - Operate within optimal temperature and pressure for sensors and electronics

Results
Science Data Gathering
Cs-137 Radiation source on the XRD and CLYC
- Data gather occurred along with a successful anticoincidence triggering
- System working as intended

Spectrum without anti-coincidence

Spectrum with anti-coincidence

Conclusions
- Anti-coincidence between detector and shield has been achieved
- All subsystems have been integrated
- Will continue to improve the robustness of the instrument
- Proof of concept flight on high altitude balloon to follow

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