Gamma-ray Large Area Space Telescope
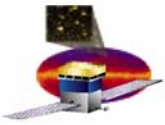
GLAST Large Area Telescope:

Light Tight Change Request (CR) Discussion
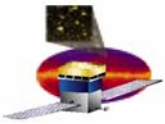
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Proposed New Requirement

"The dark current or leakage current of any sensor (PMT, SSD ladder , DPD) , or associated noise rate, shall change by less than 50 %, relative to dark-room baseline, when LAT is exposed to a light source of on-orbit solar strength from any direction."

Rationale for Change

- **LAT components are light sensitive.**

  - An attempt to provide light tightness in many cases at the subsystem or component level, there is no formal, system-level requirement for the LAT, as a whole, to be light tight.

  - This requirement corrects this oversight. When it is adopted, it must then be flowed into the LAT system design and test plans.
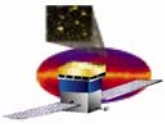
Discussion

- **In order to better define this requirement and to insure that it is clearly testable and directly relevant to the instrument performance, LAT Systems Engineering posed the following questions to the ACD, CAL and Tracker Subsystem managers.**

  (1) To assess deferring the testing of the LAT Light Tight requirement to the LAT level, we need to assess risk to CAL and Tracker subsystems. What is the potential susceptibility of these subsystems to light exposure?

  (2) The requirement as written dictates the ability to measure an increased noise on the order of 50%. How long a test would be needed to make this measurement? Also, what limitations/issues are there in performing this test?
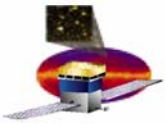
Subsystems Response

- **Waiting for ACD and CAL Subsystem responses**

- **Tracker Subsystem Response**

(1) **Silicon-Strip detectors are very sensitive to light. Not nearly as sensitive as a photomultiplier tube, but exposure to room light or sunlight can cause so much noise as to incapacitate the readout.**
  - **This presumption can't be quantified without doing a lot of work.**
  - **Each Tracker module is completely enclosed except for small gaps at the top and bottom of the 8 cable runs. It would not be hard to cover those gaps with tape, but some have to be left open for venting.**
  - **From experience with the mini-tower, it is known that gaps at the top left uncovered in full room light causes the top layer of silicon to becomes very noisy.**

(2) **It is hard to answer precisely how long it would take to measure the noise on every detector ladder.**
  - **The best method would be to measure the Layer-OR rate one layer at a time in each tower, using the trigger mask to select one SSD ladder at a time. In principle it should take just a few seconds per layer.**
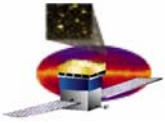
Conclusion

- **Light Tight Requirement CR Currently Being Circulated for Review/Comments**

  - **Need CR review/comments from affected subsystems**

  - **When CR is approved by Change Control Board (CCB) then implementation of requirement will proceed for affected subsystems (I&T, ACD ,CAL and Tracker)**