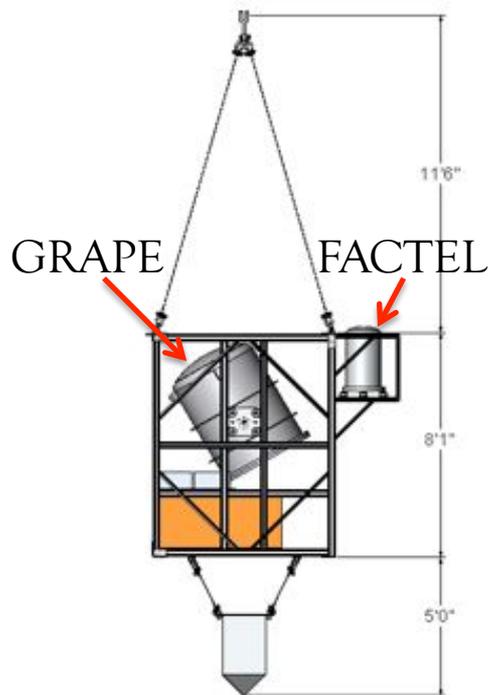# Soft- and Medium-Energy Gamma-Ray Astronomy at the University of New Hampshire:

The September 2011 Balloon Flight

Peter Bloser, Mark McConnell, and Jim Ryan

2011 Balloon Flight

UNH successfully flew a gamma-ray balloon payload on a 26-hour turnaround flight from Ft. Sumner on Sep. 23.
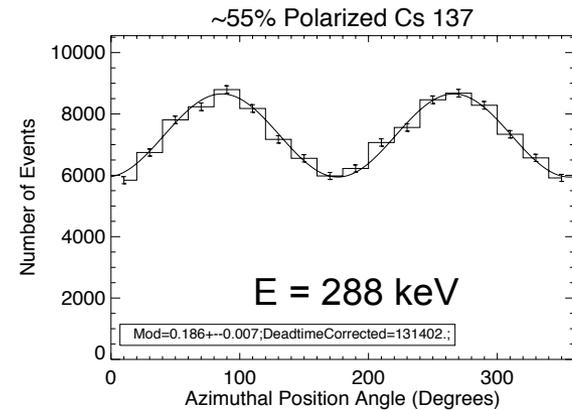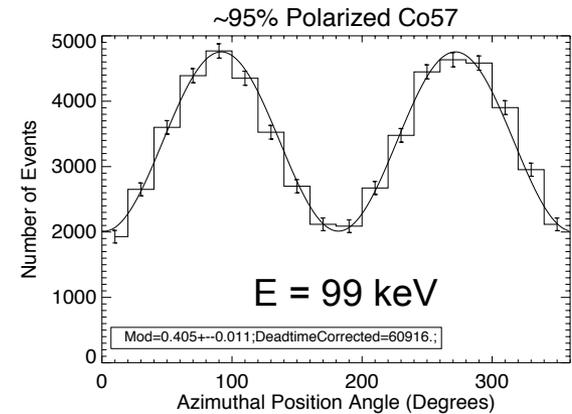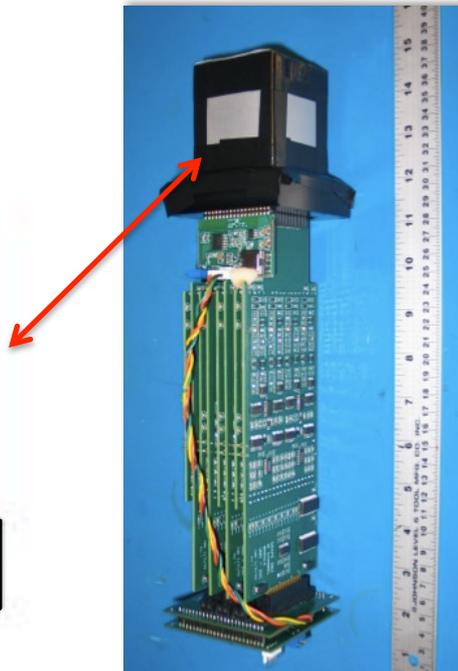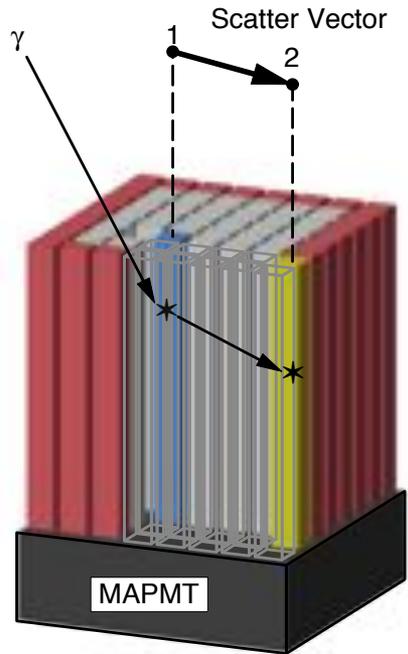

GRAPE   FACTEL

Primary Payload: GRAPE

Measures 50-500 keV polarization using an array of plastic and CsI scintillators.

~95% Polarized Co57

E = 99 keV

Mod=0.405+--0.011;DeadtimeCorrected=60916.;

~55% Polarized Cs 137

E = 288 keV
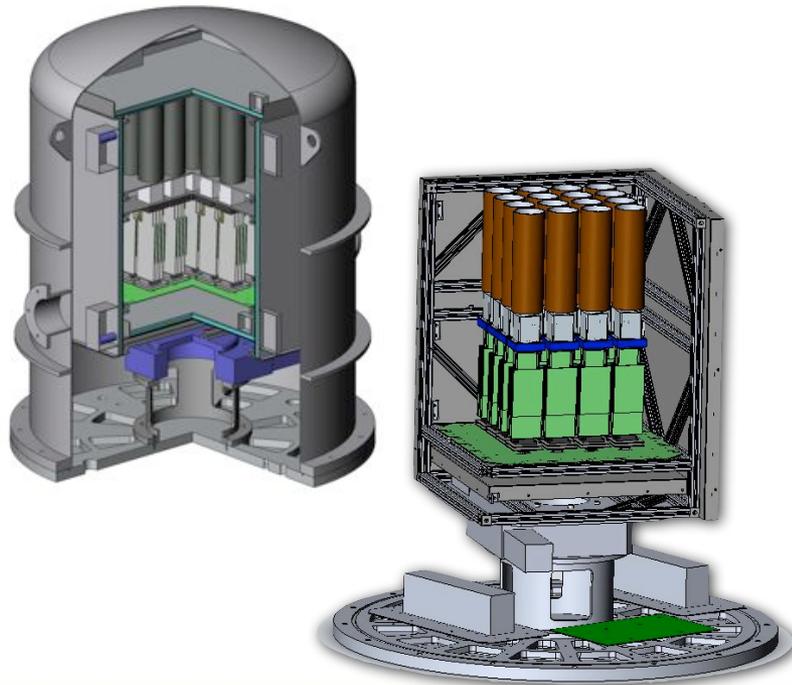
Mod=0.186+--0.007;DeadtimeCorrected=131402.;
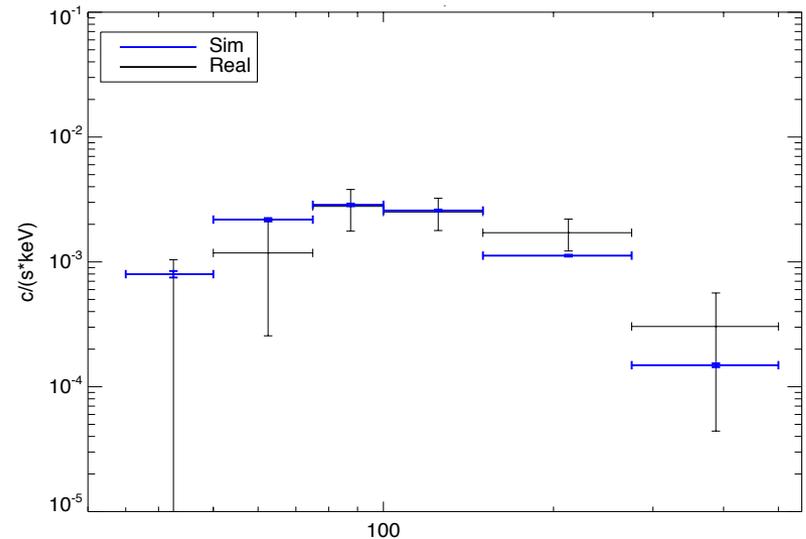
calibration data

Primary Payload: GRAPE

Collimated array measured the Crab and two M-class solar flares. Polarization analysis is in progress.


Crab Energy-Loss Spectrum

Secondary Payload: FACTEL

- "FAst Compton TELescope"

- **Goal**: To build on COMPTEL experience and demonstrate background rejection using modern, fast scintillators (LaBr$_3$) to improve the ToF.

- **Design:** Prototype had three liquid scintillators (D1) and three LaBr$_3$ scintillators (D2) separated by ≈30 cm.

- **Result**: Successfully separated upward from downward gamma-ray scatters using ToF; downward background spectrum agrees with simulations.

Downward Gammas

UNIVERSITY of NEW HAMPSHIRE
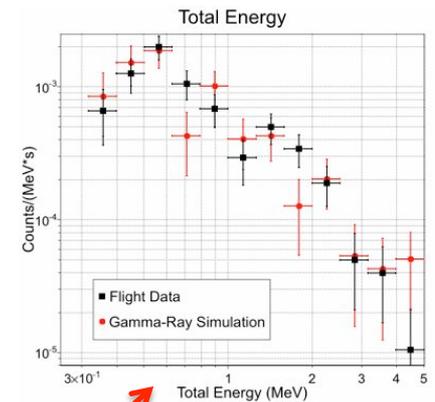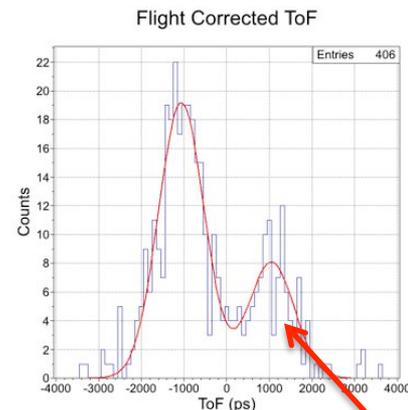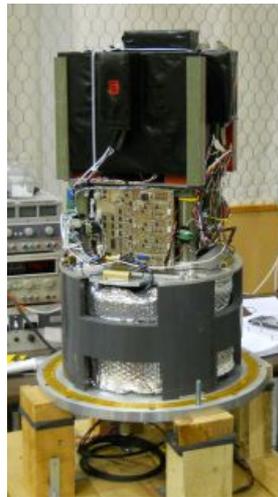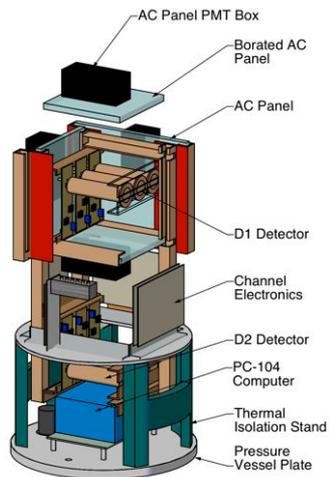
Tertiary Payload: SiPM Detector

- Tucked within FACTEL was a small test detector: a $LaBr_3$ scintillator read out by a silicon photomultiplier (SiPM).

- SiPMs have the potential to replace PMTs for scintillator read-out.

- Much smaller, lighter, but with similar gain and time response.

- SiPM detector operated successfully during entire balloon flight.
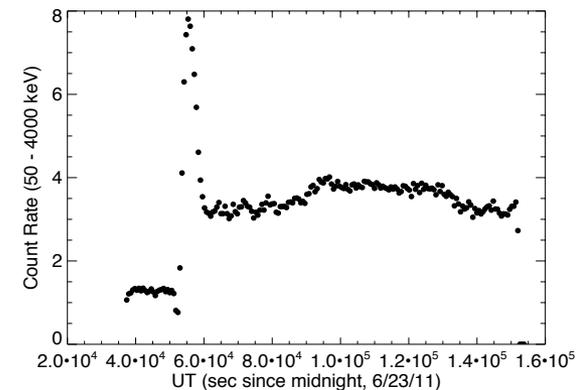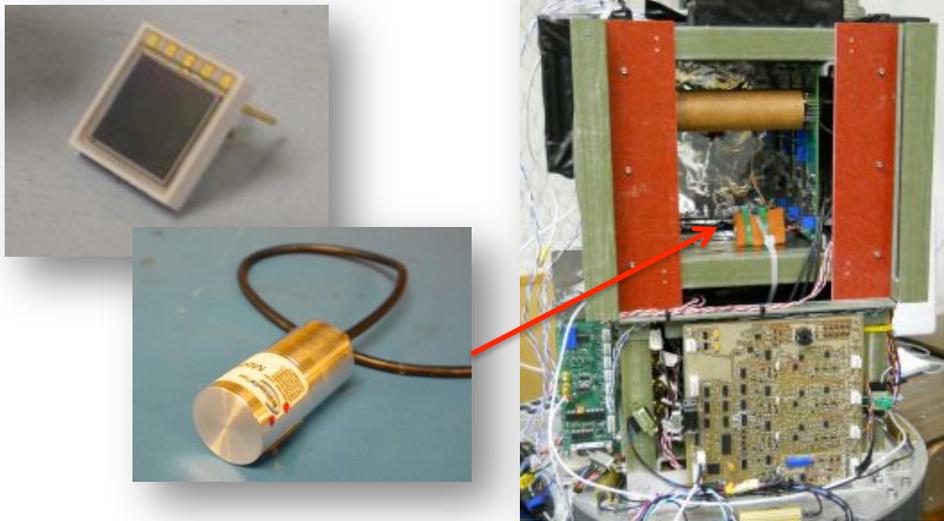
SiPM count rate during flight
(reflects variations in altitude)

Scintillators in Gamma-Ray Astronomy

In the context of the current discussion, it is important to note that scintillators still have an important role to play in gamma-ray astronomy.

New materials with improved timing and energy resolution, along with improved readout devices, promise that these technologies will remain valuable tools well into the future.