Solar System Science

Flares and Solar Energetic Particles

Terrestrial Gamma-Ray Flashes

Cosmic-ray interactions with Earth, Sun, Moon, etc.

Plans:
Optimization of GLAST flare response
Solar Physics paper on GLAST capabilities
GLAST Solar Flare Response

GLAST launch late in solar minimum
Rise in solar activity 2008-9; peak 2010-2014.
(But remember 20 January 2005 flare—later discussion)

Possible Solar Flare Mode

Activate overall solar-flare capability when probability for X-class flare exceeds 5% in a 24 day period

GBM trigger:

Soft- spectrum burst detected <20 degrees from Sun;
detectable flux > 1 MeV
GLAST action:

ACD veto disabled

Sun < 70 deg from Z-axis -

Data analyzed from 4 central towers below first 4(?) layers.
Return to normal mode in 1000 s or when GBM solar-side BGO rate < R.

Sun > 70 deg from Z-axis

Calorimeter trigger: lowered energy threshold (~100 MeV).
Return to normal mode in 1000 s or when GBM solar-side BGO rate < R.
Hardest flare ever detected in space. (near solar minimum!!)
Milagro Observation of >10 GeV Particles from Sun on 20 Jan 2005

GOES proton data
- >10 MeV
- >50 MeV
- >100 MeV

Milagro scaler data
- > 10 GeV protons
- ~1 min rise-time
- ~5 min duration

Milagro Observed > 10 GeV from the Solar Energetic Particle events on
- 6 November 1997
- 14 July 2000
- 15 April 2001
- 20 January 2005
Very hard accelerated particle spectrum, $s \sim 2.2$, from annihilation and neutron capture line comparison.

RHESSI
Nuclear continuum dominates for hard spectra, masking the discrete lines. Just statistics or something fundamental?
Pion peak?
Coronas observed pion radiation here.

Is the long 511 keV flux tail due to newly revealed radioactive material?
Terrestrial flashes observed by RHESSI (David Smith)

1 ms duration; associated with lightening (sprites); discovered by BATSE; tens per day globally.
Summed TGF spectrum extending up to ~20 MeV; GLAST observations of Earth’s atmosphere?