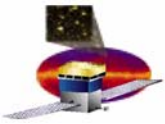


GLAST Large Area Telescope

Project Status

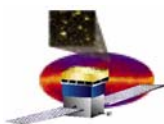
Lowell Klaisner
Stanford Linear Accelerator Center
Stanford University
LAT Instrument Project Manager

klaisner@slac.stanford.edu
(650) 926-2726



Instrument Status

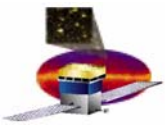
- All subsystems have begun flight production
- Flight Grid and First Flight Calorimeter & Tracker modules in Integration and Test by the end of July
- The staff has been strengthened in key positions
- The schedule is very tight
 - All subsystems near the critical path
- Budget in US FY04 (ends September 31, 2004) is very tight
 - The project will need to draw on the Stanford University backstop funding
- The over all contingency for the fabrication phase is an acceptable 29 % of the cost to go
- The project has 9 weeks of schedule float to ready to integrate with the spacecraft (December 1, 2005)



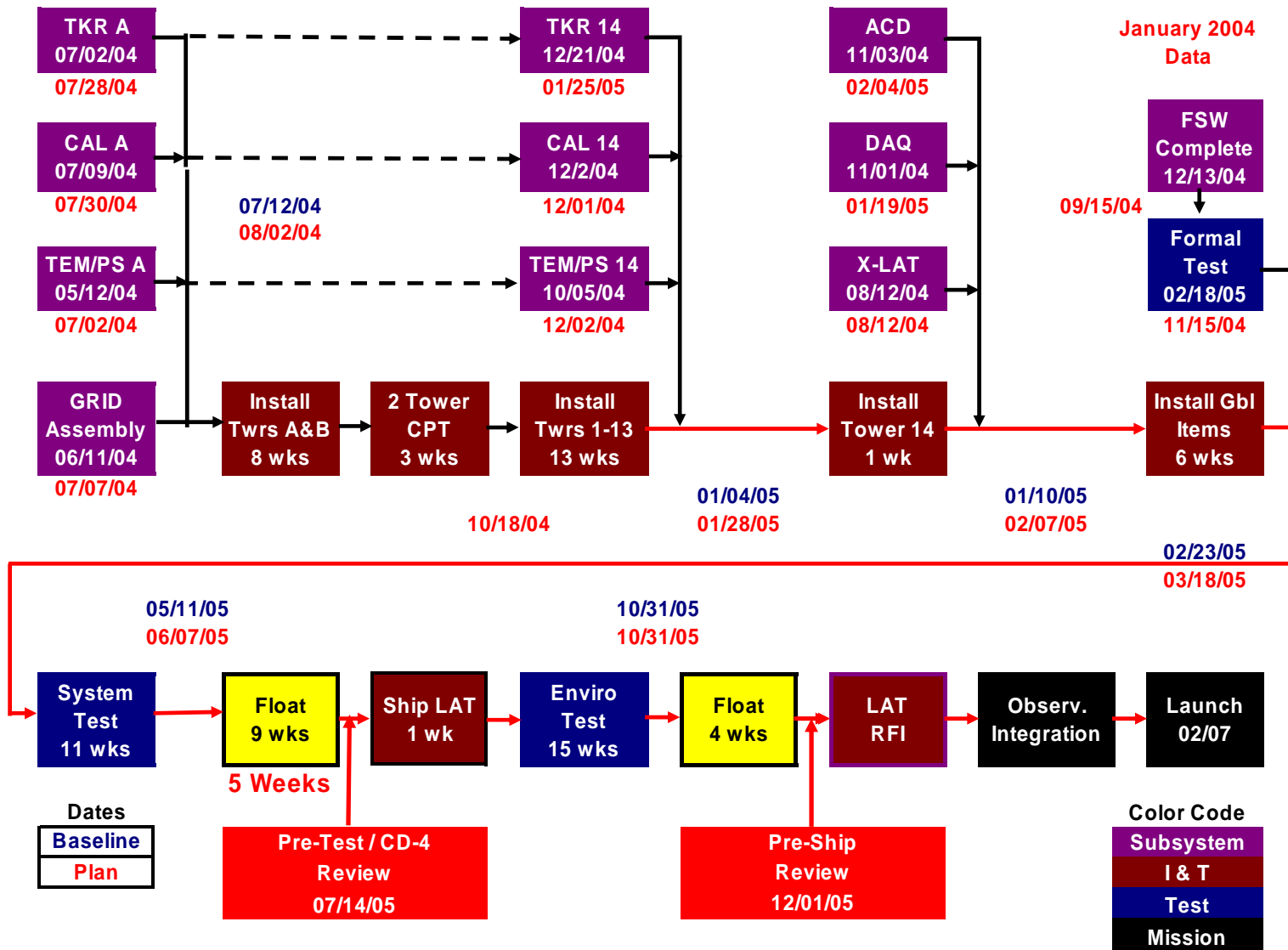
Level 1 and Level 2 Milestones

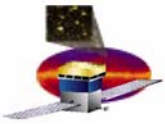
	Milestone	Plan	Float
Level 1 Milestones – DOE/NASA Joint Oversight Group			
DOE Critical Decision (CD) 0 Approval	June 25, 2001	June 25, 2001	Actual
CD-1 Approval	July 23, 2002	July 23, 2002	Actual
CD-2 Approval	November 8, 2002	November 8, 2002	Actual
CD-3 Approval	August 31, 2003	August 31, 2003	Actual
Flight Grid Complete	September 15, 2004	July 22, 2004	8 weeks
CD-4 Approval	March 15, 2006	June 7, 2005*	40 weeks
Level 2 Milestones – Federal Project Managers			
Launch Balloon Flight	August 1, 2001	August 1, 2001	Actual
Instrument Preliminary Design Review	January 8, 2002	January 8, 2002	Actual
Instrument Critical Design Review	May 16, 2003	May 16, 2003	Actual
Start LAT Integration	August 24, 2004	August 2, 2004	3 weeks
Pre Environmental Test Review	July 14, 2005	June 7, 2005	5 weeks
Instrument Pre-Ship Review	December 1, 2005	October 1, 2005	9 weeks

* The CD-4 Review is planned for June 7, 2005 and the CD-4 Approval will occur after validation by DOE.



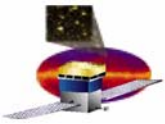
LAT Schedule





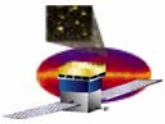
Subsystem Status

- **Calorimeter (NRL)**
 - **Thorough testing of Engineering Model**
 - **Flight CDEs, composite structure, aluminum parts, and electronics being fabricated**
 - **470 CDEs bonded (96 per module)**
- **Tracker (UCSC, INFN)**
 - **Production planning readiness workshop held in Italy**
 - **Mid-tray structures started**
 - **Anomaly in EM vibration test of Tracker to Grid interface**
 - **Titanium parts for bottom tray on critical path**
 - **Design complete**
 - **Needs verification testing**
 - **Flight MCM production has begun at Teledyne**
 - **ASICs tested and ready for MCMs**
 - **Silicon ladder production 75% complete**



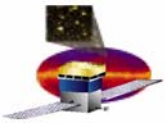
Subsystem Status (2)

- **Mechanical (SLAC)**
 - **GRID 1 being machined**
 - **GRID 2 in rough machining**
 - **Used for strength qualification**
 - **Third billet on order**
 - **Thermal components in manufacture**
- **Anticoincidence Detector (GSFC)**
 - **Photomultiplier failures**
 - **GARC ASIC reset anomaly**
 - **Panels for support structure at GSFC**
 - **Assemble structure next week**
 - **Flight tile assemblies 1/3 complete**



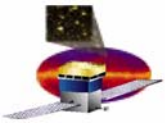
Subsystem Status (3)

- **Data Acquisition (SLAC)**
 - Drawings for flight Tower Electronics Modules complete
 - Designs of all cards exist and prototypes in test
 - Flight Software
 - Successful peer review held February 26, 2004
 - Second monthly software demonstration Feb. 27, 2004
- **Integration and Test (SLAC)**
 - MGSE design maturing
 - I&T Kickoff scheduled for March 9, 2004
 - Roadmaps for I&T
 - Adding staff

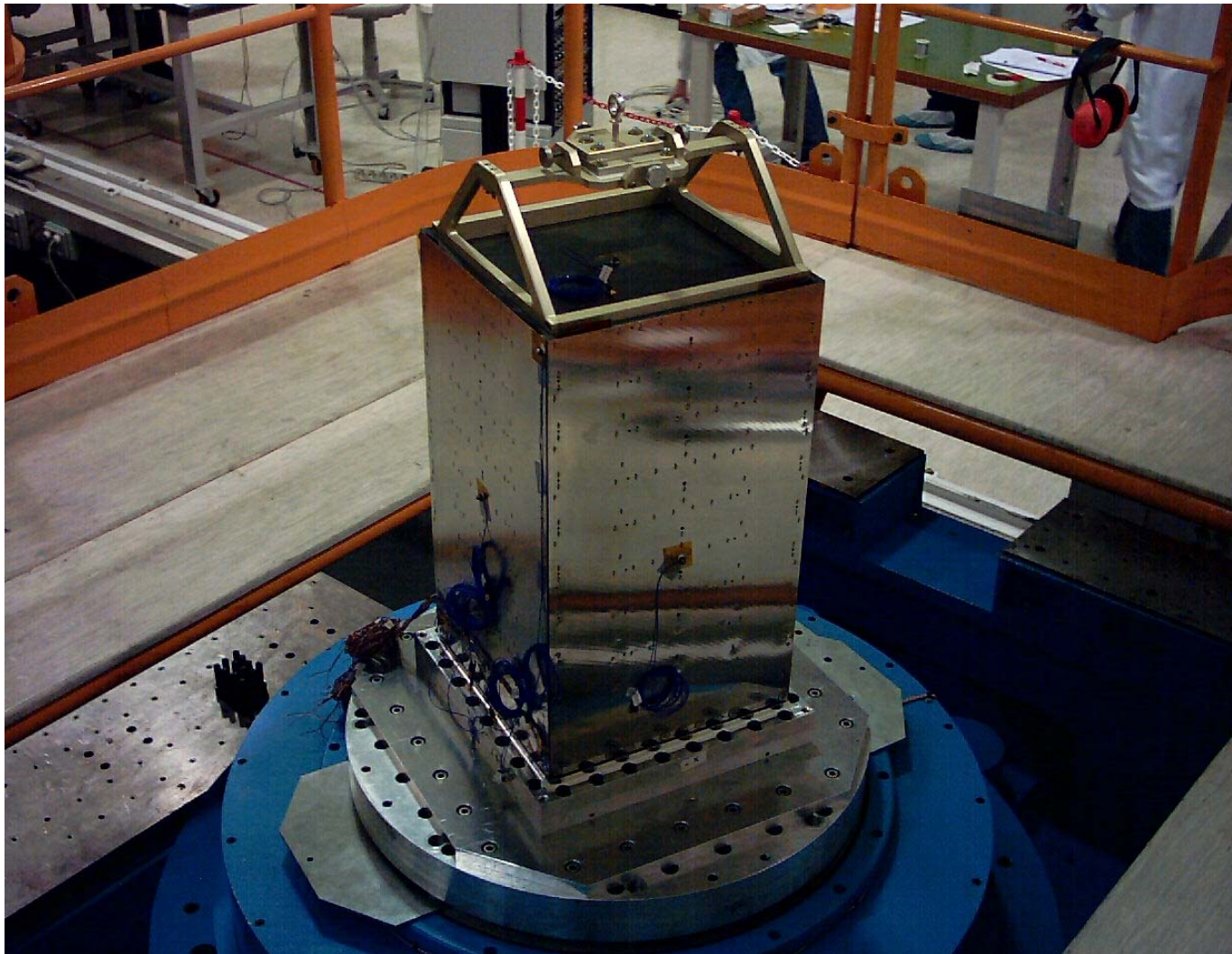


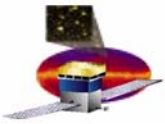
Subsystem Status (4)

- **Instrument Science Operations Center (SLAC)**
 - Search underway for Manager
 - Peer review planned for March 2, 2004
- **Science Analysis Software (SLAC, Collaboration)**
 - Successful Data Challenge



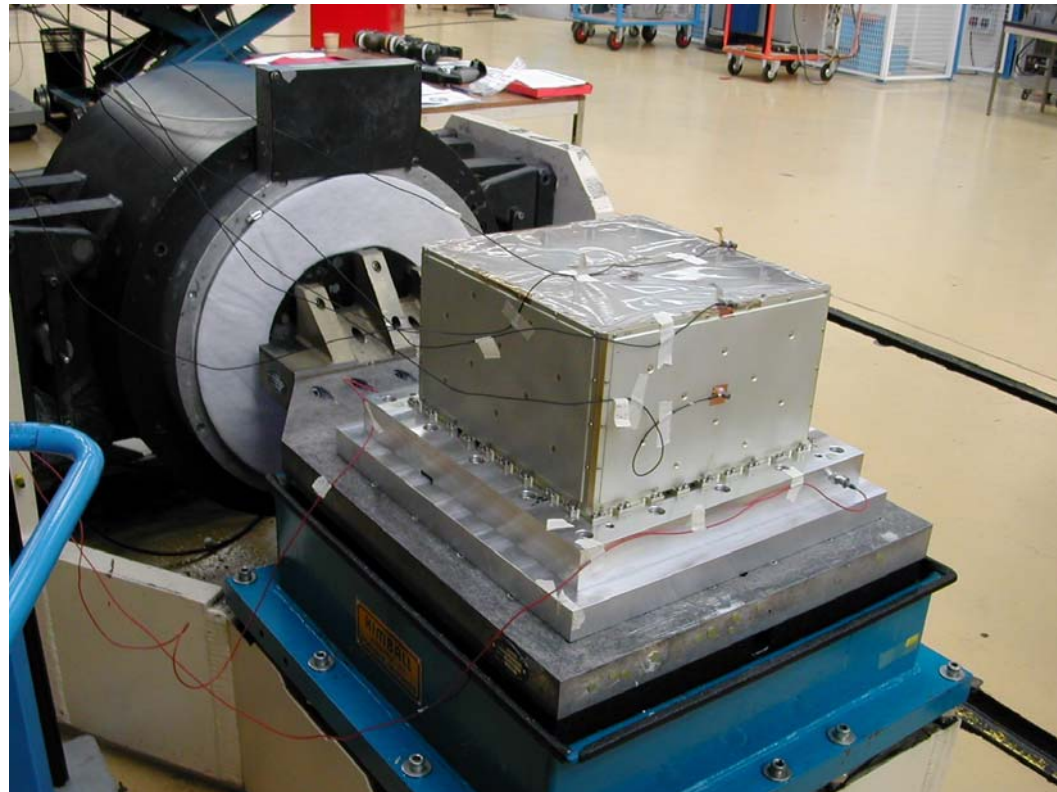
EM Tracker on Shake Table

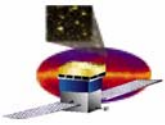




CAL -- Carbon Structure Vibration Test

Shown in the photo is the first flight carbon composite structure during its acceptance vibration test in France. The completed structure is mounted to test aluminum structural elements and loaded with mass-dummy CDEs for the test. The photo shows the structure on the slip table for a lateral axis test.

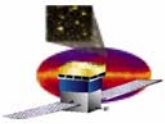




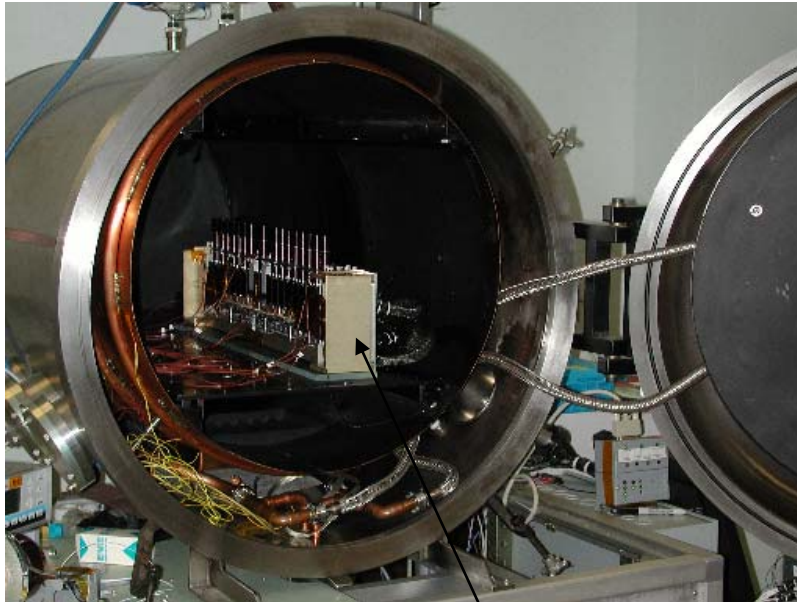
Calorimeter -- CDE Production facility

24 CDEs are manufactured at one time on the manufacturing bench shown in the figure. The technician is removing a bonded CDE from its support. The bonding mold has already been removed from the top exposing the diode bonded to the crystal. The crystals are wrapped in temporary wraps during bonding to protect the surfaces.

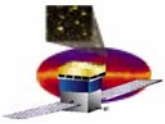




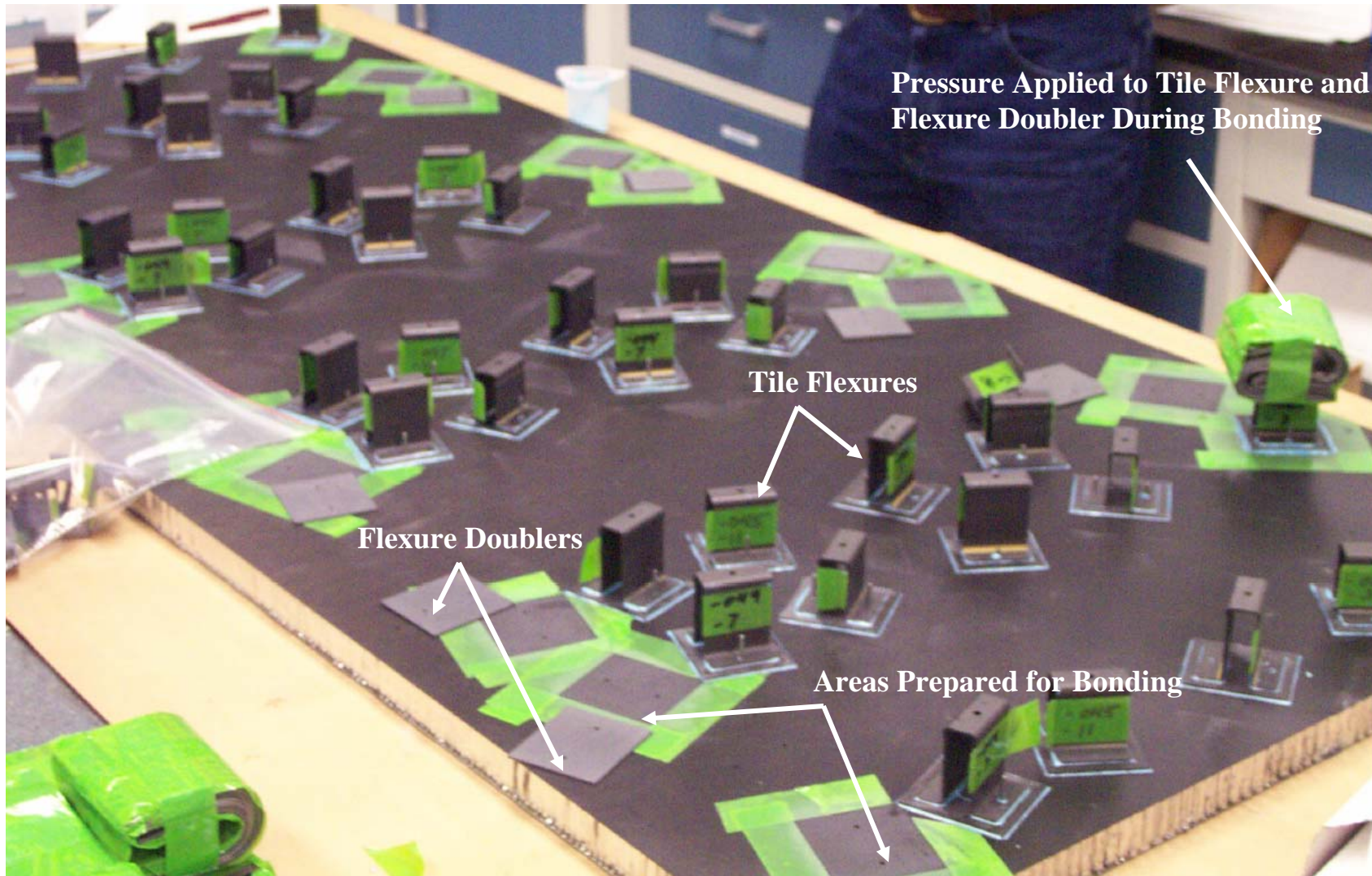
ACD Electrical Chassis Test Unit

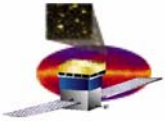


Electronics Chassis Installed in Thermal Vacuum Chamber



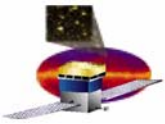
ACD Side Panel Assembly



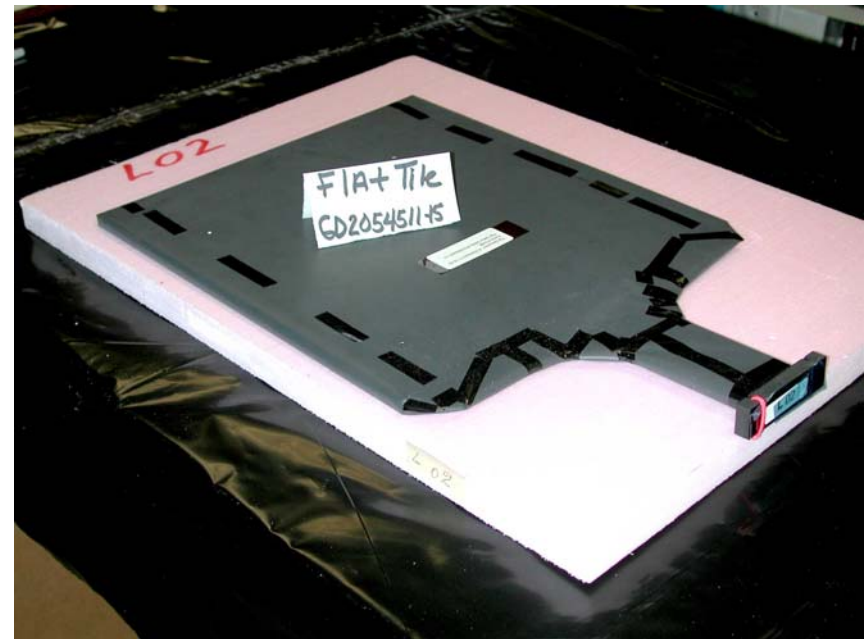


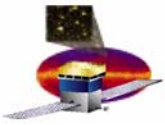
ACD Base Frame Assembly



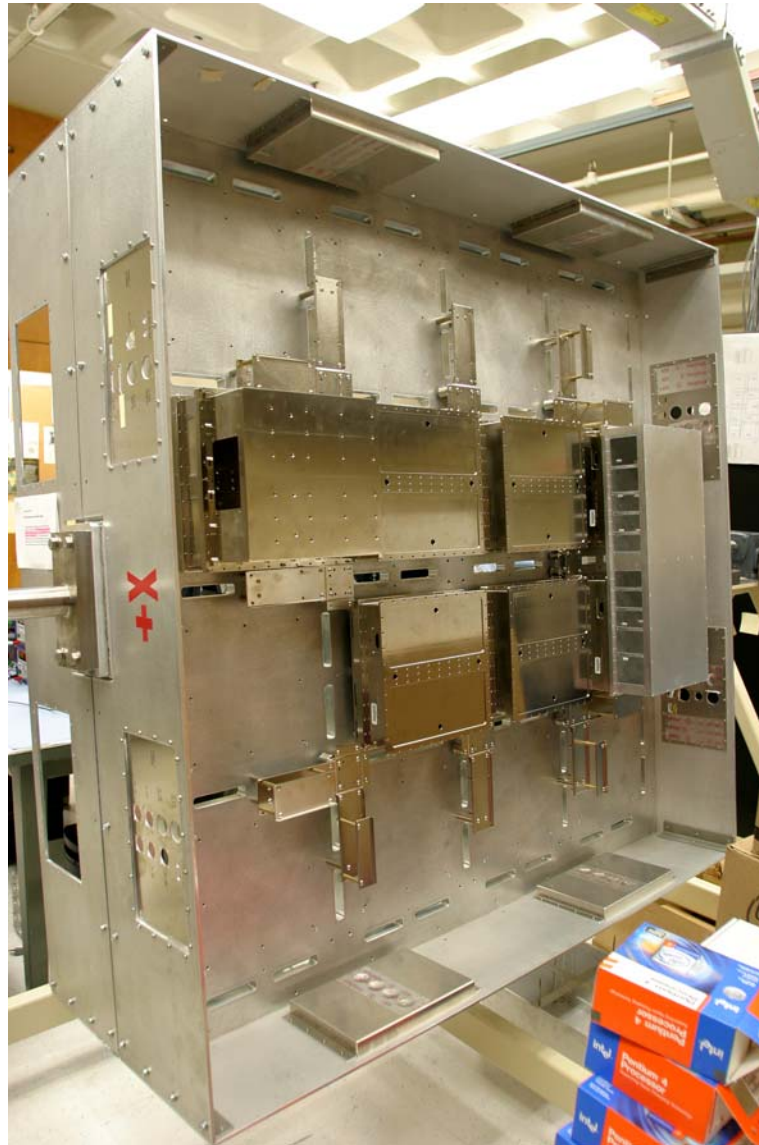


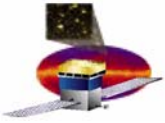
ACD Tile Detector Assemblies





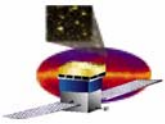
DAQ – Test Bed, EM Electronics Side



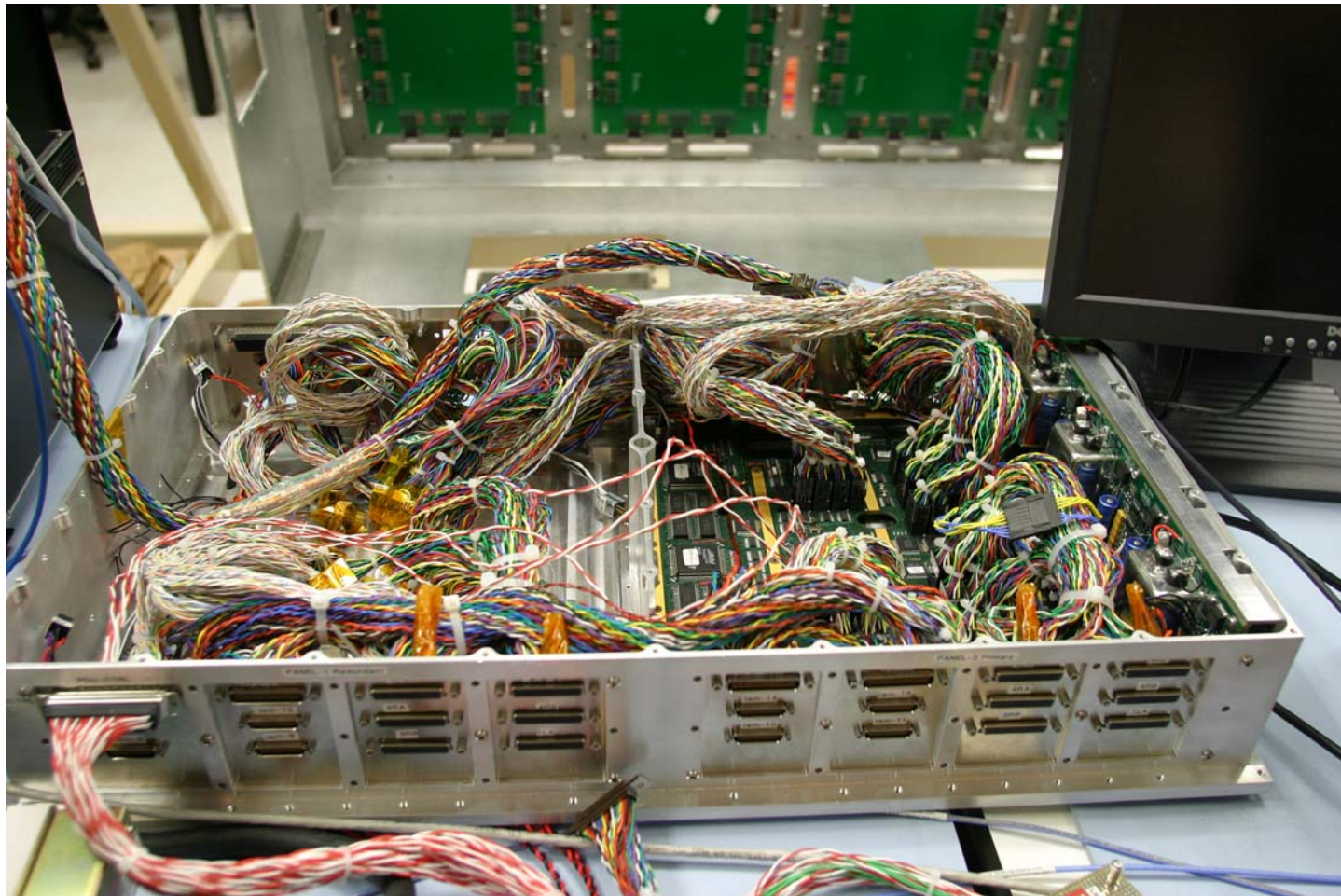


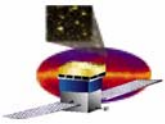
DAQ – Test Bed, Simulator Side



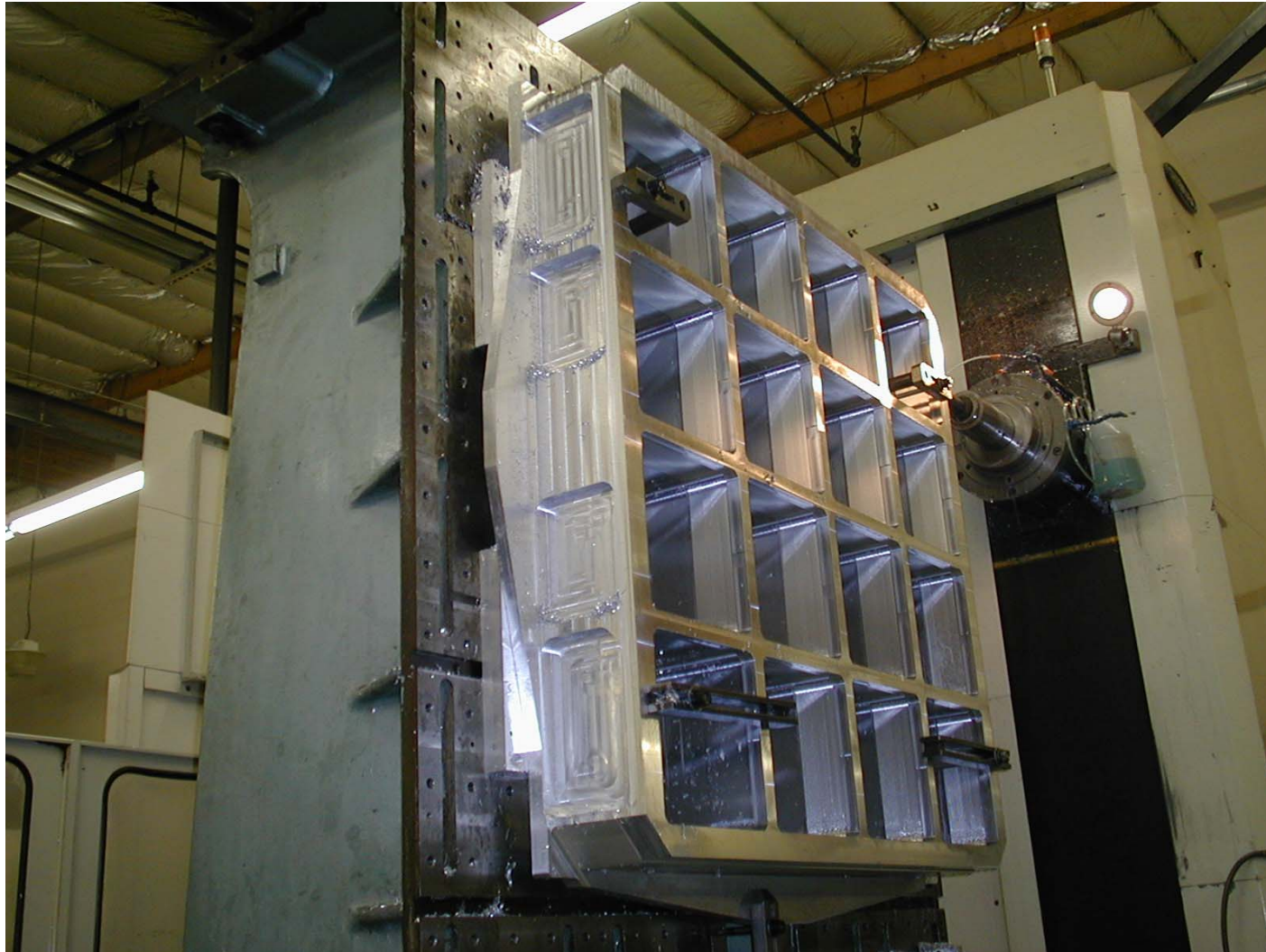


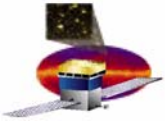
DAQ – Engineering Model GASU



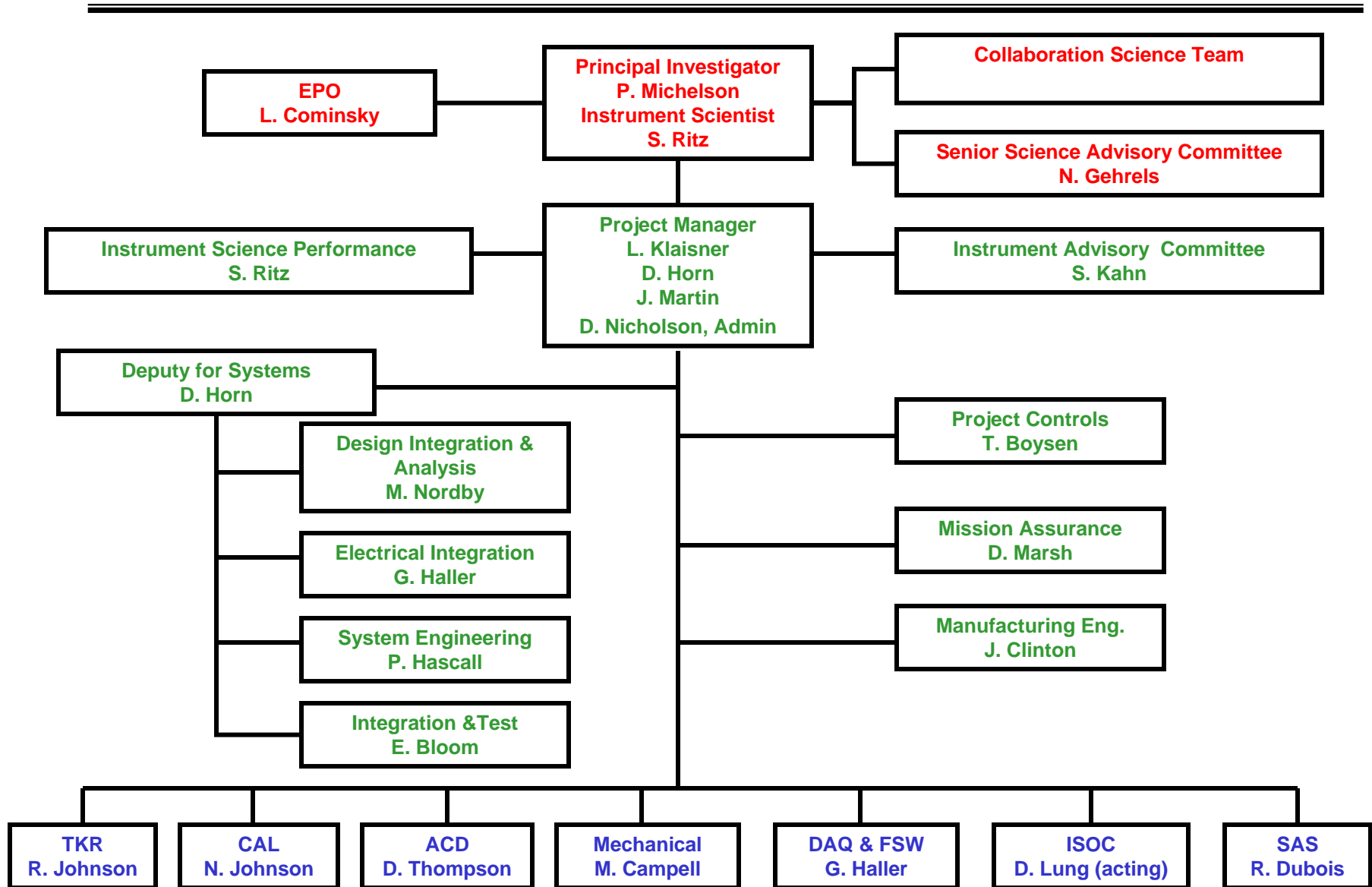


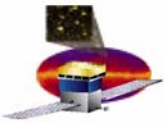
GRID being rough machined



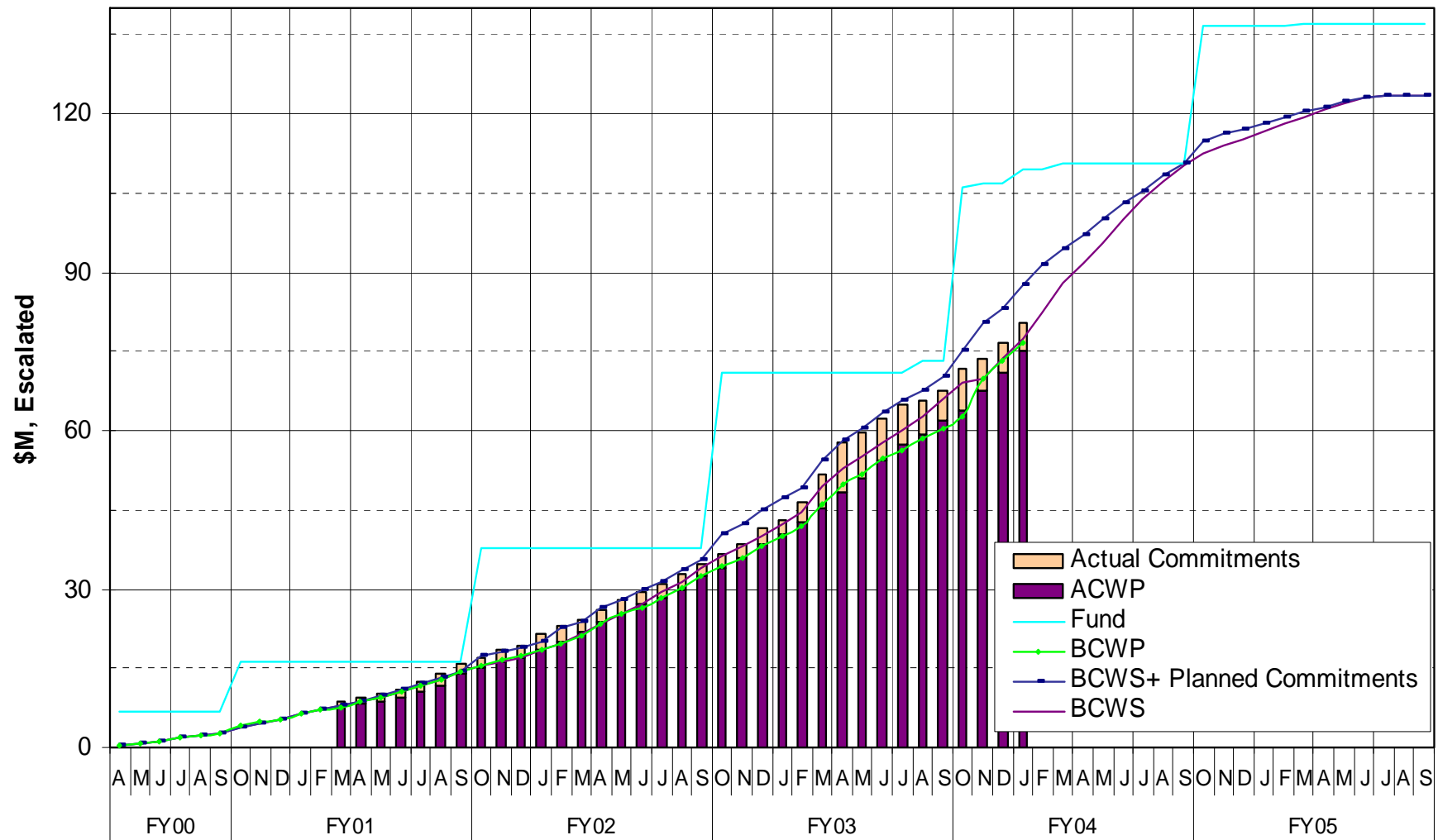


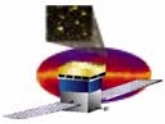
LAT Organization Chart





Budget, Cost, Funding, Performance



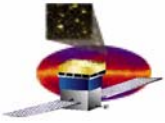


Contingency Analysis

Current Baseline
January 04 Costs

Funding	\$136,830
Estimate at complete	\$123,444
Work Performed	\$76,574
Cost to Go	\$46,870
Percent complete	62%
Contingency	\$13,386
Contingency/ Cost to Go	29%

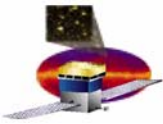
US funding of the fabrication project



US FY04 Cash Flow

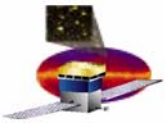
	End of FY04 Current Baseline	CCBs in progress	End of FY04 With CCB Actions
Funding	\$110,600	\$271	\$110,871
Estimated Cost + Commitments	\$110,637	\$1,896	\$112,533
Difference	-\$37		-\$1,662

Note: \$5,000 available from Stanford University to forward fund costs



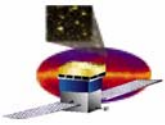
Collaboration Contributions

Calendar Year	2001*	2002	2003	2004	2005	2006	2007	2008	Total
Funding for the GLAST-LAT Project US\$ X 1000									
France									
Italy - ASI		\$800	\$2,230	\$2,604	\$354	\$440	\$922	\$930	\$8,280
Italy - INFN	\$2,100	\$4,319	\$1,551	\$1,200	\$1,200				\$10,370
Japan	\$1,140	\$1,040	\$880	\$730					\$3,790
Sweden									\$0
US - DOE Project	\$10,709	\$8,288	\$8,658	\$8,030	\$6,316				\$42,000
US-DOE Ops	\$4,200	\$3,400	\$4,000	\$4,600	\$6,400	\$8,400	\$7,500	\$7,100	\$45,600
US - NASA (Fab Phase)	\$10,994	\$16,481	\$27,051	\$25,899	\$13,211				\$93,636
US - NASA (Comm Phase)					\$2,900	\$8,800	\$6,853	\$6,734	\$25,287
Scientific and Technical FTE's supporting LAT Project									
France									
Italy			6.0	6.0	4.0	4.0	4.0	4.0	
Japan									
Sweden	6.3	7.5	5.6	5.0					
US	27.4	22.2	22.2	25.6	41.3	48.2	36.3	47.6	
* The 2001 column includes funds from prior years									



Issues

- **Technical issues**
 - **Tracker interface to GRID – EM Vibration Test Anomaly**
 - Drawings complete
 - Validation plan in development
 - **ACD Photomultiplier Tube Breakage**
 - Move mumetal from inside the holder to outside
 - Change potting material from urethane to silicon rubber
 - Design in test
- **Programmatic issues**
 - **Uncertainty in Japanese funding in FY04**
 - Plan has \$1M funding
 - **ASI contract with G&A for Tracker production**
 - Must be placed by June to avoid schedule delay
 - **Completion of delivery of the CsI crystals from Kalmar**



Summary

- Project is fabricating flight hardware
 - Currently in the startup phase for flight hardware
- GLAST Mission office has applied mission contingency
- FY04 budget is very tight
 - More room in FY05
- Schedule is tight
 - 9 weeks contingency to LAT RFI (on 22 months)
- Adequate float to Level 1 and Level 2 milestones