**HERO: A Balloon-Borne Focusing Hard X-Ray Telescope**
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**The HERO Program**
HERO is an evolutionary balloon payload featuring hard-x-ray focusing optics.

**HERO Instrument Specification**
The HERO instrument consists of 8 optic modules and 8 corresponding focal plane detectors, housed in a 6-m-long cylindrical optical bench. The bench is mounted on a gimbal that provides pointing, leveling and protection. Below are the details of the key instrument components.

**Optics**
- **Mirror modules**: 8
- **Number of shells per module**: 12
- **Focal length**: 6 m
- **Shell thickness**: 250 μm
- **Shell length (total)**: 60 cm
- **Shell coating**: Ir, 60 nm
- **Mirror modules**: 8
- **Prescription**: Conical approximation to Wolter-I
- **Resolution (average over 8 modules)**: 25 arcsec HPD
- **System total effective area**: 80, 40 cm²

**Detectors**
- **Number of detectors**: 8
- **Type**: Gas scintillation proportional counter
- **Gas depth**: 5 cm
- **Sensitive diameter**: 5 cm
- **Readout system**: Hamamatsu position sensitive photomultiplier
- **Spatial resolution (FWHM)**: 400 μm (40 keV)
- **Energy resolution (FWHM)**: 4% (40 keV)
- **Efficiency**: 98% (40 keV), 89% (60 keV)

**HERO Flight Operations**
The sequence of pictures below show the HERO balloon payload in New Mexico. At the top left is the gondola in the Columbia Scientific Balloon Facility (CSBF) hangar, undergoing painting. To the right of this is the payload on the CSBF launch vehicle, then below are images of HERO after launch and during ascent.

**Flight Data, May 2007**
The figure below shows the expected sensitivity for the HERO balloon payload in the configuration detailed above, assuming a flight altitude of 40 km. The line corresponding to 1 mCrab (1/1000 of the Crab Nebula) is also indicated for comparison.

**Future Flight Plans**
The next flight of the HERO payload is currently scheduled for September 2009, from Alice Spring, Australia. The prime science for this flight will be high-angular-resolution mapping of the Galactic Center region. Three additional shells will be added to each module for this flight, increasing the payload effective area by about 25%.