

GLAST Calorimeter

*Monthly Cost /
Schedule / Mission
Dec 2003*

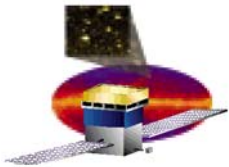
Monthly Cost/Schedule/Mission Review

GLAST LAT Calorimeter December 15, 2003

**William C. Raynor
CAL Project Manager
Naval Research Lab**

Naval Research Lab
Washington DC





GLAST Calorimeter

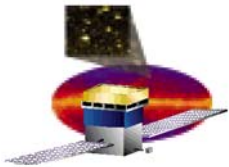
Outline

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Technical Status:

- ❑ **Last Month's Accomplishments**
 - **Summary of issues & concerns**
 - **Status/Closure of action items**
- ❑ **Open Design/Engineering model/manufacturing issues and closure plan for them**
- ❑ **Near-term Milestones & Status towards them for next 3 months**





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Significant Accomplishments November 2003

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□ CDEs

■ Csl Crystals

- To date Kalmar has delivered ~650 fully tested crystals to NRL. Flight deliveries to Swales have begun.

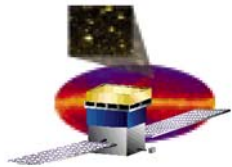
■ PIN Photodiode Assembly (PDA)

- ~1200 Dual PIN Photodiodes (corrected flight process) have been received from Hamamatsu
- 50 copies of PDA tooling were manufactured and delivered to PDA assembly vendor.
- First 150 flight PDAs have been manufactured, tested and delivered to Swales.

■ CDE Assembly Process

- 12 pre-Qual CDEs have successfully completed thermal cycling.
- 12 more Qual CDEs have been fab'ed.
- Production rate test build (60 CDE/week) was completed. Used 12 crystals and 48 Aluminum dummies. No production flow problems detected. Ready to build.
- Flight CDE build started December 8th.





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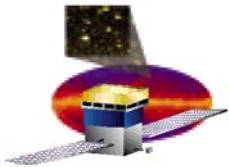
Significant Accomplishments November 2003 (2)

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□ Mechanical Structure

- Revised, reviewed and released flight machined part drawings.
 - Final revisions of base plate drawing completed last week.
- Structural Model 2 (SM2 – carbon composite structure) successfully completed strength test (LAT-SS-02052-01 == GLAST LLR-SP-078).
- Titanium insert cleaning and kitting is underway. Kits for FMA and FMB have been delivered to LLR.





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Significant Accomplishments

November 2003 (3)

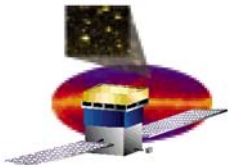
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□ AFEE Electronics

- Received Lot T31D ASICs (CAL and T&DF) from packaging at ASAT.
- Shipped Lot T36T ASICs (ACD, CAL and T&DF) to ASAT for packaging.
- Completed manufacture of ASIC burn-in boards.
- ASIC functional test GSE is essentially complete. They have been used to screen GCFE9A and GCRC5 chips to be placed on EM-version AFEE boards.
- Completed design and layout of ASIC functional test board that supports temperature forcing unit (tests at -30 , $+25$ and $+85$ deg C).
- Four more EM AFEE cards were assembled for mini-EM to be delivered to SLAC.
- Flight AFEE layout is approaching completeness. 1st prototype was deemed unsatisfactory. Issue is placement of holes for PDA wires and areas for wire soldering and staking. New prototype next week.

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Significant Accomplishments

November 2003 (4)

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□ EM CAL Module

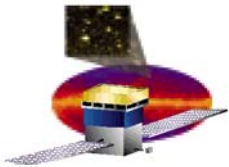
- Modified 2/4 AFEE for flight version of GCFE (9A). Works as well or better. Noise is somewhat higher however.
- Packed and shipped EM CAL and GSE to Darmstadt, Germany for heavy ion beam test at GSI.
- Successfully executed 10 nights of tests with ^{58}Ni , ^{28}Si and ^{12}C beams. Preliminary evaluations of the data show expected performance (or better) and no significant problems.

□ Mini-EM (2 active layers with full electronics)

- 24 CDEs have been manufactured, tested and inserted in the structure.
- AFEE cards have been installed (GCFE9As at cells w/ crystals, GCFE9s at remaining positions).
- Ready for delivery to SLAC, will ship after holidays.

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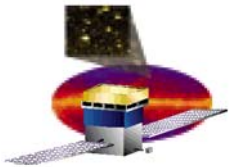
CAL Near Term Milestones

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Activity ID	WBS	Activity description	Early Start	Early Finish	Current Finish	Comments
5C1130	4.1.5.9.1	Hadronic beam test	10-Nov-03	9-Dec-03		Done. EM CAL back at NRL on 12/9
5C61500030	4.1.5.6.1.5	Aluminum Parts Manufacture	3-Nov-03	6-Feb-04		Final comments received from IPO, released on 12/12/03. Baseplate delivery will delay the start of FMA PEM assy
5C61300590	4.1.5.6.1.3.2	AV: Flight Mech Dwgs		8-Dec-03		
5C62300000	4.1.5.6.2.3.1	IN: Receive FMA Mechanical Struct		9-Feb-04		
5C76000224	4.1.5.7.6.1	Package ASIC Lot T36T	30-Oct-03	17-Dec-03		In process at ASAT. Delivery is
5C76000228	4.1.5.7.6.1	IA: GCFC9A, GCRC5 for Screen/Qual		17-Dec-03		
5C76000460	4.1.5.7.6.1	100% functional test GCFC/GCRC	17-Dec-04	23-Dec-04		Need to complete test vector implementation.
5C76000480	4.1.5.7.6.1	10% RC Post Burn In Func test (-30C,25C,85C)	15-Jan-04	29-Jan-04		Need to assemble Variable Temp board and housing. Rent thermal control hood.
5C53100070	4.1.5.5.3.1.3	Receive 1st 600 diodes		26-Nov-03		Done. 1200 Diodes in hand.
5C57000050	4.1.5.5.7	Fab PDA Lot 1 (600)	2-Dec-04	7-Jan-04		First 150 PDAs are complete.
5C58200140	4.1.5.5.8.2	Lot 1 - Bond, Clean, Form Wraps	15-Dec-03	5-Jan-04		Starting 12/10
5C77300120	4.1.5.7.7.3	ND: (5) EM2 TEM/PS for AFEE board ass'y & test		15-Jan-04		
5C77300130	4.1.5.7.7.3	ND: (5) CAL Test Stations for AFEE ass'y & test		15-Jan-04		

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Issues - PIN Diode Update

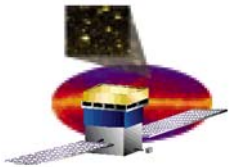
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DPD Wire Bond failures at Hamamatsu

❑ Corrective actions have been implemented

- CAL QA (Nick Virmani) recently completed source inspection visit at Hamamatsu in Japan – No significant problems identified.
- Production is proceeding at a pace to deliver all 4800 diodes to NRL by the end of Jan '04.
- NRL has received ~1200 diodes.
- Flight lot qualification samples have been delivered to GSFC for qualification testing.





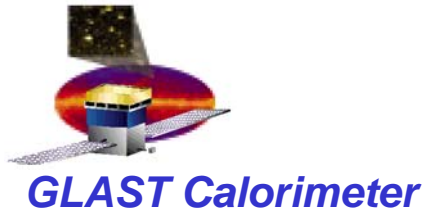
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Open Design/EM/Manufacturing Issues

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- ❑ **EMI/EMC performance – CAL has implemented modifications to mechanical structure to improve EMI/EMC results.**
 - **Resulting performance will not be known until FMA testing.**
 - **Outstanding issues:**
 - EMI shielding around AFEE-TEM cable
 - Reasonable subsystem EMI/EMC specs and test configurations are still needed.
- ❑ **LAT environmental instrumentation**
 - **CAL has made no provisions for mounting or routing instrumentation / cabling used in LAT testing.**



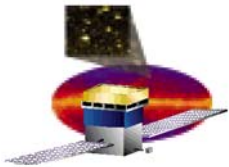


Plans for December

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- ❑ Ship mini-EM to SLAC.
- ❑ Post ship functional test of EM CAL. Change remaining 2 AFEE cards to GCFE9A ASICs.
- ❑ Build ~72 CDEs. First 12 will be qualification units.
- ❑ Fab FMA carbon composite structure.
- ❑ Receive flight lot (T36T) ASICs and begin functional testing and qualification program.
- ❑ Assemble and test prototype flight AFEE boards.
- ❑ Begin manufacture of aluminum parts.
- ❑ Complete documentation on ASICs and remaining analyses on AFEE boards.





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Top 3 Threats to Cost / Schedule

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- ❑ **Manufacturing delay in base plate could make this the pacing item for completion of FMA. Currently base plate will likely prevent the early start of FMA PEM assembly.**
- ❑ **Readiness and ability to execute the ASIC screening and qualification program as scheduled could also delay delivery of FMA. This is currently the critical path.**
- ❑ **Inability to sustain the flight module assembly and test schedule.**

