

## High Altitude Balloon Flights of Position Sensitive CdZnTe Detector for High Energy X-ray Astronomy

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CdZnTe is a semiconductor detector well suited for high energy X-ray astronomy. The High-Energy X-ray Imaging Survey (HEXIS) program is developing this technology for use in a hard X-ray all-sky survey. In addition, CdZnTe will be valuable as a focal plane imager on hard X-ray focusing optic missions, such as Constellation X and Far-XITE. CdZnTe is an ideal candidate since it has very good energy resolution, 4.2 keV at 60 keV and 6.4 keV at 122 keV, very fine spatial resolution, 50  $\mu\text{m}$  at 22 keV and 100  $\mu\text{m}$  at 88 keV, good detection efficiency from 5 - 200 keV and a large band gap ( 1.4 eV) which is suitable for room temperature operation. The HEXIS program has flown two high altitude balloon payloads from Ft. Sumner, NM to investigate background properties and shielding effects on a position sensitive CdZnTe detector, with a third flight planned for Fall 1999. We are implementing new background rejection techniques intrinsic to the unique electrode design and the material properties of the cross-strip CdZnTe detector on these data. The unique electrode design improves interaction localization and depth of interaction determination. In addition, we are investigating techniques that recover lost energy resolution information. Preliminary results indicate that the background level in 40-80 keV is  $4 \times 10^{-4} \frac{\text{cts}}{\text{cm}^2 \cdot \text{s} \cdot \text{keV}}$  for the cross-strip CdZnTe detector before applying rejection techniques other than an active-shield energy deposition veto. Based on our preliminary analysis, we are confident that CdZnTe detectors will be desirable for future low background, hard X-ray astronomy missions.