GLAST Large Area Telescope: EM Operations Status

Larry Wai
SU-SLAC
Integration, Facility, Configuration, Test (IFCT) Manager
(within I&T)

wai@slac.stanford.edu
650-926-3145
Tracker and Calorimeter Integration Tests

**Stand-alone TKR Mini-Tower tests**
- **AUG 22 -26**
  - Receive TKR mini-tower at SLAC
  - TKR Mini-tower Post Ship Test
  - Install mini-tower on EM single bay
  - AUG 27 – SEP 2

**Stand-alone CAL tests**
- **AUG 7 - 8**
  - Receive CAL Module at SLAC from NRL
  - CAL Module Post-Ship Test (in shipping container)
  - Install CAL Module in EM Single Bay
  - SEP 2

**Stand-alone TKR Mechanical Model tests**
- **SEP 1**
  - Receive EM TKR Mechanical Tower
  - Mechanical TKR Inspection/Test
  - OCT 2 - 6

**Stand-alone EM Grid tests**
- **SEP 1**
  - Receive EM Grid
  - EM Grid Inspection/Test
  - OCT 2 - 6

**Single Bay Electrical Performance Tests**
- **SEP 17 - OCT 1**
  - Cosmic ray data taking
  - Van de Graaff data taking
  - OCT 17

**Flight Software Development**
- **SEP 19 - OCT 9**

**Fit Check w/ Mech TKR, CAL, and EM GRID**
- **OCT 17**

**EM CAL Shipped to NRL and on dock**
- **OCT 17**

**CAL script migration**
- **SEP 2 -16**

**XP2**
- **SEP 17 - OCT 2**

**Integrated test**
- **SEP 15-16**

**Integrated test**
- **SEP 11-16**

**OCT 2-6**

**AUG 11 – SEP 1**

**AUG 27 – SEP 2**

**Larry Wai 2**
Operations Summary

Aug. 21-22
✓ Mini-Tower Post-Ship LPT failed X3 and Y3 charge injection occupancy test

Aug. 25
✓ Mini-Tower with opaque cover
✓ Mini-Tower LPT - X3 and Y3 now pass, but X2 now fails charge injection occupancy test

Aug. 27
✓ Mini-Tower fit check on EM single bay
✓ Mini-Tower LPT – X2 fails

Aug. 28
✓ Mini-Tower De-Integrated
✓ Mini-Tower LPT – X2 fails

Sept. 2
✓ Mini-Tower Integrated
✓ Mini-Tower LPT – X2 fails (need to check this)
✓ EM CAL Integrated
✓ EM CAL LPT passed
✓ Mini-Tower LPT – X2 fails (need to check this)

Sept. 8
✓ EM CAL De-Integrated
✓ EM CAL LPT passed
✓ Mini-Tower De-Integrated
✓ Mini-Tower LPT – X2 now passes, Y1 now fails!
Mini-Tower Aug. 22

Threshold = 30
DAC, range 0
Calibration = 60
DAC, range 0

X2 - OK
After Mini-Tower light-tightness measures implemented – X3 and Y3 OK

X2 ladders 3 & 4 - FAILED

Stable results through 1st Mini-Tower de-integration
Mini-Tower Sept. 8

After 2\textsuperscript{nd} De-Integration Operation

\begin{itemize}
  \item X2 - OK
  \item Y1 - FAILED
\end{itemize}
X2 – Noise and Gain
Y1- Noise and Gain

Ladder 4 – Zero or low gain

Ladder 4 - NOISY
Mini-Tower Cosmics (6-layer trigger)

Y1 Ladder 4 – 100 times more hits

Y1 Ladder 3 – 50% fewer hits
There are 8 layers instrumented with Front-End Electronics (MCMs) but only 6 layers instrumented with silicon detectors.

- X2 is readout with flex cables C2, C3
- Y1 is readout with flex cables C4, C5
EM CAL de-integration was performed prior to Sept. 8 de-integration; procedures were updated and signed-off by QA before Sept. 8 operation

Mini-Tower de-integration was performed prior to Sept. 8 de-integration; procedures were updated and signed-off by QA before Sept. 8 operation

Cleanroom has been in conformance with LAT contamination control plan during entire EM Operations

I&T had good procedures, technicians trained beforehand, good facility conditions – unlikely cause of this problem
Summary and Test Program

- X2 ladders 3 & 4 problem has come and gone away again
- Y1 ladders 3 & 4 problem has appeared recently

- Need to establish review committee (right now!) specific to this problem
- Regularly Scheduled Mini-Tower Tests and review committee meetings – including liveness, cosmics, leakage current, etc..
- Software development program to allow quick generation of standard online graphs from online generated data files (not yet implemented!)
- Need deadline / schedule for test program to determine when/if this non-conformance is a considered a “show-stopper”