Gamma-ray Large Area Space Telescope

GLAST Large Area Telescope
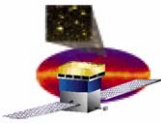## Instrument Science Operations Center

**Monthly Status Review
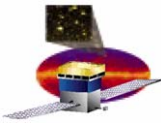5 October 2007**

**Rob Cameron
ISOC Manager**

ISOC Highlights

❑ **LAT RTS delivered to GD**

– **Called from ATS at each SAA exit to set LAT sub-system bias voltages**

  • **Sets TKR bias at 80V**

❑ **Upcoming Events**

– **ISOC operations sim: 8-12 October**

– **Instrument Commissioning Simulation #1a: 23-25 Oct**

  • **LAT training for FOT: 22 Oct**

– **ETE3 Test: 29 Oct**

Narrative Procedure Development

❑ **Total of 109 NPs**
- **107 in at least draft form (98%)**
    - **Two remaining (File System Format and File System Boot) will be in draft form by next week**
- **94 reviewed at level 3 or higher (85%)**
    - **All 31 NPs for ETE3 are at level 3 or higher**
- **All remaining NPs (15) are for contingency use**
    - **4 identified as high priority for contingency use**
        - **L-FIL-04 File Upload to SIU in Boot (in level 3 review)**
        - **L-FIL-05 File Upload to EPU in Boot (in level 3 review)**
        - **L-LSW-01 Dump Start Line System Trace (in review next week)**
        - **L-LFS-10 File System Format (in draft next week)**
    - **1 identified as medium priority for contingency use**
        - **L-LFS-11 File System Mount (in draft next week)**
    - **10 are low priority for contingency use (to be reviewed in next few weeks)**
        - **L-MEM-08 Dump PCI Device Header in Boot**
        - **L-MEM-09 Write PCI Device Header**
        - **L-MEM-10 Write PCI Device Header in Boot**
        - **L-MEM-11 Access RAD750 CPU Register**
        - **L-MEM-13 Write RAD 750 CPU Register**
        - **L-MEM-12 Memory Write in Boot**
        - **L-LSW-02 Dump Code Trace by Numeric ID**
        - **L-LSW-03 Dump Code Trace by Name**
        - **L-LSW-04 Set Trace Enable Bits**
        - **L-LFS-09 File System Repair**

Narrative Procedure Status

Status by ETE								
ETE	Date	# of Procedures	Level					
			1	2	3	4	5	6
ETE 1a	Apr-07	2	0	0	0	0	2	0
ETE 1b	Jul-07	8	0	0	0	0	8	0
ETE 2	Jul-07	20	0	0	0	12	8	0
ETE 3	Oct-07	31	0	0	23	8	0	0
ETE 4	Jan-08	48	11	2	32	1	0	0
		109	11	2	55	21	18	0

Schedule				
	Planned Draft	Draft Actual	Planned Level 3	Level 3 Actual
Apr	3	4	0	0
May	7	8	0	0
Jun	9	5	0	0
Jul	4	0	2	2
Aug	6	8	1	1
Sep	4	9	11	11
Oct	6	7	12	11
Nov	12	11	8	16
Dec	13	12	2	1
Jan	8	7	15	10
Feb	2	2	9	9
Mar	2	1	3	0
Apr	3	1	0	0
May	7	11	0	2
Jun	3	4	13	13
Jul	13	8	12	14
Aug	6	5	14	2
Sep	1	3	6	1
Oct	0	1	1	1
	109	107	109	94

Cumulative NP Progress				
	Planned Draft	Draft Actual	Planned Level 3	Level 3 Actual
Apr	3	4	0	0
May	10	12	0	0
Jun	19	17	0	0
Jul	23	17	2	2
Aug	29	25	3	3
Sep	33	34	14	14
Oct	39	41	26	25
Nov	51	52	34	41
Dec	64	64	36	42
Jan	72	71	51	52
Feb	74	73	60	61
Mar	76	74	63	61
Apr	79	75	63	61
May	86	86	63	63
Jun	89	90	76	76
Jul	102	98	88	90
Aug	108	103	102	92
Sep	109	106	108	93
Oct	109	107	109	94

Draft Activities for ETE4

Priority/Expected Usage

- ❑ **High/Nominal (13)**
- ❑ **High/Contingency (7)**
- ❑ **Medium/Contingency (8)**
- ❑ **Low/Contingency (20)**

❑ **Configuration and diagnostics with full LAT**
- – **L-LIM-18 LATC Configuration**
- – **L-LIM-19 LATC Verify**
- – **L-LPA-07 Compression Debug**

❑ **Miscellaneous contingency commands with full LAT**
- – **L-LIM-17 ARR Abort**
- – **L-LFS-09 File Repair**
- – **L-MEM-09 Write PCI Header**
- – **L-MEM-13 Write RAD750 CPU Register**
- – **L-MEM-11 Access RAD750 CPU Register**

❑ **EPU Boot Activities (in order of use)**
- – **L-PBC-04 Reboot EPU**
- – **L-FIL-05 File Upload to EPU in Boot**
- – **L-PBC-03 EPU Secondary Boot**

❑ **Diagnostic Data following secondary boot**
- – **L-LSW-01 Dump Start Line System Trace**
- – **L-LSW-02 Dump Code Trace by Numeric ID**
- – **L-LSW-03 Dump Code Trace by Name**
- – **L-LSW-04 Set Trace Enable Bits**

❑ **Change Settings**
- – **L-LHK-01 Restart and Reinitialize LHK**
- – **L-LCM-05 Configure MSG Output Interface**
- – **L-LIM-03 Configure Discrete Signals**
- – **L-LSM-01 Enable/Disable Magic 7**
- – **L-LCM-08 Configure CPU Error Handling**
- – **L-LCM-07 Configure Communication Statistics Monitor**
- – **L-LCM-09 Configure Memory Scrubber**
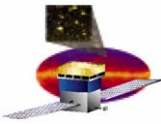- – **L-LCM-06 Run Memory Scrubber**

Draft Activities for ETE4, continued

- ❑ **File System Format (in order of use)**
  - – **L-LFS-10 File System Format (Reformat bank EE0)**
  - – **L-FIL-01 Upload file (Upload build to EE0)**
  - – **L-LIM-02 Load Shed**
  - – **L-FIL-04 File Upload to SIU in Boot (Upload boot code secondary script)**
  - – **L-PBC-01 SIU Secondary Boot**
  - – **L-LFS-11 File System Mount**
- ❑ **SIU Boot Activities (in order of use for first 3)**
  - – **L-PBC-02 SIU Primary Boot (Warm Reset)**
  - – **L-MEM-12 Memory Write in Boot**
  - – **L-MEM-02 Memory Dump in Boot**
  - – **L-PBC-09 PBC Error Dump**
  - – **L-MEM-10 Write PCI Device Header in Boot**
  - – **L-MEM-08 Dump PCI Device Header in Boot**

- ❑ **Power**
  - – **L-LIM-14 Main Feed On**
  - – **L-LIM-15 Component Power On**
  - – **L-LIM-16 Component Power Off**
- ❑ **LRA Activities**
  - – **L-LRA-01 Main Feed On**
  - – **L-LRA-02 Read LRA Registers**
  - – **L-LRA-03 Load LRA Registers**
  - – **L-LRA-04 Reset the LAT**
  - – **L-LRA-05 Register Look At Me**
  - – **L-LRA-09 Send Statistics to SSR**
  - – **L-LRA-10 Send ESR Data to SSR**
  - – **L-LRA-06 LCB Look At Me**
  - – **L-LRA-07 Set Statistics Update Period**
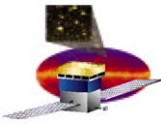 - – **L-LRA-08 Clear Statistics**
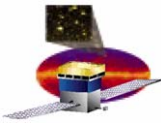
PROC Development

PROC	Not Started	Draft	Not complete	Coded	Needs Update	Ready for test	Tested	Validated	Total
ETE1	0	0	0	0	0	0	0	13	13
ETE2	0	0	0	0	0	5	11	20	36
ETE3	0	0	0	0	8	0	30	0	38
ETE4	14	7	0	2	0	5	7	0	35
ETE5	10	0	0	0	0	0	0	0	10
Total	24	7	0	2	8	10	48	23	132

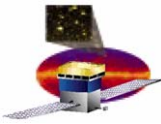# ISOC/Flight Operations Software Progress

❑ **Continued FOS 4.0 release preparation**
  – **Release date 8 Oct**
  – **One requirement (ATNS0100, automated handling of MOC anomaly notifications) deferred pending input from the FOT.**

❑ **In progress:**
  – **Mission Plan Request method**
  – **Mission Planning Tool updates**
  – **Web version of other real-time tools**
  – **Protection against receipt of bad or malformed data packets from MOC/GSSC**

❑ **Completed:**
  – **Web based Telemetry Table GUI**
  – **Limit-set handling**
  – **Derived telemetry handling**
  – **Telemetry display configuration files**
  – **Strip chart configuration files**
  – **Mnemonic viewer**
  – **Method of specifying LAT's pointing and "down-time" needs to GSSC**
  – **SAA Boundary polygon management**
  – **Centralized logging for non-FOS software**
  – **Automated command completion handling**

❑ **Developing contingency ISOC plans**

Requirements Tracking

	1 6/05	1.2 11/05	1.3 2/06	1.4 5/06	2 7/06	2.1 10/06	2.2 2/06	3 6/07	3.1 7/07	3.2 9/07	4 10/07	4.1 11/07	
Release Status & Plan (as of 10/3/07)													
Requirement Category	GRT2	GRT3			GRT5	GRT6	ETE1 MPEX1	GRT7 MPEX2	ETE1b/2	ETE3	ETE4-6	ETE4-6	total
Misc (Facility, Redundancy, Security, Doc, etc.)	3	1		2	7	4	4		17	3	5	16	62
Mission Planning	2	2					30	9	2	3	4		52
Telemetry Processing	2	3	1	7	4	14	2	2	4	1	3	2	45
Science Data Processing		1		1	3	3			6	1	5	15	35
Telemetry Monitoring		1	1	2	1	15	1	5		6	1		33
Logging			3			4		1		1	1		10
Trending			12		6	3			1				22
Anomaly Tracking & Notification						6	3		5	2		1	17
# new reqts verified	7	8	17	12	21	49	40	17	35	17	19	34	276
cumulative total	7	15	32	44	65	114	154	171	206	223	242	276	

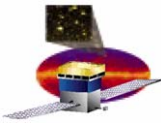| Key:	
	Incremental release (only new requirements tested)
	Major release (all requirements satisfied to date tested)

FOS JIRA issues (as of 10/3)

Package	Issues opened since 7/30	Issues closed since 7/30	Total # of issues currently open
Core	65	235	40
Monitor: FASTcopy	0	2	3
Monitor: Logging	3	5	3
Ops Facility	11	12	1
Packages & Installers	9	15	1
Trending: Calibration	0	1	3
Trending: Telemetry	0	2	3
LAT T&C	2	2	2
Totals	90	273	56

ETE3 Test Status

❑ **Status of NPs and PROCs**

  – **NP development complete**

  – **PROC development complete**

  – **14 PROCs have been run on the testbed this week**

    • **Includes 6 PROCs already tested in ETE2 but needed modifications due to errors or enhancements**

❑ **LAT Activities Summary**

  – **LAT Fast Turn On by the MOC, followed by setting up the HV biases**

  – **Physics Acquisition Runs**

    • **File Management Activities, including File Upload, Memory & Diagnostic commands, and LTC Operations will be performed during these runs**

  – **LCI Calibration Runs**

  – **One TOO Observation (with TOO Cancel)**

  – **3 LAT-initiated GRBs using the on-board GRB Simulation Package**

  – **Detection of GBM-triggered GRBs**

  – **LAT Power Down, followed by a Load Shed by the MOC**

  – **55 PROCs to be exercised (some already verified in previous ETEs)**

Current Developments in Science Ops

- **ISOC Ops Sim 1: at SLAC October 8-12 ("Oktobertest")**
  - **70+ attendees are registered including 20+ from LAT collaborating institutions**
  - **Preparations have been intense in order to make this a useful exercise –a realistic test of our plans for operations**
- **Will include training of prospective Duty Scientists and Shift Coordinators for the Operations aspects of Science Operations, including participation in mission planning with FO**
  - **Shift logs, transient sources, hardware anomalies, CCBs**
- **The Level 1 pipeline (reconstruction, classification, and monitoring aspects) will be exercised in real time during the Ops Sim; the ASP pipeline will be fed L1 products as well**

Operations Simulation 1 (cont)

❑ **The Ops Sim will also feature 16 orbits of the most realistic simulated data sets we have made to date**

❑ **The configuration changes and observation patterns are as planned for the L&EO, including calibrations, although compressed in time**

 – **The analysis plans include all L&EO issues within scope of the data set**

L&EO Simulations Table

Orbit #	Description	Obs Mode	Start and Stop times	SAA Def.	Input Spec.	Filter	Config	Calib	Job Opt.	Run Gen.	Run Ver.
1	initial configuration with conservative thresholds	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
2	nominal pre-launch configuration and a misconfigured CAL threshold	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
3	nominal pre-launch configuration with correct thresholds	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
4	high background rates and nominal pre-launch configuration	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
5	first nominal on-orbit configuration with tolerable rates	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
6	thresholds determination on-orbit (CAL and ACD together) Low setting	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
7	thresholds determination on-orbit (CAL and ACD together) Nominal setting	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
8	thresholds determination on-orbit (CAL and ACD together) High setting	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
9-12	nominal on-orbit configuration with calibrated thresholds, Vela and AGN flare	pointed obs		✅	✅	✅	✅	✅	💡	❌	❌
13	nominal on-orbit configuration with calibrated thresholds	sky-survey		✅	💡	✅	✅	✅	💡	❌	❌
14-15	Subtle problem related to instrument configuration (to be discovered by people on shift)	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌
16	final nominal configuration on-orbit	sky-survey		✅	✅	✅	✅	✅	💡	❌	❌

Other SO news

- ❑ **The geomagnetic field model for Gleam has been updated (M. Ackermann) to permit more realistic estimates of the particle background rates at low geomagnetic latitudes**

- ❑ **A particle background model for the trapped radiation in the SAA has also been implemented, for the first time in our simulations (M. Ackermann)**
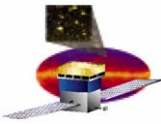

Proton flux E > 20 MeV

Initial SAA perimeter for Ops Sim

N.B.: log scale
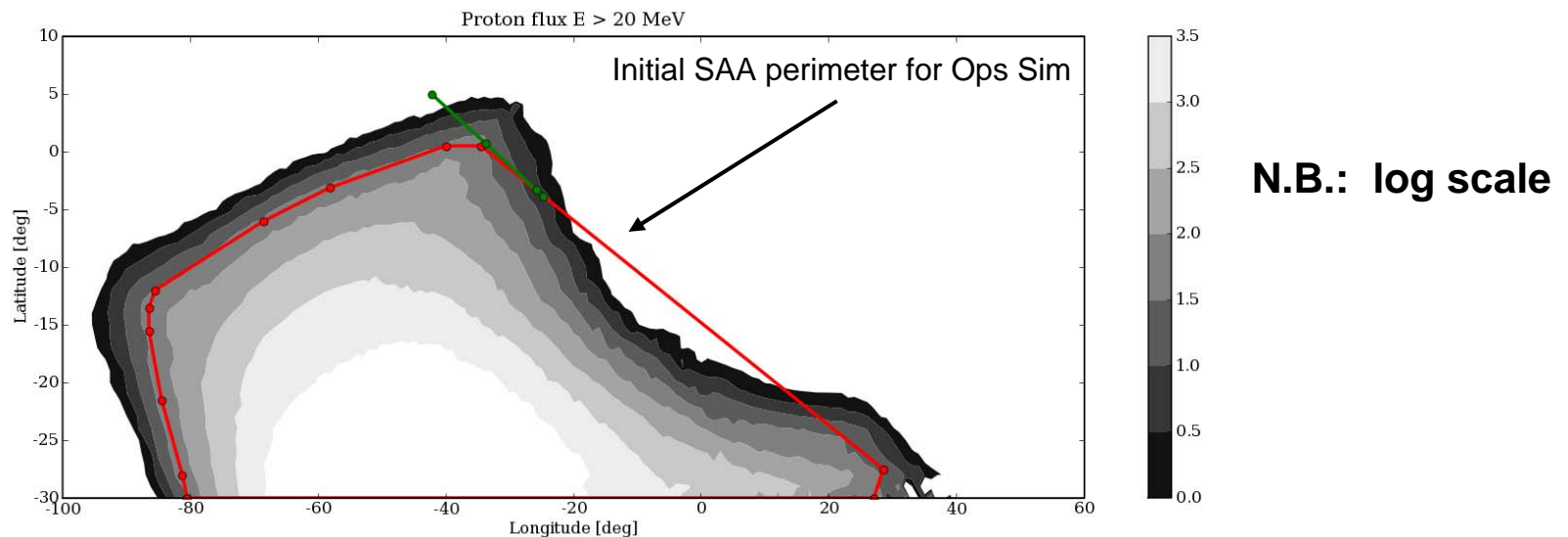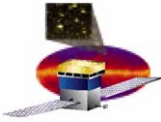
SAS Status: Service Challenge

❑ **Service Challenge Work**

- **55 day run main processing completed**
  - **a redo of the 55 day run to original specs (with ARRs)**
  - **Finishing up the FITS file production and release to data servers**
    - **Bulk of generation done in 24 hours (cf 1 week for DC2!)**
- **GlastRelease v12 series underway**
  - **Improvements to ACD geometry, digi, recon**
  - **In use for OktoberTest sims**
- **Tremendous focus on input orbit sims for OktoberTest**
  - **16 orbits, all with different configurations**
  - **Full background + sky sim with Level 0 output**
  - **~40,000 batch jobs; ~15 failures total**
  - **Good opportunity to find (and excise) all linkages to MC in recon of data**
- **Now preparing for the Big Run - 1 orbit year**
  - **Final update to ACD geometry (trapezoidal side tiles)**
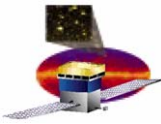 - **Infrastructure: event collections and xrootd**

SAS: Sundry Items

- ❑ **Our 400 cores are being put to good use**
  - – **Peaked at 750 (extra capacity in batch farm)**
- ❑ **Data access tools being configured**
  - – **Data Catalogue, LAT Data & Astro Servers**
  - – **Tighter connection of Catalogue and Skimmer**
  - – **Web tools for OktoberTest in good shape (we think!)**
- ❑ **Xrootd**
  - – **Working on devoting all new disk to xrootd**
    - • **Will load balance disk usage**
    - • **Tape archive**
    - • **Met with key developers**
- ❑ **Pipeline2 @ Lyon**
  - – **In final stages of preparation**
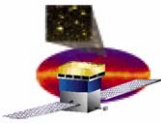 - – **Expect to launch first test task in next few days!**
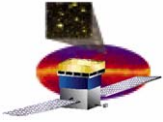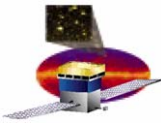
Backup Slides

LAT Configuration CCB Charter

- ❑ **LAT configuration will be controlled within the LAT CCB framework**

- ❑ **Serves as entry point for input from science community (SOOG and GSSC) regarding intent of LAT onboard configurations**

- ❑ **Approve intent of proposed changes of onboard configuration for various operational scenarios**

- ❑ **Define general guidelines for testing required for various classes of changes**

- ❑ **Make implementation decisions for approved changes in cases where implementer requires clarification**

CCB Members

❑ **CCB Chair: ISOC Manager**

❑ **Approval Expected:**
  – **LAT Configurator**
  – **LAT Commissioner (thru L+60D)**
  – **Science Ops**
  – **Flight Ops/FSW**
  – **Deputy PI**
  – **Systems Engineering (thru L+60D)**

❑ **Approval as needed/optional:**
  – **I&T/Online**
  – **LAT Project Manager (thru L+60D)**
  – **SOOG/Deputy PI**
  – **LAT Analysis Coordinator**
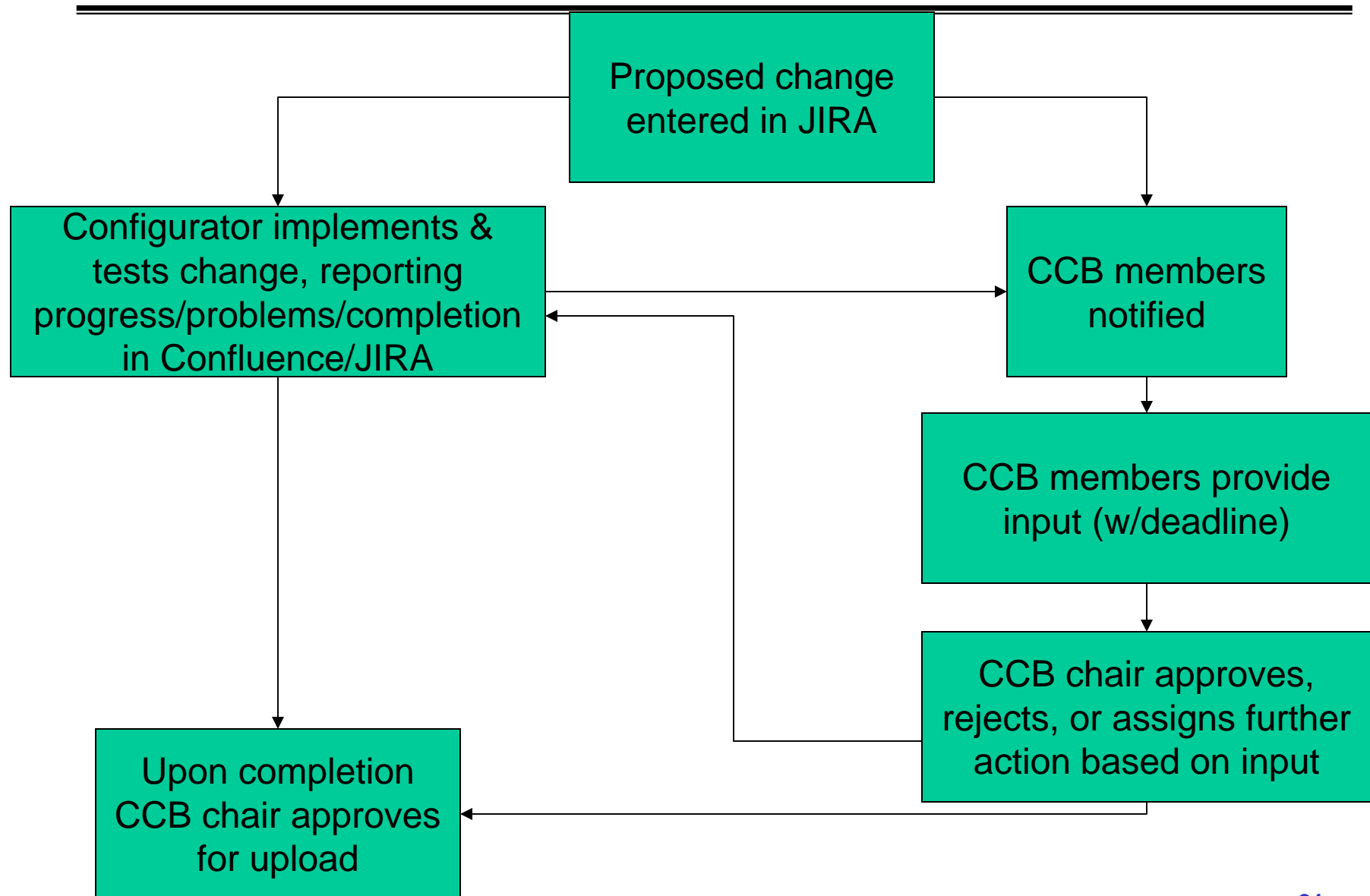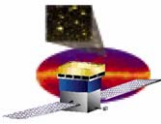 – **SAS**
  – **LAT Calib&Analysis**

Controlled Items

- ❑ **A subset of the FSW CDM files (*_DBs) that contain science configuration data (pedestals, gains, filter configuration, GRB algorithm parameters, etc.)**
- ❑ **Application configuration files for housekeeping, thermal control, and charge injection**
- ❑ **Instrument configuration files: LATC, LATC ignore**
- ❑ **RTS command blocks**
- ❑ **EEPROM management strategy (e.g., when to delete obsolete files)**

- ❑ **Note:**
  - – **In the prelaunch era after B1-0-2 is uploaded**
    - • **The Onboard Configuration CCB approves uploads of controlled items to the EEPROM**
    - • **Uploads of controlled items to RAM for testing purposes remains under the purview of the LAT I&T team**
  - – **Post-launch, upload of controlled items to RAM will also require approval by the Onboard Configuration CCB**

Nominal CCB Process

Proposed change entered in JIRA

Configurator implements & tests change, reporting progress/problems/completion in Confluence/JIRA

CCB members notified

CCB members provide input (w/deadline)

CCB chair approves, rejects, or assigns further action based on input

Upon completion CCB chair approves for upload

Links

- **Confluence Onboard Configuration page:**
  http://confluence.slac.stanford.edu/display/ISOC/Onboard+Configuration

- **Confluence Onboard Configuration CCB page:**
  http://confluence.slac.stanford.edu/display/ISOC/Onboard+Configuration+CCB

- **Onboard Configuration JIRA project:**
  https://jira.slac.stanford.edu/browse/OBCONF