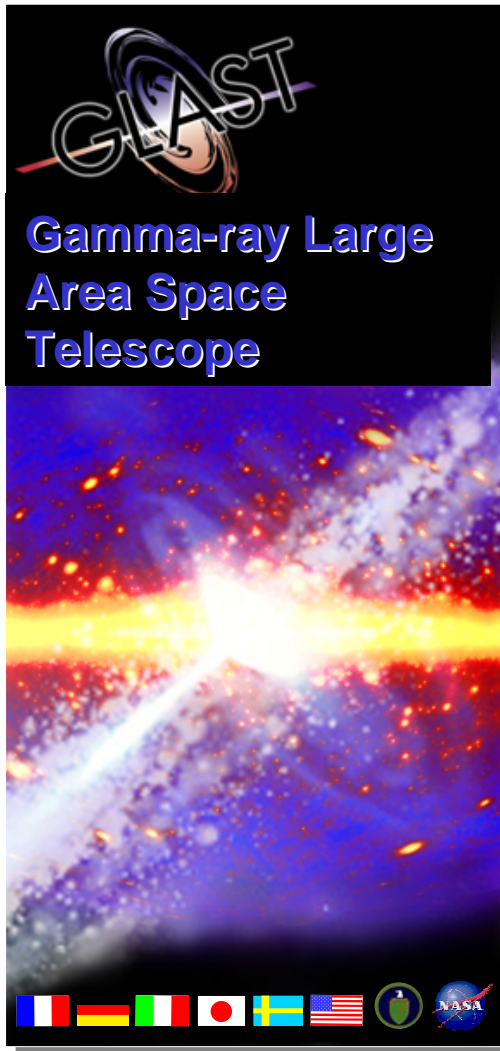


GLAST Calorimeter

*Monthly Cost /
Schedule / Mission
Aug 2005*



Monthly Cost/Schedule/Mission Review

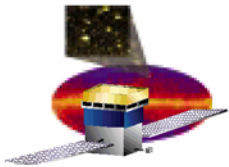
GLAST LAT Calorimeter Closeout

Sept 1, 2005

**W Neil Johnson
Naval Research Lab
neil.johnson@nrl.navy.mil**

**NAVAL RESEARCH LAB
WASHINGTON DC**





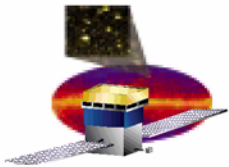
Significant Accomplishments

- ❑ **Manufactured and tested Engineering Model Calorimeter**
 - Tested in qualification test program – May '03
 - Calibrated in heavy ion beams at GSI – Nov '03
 - Delivered to SLAC for LAT ELX testing and I&T software development – Jan '04
 - Upgraded to flight ASIC versions – July '05
- ❑ **Manufactured and tested Protoflight CAL FM 101**
 - Delivered to LAT I&T – Dec '04
- ❑ **Manufactured and acceptance tested Flight CALs FM102 – FM118**
 - Delivered to LAT I&T – Jan '05 thru Jun '05
- ❑ **Manufactured CAL 119 for ground test support**
 - Assembled from spare flight parts
 - No environmental tests performed
 - Could be refurbished to flight status, if necessary



10 flight (+ 1 EM) CAL modules (in shipping containers) at SLAC ready for integration. The other 8 have been installed in the Grid.





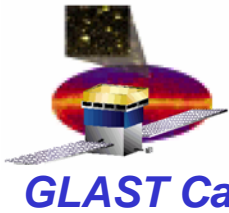
GLAST Calorimeter

Acceptance Test Data Packages Summary

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- ❑ **Electronic versions are available online:**
http://heseweb.nrl.navy.mil/glast/CAL_ATDP
- ❑ **For 18 flight CALs (3456 crystal ends and GCFEs), all channels meet flight specifications**
 - **Out of family performance (CPT test limits):**
 - 4 GCFE have higher noise on FLE threshold causing inefficiency in muon triggering on those channels
 - 6 GCFE have broad pedestal distributions (more noise) at room temperature or higher temps (1 exceeds GCFE level 4 spec for noise at room temp).
 - **FM 101 and 109, while fully flight qualified, have been selected as flight spares. Rationale:**
 - FM101: rework on AFEE card solder mask
 - FM109: EGSE mis-cabling caused 28V application to the associated EM2 TEM. Damage contained in TEM (analysis and test) and FM 109 performance unchanged with replaced TEM.





CAL Budgeted Cost Summary

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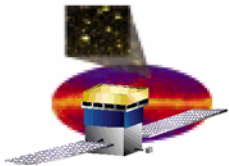
Change Request	Date	Description	Delta Cost vs Phase			Completion Cost vs Phase		
			LAT FAB	LAT COMM	TOTAL	LAT FAB	LAT COMM	TOTAL
	8-Jan-02	Base Program (LAT PDR)				13,378	-	13,378
LAT-XR-00699-01	26-Apr-02	New Base Program - Work from France	2,323		2,323	15,701	-	15,701
LAT-XR-00700-01	26-Apr-02	CDE Bonding Study	418		418	16,118	-	16,118
LAT-XR-00713-01	6-May-02	CAL Electronics Parts, Qualification and Testing	921		921	17,039	-	17,039
LAT-XR-00743-01	20-May-02	CAL New Base Program Error Correction	48		48	17,086	-	17,086
LAT-XR-00825-01	8-Jul-02	Schedule Extension and Fab Phase Definition	(139)	802	663	16,947	802	17,749
LAT-XR-00821-01	12-Jul-02	Procurement of Dual PIN Photodiodes	400		400	17,347	802	18,149
	30-Jul-02	Revised Program (LAT Delta PDR)				17,347	802	18,149
LAT-XR-00934-01	22-Sep-02	CDE Development Mods	226		226	17,573	802	18,376
LAT-XR-01195-01	28-Jan-03	CAL Additional EM & FM TV Testing	255		255	17,829	802	18,631
LAT-XR-01870-02	26-Mar-03	Cal Schedule Change for GSI Beam Test	0		0	17,829	802	18,631
LAT-XR-01999-01	25-Apr-03	CAL Flight Parts Proc - Novacap Capacitors	0		0	17,830	802	18,632
	12-May-03	Revised Revised Program (LAT CDR)				17,830	802	18,632
LAT-XR-02626-01	20-Nov-03	LAT Rebaseline	4,371	855	5,226	22,200	1,657	23,857
LAT-XR-02647-01	20-Nov-03	Add'l Calorimeter changes - Rebaseline	448		448	22,649	1,657	24,306
	20-Nov-03	Revised Revised Revised Program				22,649	1,657	24,306
LAT-XR-02999-01	6-Feb-04	4.1.5 CDE Manuf. Development Cost Savings	(546)		(546)	22,103	1,657	23,760
LAT-XR-03063-01	18-Feb-04	Extend Commissioning Phase to Launch		109	109	22,103	1,766	23,869
LAT-XR-04482-01	27-Jul-04	4.1.5 Calorimeter Parts Cost Reduction	(81)		(81)	22,022	1,766	23,788
LAT-XR-05950-01	9-Mar-05	LAT Rebaseline thru FY05 (FAB = thru FY05) (COMM = FY06,07)	571		571	22,593	1,766	24,359
For Info Only	9-Mar-05	Proposed CAL Costs FY06, 07	-	809	809	22,593	2,575	25,168
	9-Mar-05	Revised Revised Revised Revised Program				22,593	2,575	25,168

FAB Phase – thru preship review and LAT acceptance by NASA (2002) or thru delivery to Env test at NRL (2003), or thru FY05 (2005)

COMM Phase – End of Fab thru Launch + 30.

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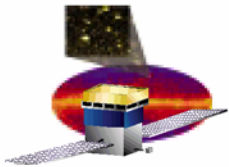
GLAST Calorimeter

CAL Cost Increase Categories

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Category	\$K
French Contribution Descope (2002)	3,400
French Contribution Descope (2003)	4,200
EEE Parts Program – Plastic Encapsulated Microcircuit Qualification and Screening	920
Environmental Test – Scope change in TVAC, EMI/EMC	400
Facilities – Humidity Control	90
Electronics Development Overrun – Design, ASICs	400
Schedule Extensions	3,000
Cost Reduction – CDE Manufacturing	(630)
TOTAL	11,790





GLAST Calorimeter

CAI Actual Cost Summary

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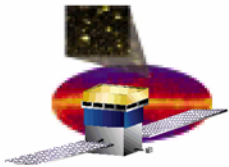
GLAST LAT Calorimeter - Actual Formulation and Fabrication Costs (\$K) February 2000 - July 2005

	Budgeted Cost at Completion	Budgeted Cost of Work Performed	Actual Cost of Work Performed	Cost Underrun	Work to Go
4.1.5 CALORIMETER (\$K)	22,593	22,121	21,554	567	473
4.1.5.1 PROGRAM MANAGEMENT & ADMINISTRATION	3,614	3,540	3,412	128	74
4.1.5.2 SYSTEMS ENGINEERING	2,227	2,171	2,015	155	56
4.1.5.3 RELIABILITY AND QUALITY ASSURANCE	1,261	1,222	1,179	43	38
4.1.5.4 DESIGN	889	889	889	-	-
4.1.5.5 Csi DETECTOR ELEMENTS (CDE)	3,635	3,635	3,603	32	-
4.1.5.6 PRE-ELECTRONICS MODULE (PEM)	1,732	1,732	1,701	31	-
4.1.5.7 ANALOG FRONT END ELECTRONICS	4,655	4,655	4,597	58	-
4.1.5.8 TOWER CONTROLLER	24	24	12	12	-
4.1.5.9 MODULE ASSEMBLY, TEST & CALIBRATION	3,954	3,921	3,893	28	34
4.1.5.A INSTRUMENT I&T SUPPORT	602	332	253	79	271
4.1.5.B S/C I&T SUPPORT					

Budgeted Cost at Completion = CCB-approved budget thru the end of FY '05

Work to Go = budgeted work in FY '05 beyond July 31, 2005 (the closeout date)





Final CAL Costs

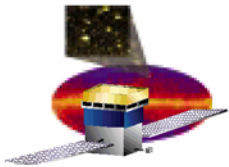
- ❑ **Current CAL budget sustains CAL Team involvement in LAT thru Launch+30, including:**

- **Science preparation**
- **LAT I&T support**
- **Sustaining engineering**

	TOTAL (\$K)	Thru FY'05 (\$K)	FY'06 (\$K)	FY'07 (\$K)
Current CAL Budget (XR-05950-01) Rebaseline thru FY'05	23,997	22,593	1,137	267
Expected CCB action for FY'06,'07 Complete Rebaseline	25,168	22,593	1,690	885
Cost At Completion	21,554	21,554		
Cost Savings - Return to Contingency	(567)	(567)		
Work to Go - Reprogram	3,047	472	1,690	885

- ❑ **All this activity (Work to Go after 31 July, 2005) will be reprogrammed into other LAT WBS elements**
 - **4.1.1 Science Preparation**
 - **4.1.2 System engineering**
- ❑ **This amounts to \$3,047K based on the rebaseline developed in Mar '05 (FY'06 – '07 changes have not been approved by CCB)**
- ❑ **There are several liens against CAL cost under run in other LAT efforts at NRL – Electronics, Flight Software, Env Test.**





Where have all the people gone

4.1.1 Science Preparation

Johnson	100%	Mgmt, SVAC, Obs I&T, Mops
Grove	100%	SVAC, Trigger, I&T support, Calibration
Chekhtman	50%	SVAC, I&T support, Calibration
Strickman	50%	SVAC, I&T support, Calibration
Fewtrell	100%	SVAC, I&T support, SAS software
Leas	100%	Software - LATTE, LICOS, SVAC
Lyon	25%	Admin, Financial

4.1.2 System Engineering

Raynor	50%	Sustaining Eng (Mgmt) thru FY05 I&T
Dizon	50%	Sustaining Eng (Mech) thru FY05 I&T
Ampe	50%	Sustaining Eng (Elect) thru FY05 I&T, 25% Thru LAT Env Test at NRL
Sandora	50%	Config Mgmt, Archive thru FY05

4.1.9.8 I&T Environmental Test

Raynor	50%	Env Test Lead, 100% thru LAT Env Test
Dizon	50%	Env Test Facilities Test Director, 100% thru LAT Env Test
Sandora	50%	Technician, Test Conductor, Config Mgmt.
Brooks	100%	Mech Design, thru PathFinding (Nov 05)
Wolko	100%	Mech Design, thru FY'05

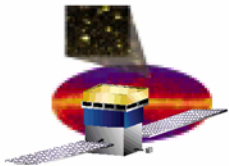
4.1.A Reliability & QA

Virmani	50%	EEE Parts, QA thru delivery of LAT to NRL
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4.1.D SAS

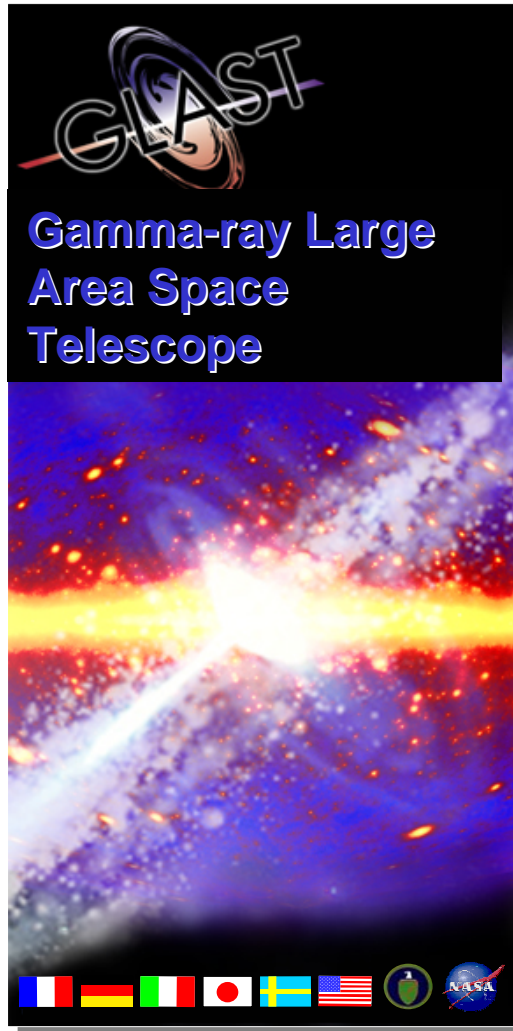
Chekhtman	50%	Simulation and Analysis software - CAL-centric
Strickman	50%	Calibration and Analysis software - CAL-centric
Makeev	50%	Grad Student, Heavy Ion Calibration





GLAST Calorimeter

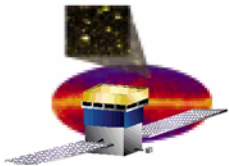
*Monthly Cost /
Schedule / Mission
Aug 2005*



Cost/Schedule Reports for 4.1.5 Calorimeter Presentation July 2005 Month End

wnjohnson





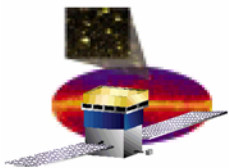
GLAST Calorimeter

Cost Report

Monthly Cost /
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Reporting Category	Cost Incurred				Estimated Cost			Estimated Final Cost		Unfilled Orders Outstanding
	During Month		Cum. to Date		Detail		Balance of Contract	Contract Estimate	Contract Value	
	Actual	Planned	Actual	Planned	AUG05	SEP05				
4.1.5 CALORIMETER										
4.1.5.1 PROGRAM MANAGEMENT & ADMINISTRATION	5	40	3,412	3,540	39	35	128	3,614	3,614	2
4.1.5.2 SYSTEMS ENGINEERING	1	25	2,015	2,171	29	27	155	2,227	2,227	0
4.1.5.3 RELIABILITY AND QUALITY ASSURANCE	2	17	1,179	1,222	20	18	43	1,261	1,261	0
4.1.5.4 DESIGN	0	0	889	889	0	0	0	889	889	0
4.1.5.5 Csi DETECTOR ELEMENTS (CDE)	0	0	3,603	3,635	0	0	32	3,635	3,635	0
4.1.5.6 PRE- ELECTRONICS MODULE (PEM)	0	0	1,701	1,732	0	0	31	1,732	1,732	0
4.1.5.7 ANALOG FRONT END ELECTRONICS	0	0	4,597	4,655	0	0	58	4,655	4,655	7
4.1.5.8 TOWER CONTROLLER	0	0	12	24	0	0	12	24	24	0
4.1.5.9 MODULE ASSEMBLY, TEST & CALIBRATION	32	18	3,893	3,921	20	14	28	3,955	3,955	4
4.1.5.A INSTRUMENT I&T SUPPORT	47	65	253	434	93	76	181	602	602	0
CAPW[3]Totals:	88	166	21,554	22,223	201	171	668	22,594	22,594	14





GLAST Calorimeter

FTE Report (DOE/NASA-funded only)

Monthly Cost /
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Aug 2005

