

SuperNova Acceleration Probe



SNAP

University of Michigan Physics REU Program 2006

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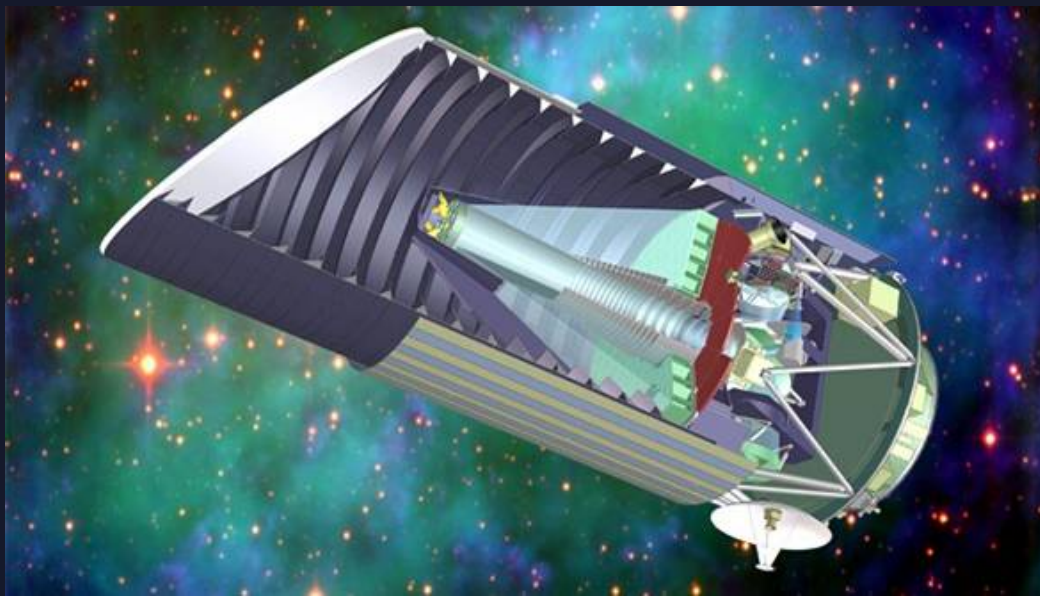
- ❖ The purpose: to study dark energy in the universe
- ❖ This dark energy makes up approximately $2/3$ of our universe, and is the cause of the accelerating universe.
- ❖ How: SNAP will be a wide range telescope that will be able to observe many type 1a supernovae, and use them as standard candles to measure redshift and the expanding universe.

THE MICHIGAN CONTRIBUTION



Testing and characterization of NIR detectors

The SNAP detector must have a uniform 2% QE measurement



Spot-o-matic



- ❑ A CCD is mounted in a dewar, kept cooled at 140 K by liquid nitrogen.
- ❑ The dewar faces into a “light-tight” box where light is provided through a tiny pinhole using an optical fiber.
- ❑ A projector aligned to an x-y-z stage allows us to move and focus the spot on the CCD.
- ❑ Spot Size in focus: 1.40 μm to 1.00 μm at 1050 nm wavelength, 2.10 μm to 1.50 μm at 1550 nm wavelength
- ❑ The size of the pixels in the CCD’s and NIR detectors vary from 10-20 μm
- ❑ We use the spot-o-matic to measure things such as lateral charge diffusion, intra-pixel variation, etc.

Spot-o-matic



My Research



- **LEARNING**
 - Linux
 - Python Programming
 - How the equipment works
 - Lots and lots of reading
- **HARDWARE**
 - Connectors
 - Spot-o-matic
- **ANALYSIS**
 - Writing and running many programs
- **LOVELY TUES. & WED. MEETINGS**



Computational Analysis



Computational Analysis



- ✓ Knife Edge Analysis

- ✓ Noise Analysis

 - Spatial Noise

 - Temporal Noise

- ✓ Mean Background vs. Frame

- ✓ Finding X-rays

- ✓ Organized all the data into tables

- ✓ Linux to Windows slows us down

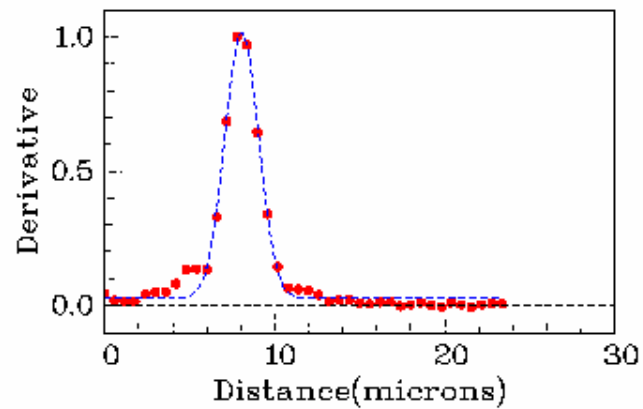
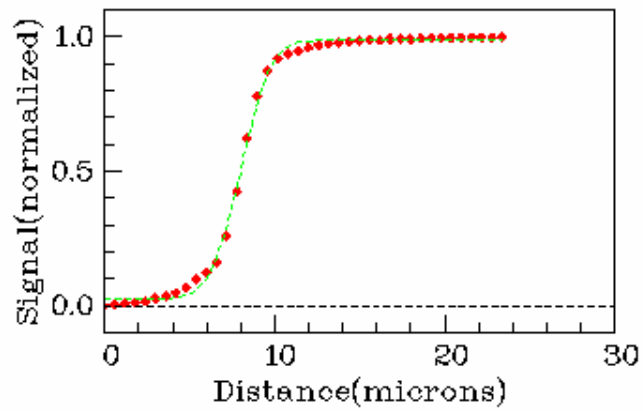


Knife Edge Test Vertical Cross Section

Filter used: 1050 nm

Z = 505688

Erf fit: $\sigma = 1.39$ microns



Gaussian fit: $\sigma = 1.00 \pm 0.03$ microns

Future Research



- Our CCD finally arrived and we can start testing it
- Keep finding new, better and more efficient ways to test and characterize CCD's and NIR detectors until we achieve our requirements