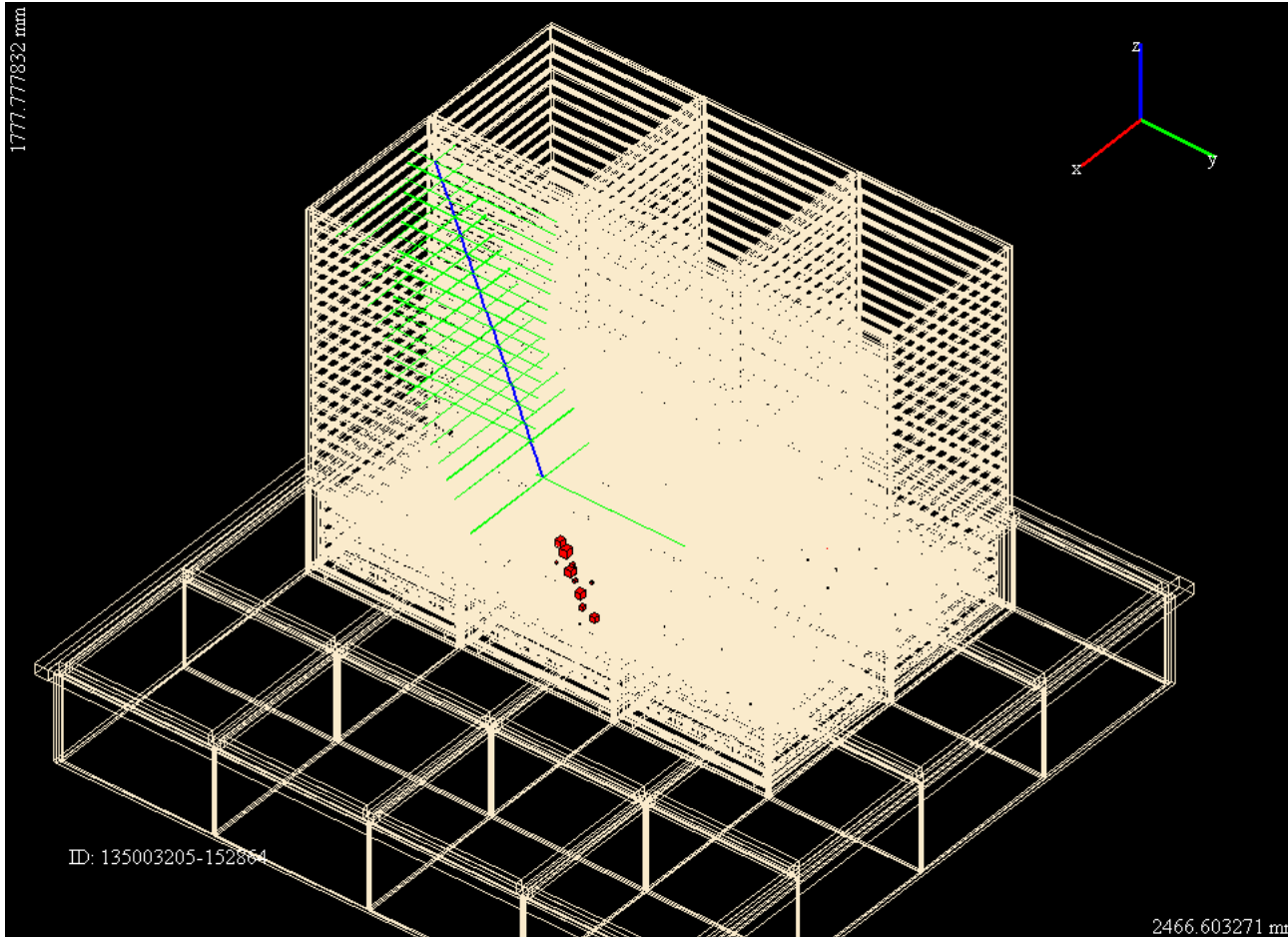


Overview of Data Taking

aka the “Don't Shoot the Messenger” talk

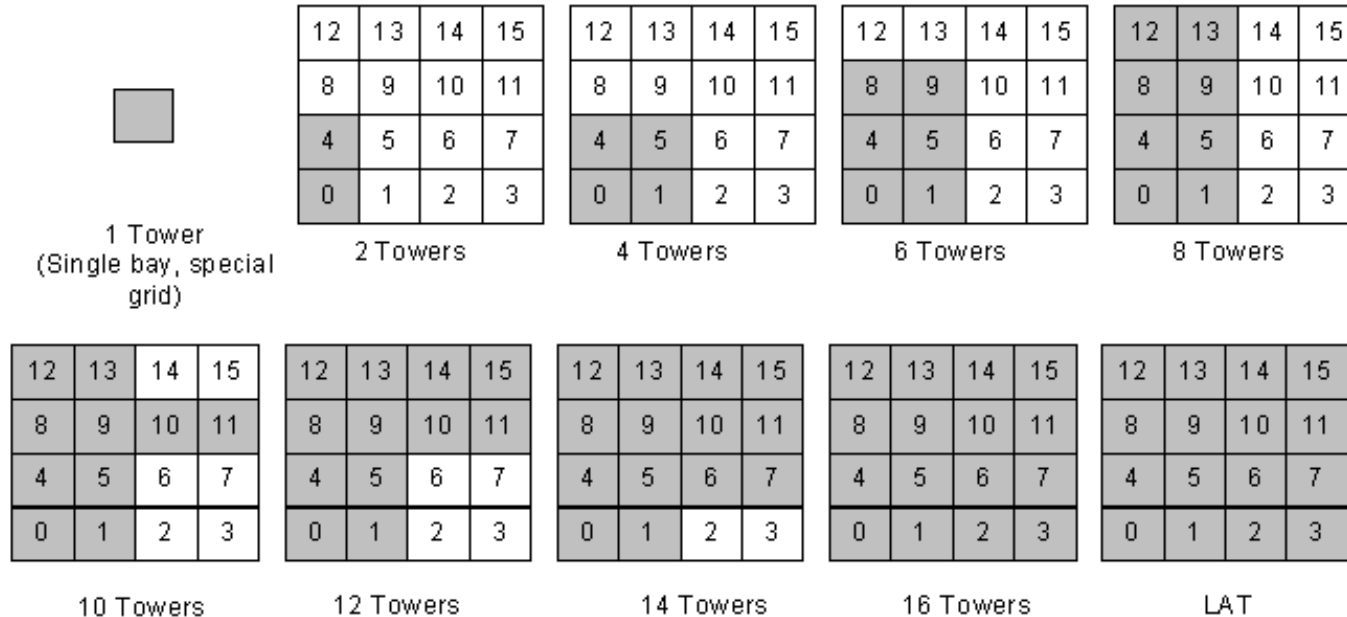


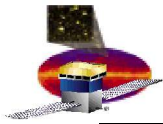
Anders W. Borgland

Science
Verification,
Analysis and
Calibrations

Towers In The Grid

- **Workshop 3:**
 - Preliminary data from the first integrated tower!
- **Since then:**
 - 1 tower data
 - 2 tower data
 - 4 tower data
 - 6 tower data

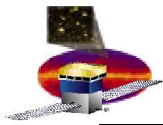




Overview

- **General data taking overview**
- **Where to find:**
 - **Data**
 - **Monte Carlo**
- **Run configurations:**
 - **What does 1-1, B-13 etc mean?**
- **Data quality:**
 - **What you should know about the data quality**
 - **Calibration issues**
 - **Software bugs**
- **Warning!**
 - **Will talk a lot about problems**
 - **To make you aware of them!**
 - **Ignorance is not bliss!**
 - **But don't despair: We have lots of high quality data!**

The Center of the (Data Taking) Universe



LAT Instrument Analysis Group - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www-glast.slac.stanford.edu/IntegrationTest/SVAC/Instrument_Analysis/Instrument_Analysis.html

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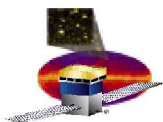
LAT Instrument Analysis Group

Meetings	Finding Data	Data Analysis
Weekly Friday Meetings Workshops 1, 2, 3, 4, 5 SVAC JIRA CCB Contact info	Runs Database Trigger runs NEW! How to get data - End2End runs: 1, 2, 3, 4 towers Register Configuration Data quality reports Housekeeping data Hardware Information Tower/Bay location Info (excel) NEW! EM versions in the pipeline MC Simulated Data Useful things to know about the data quality	Data Analysis Primer (html) (pdf) How to Look at Data Merit Ntuple Description SVAC Ntuple Description How to filter events Using the Event Display Mapping from physical space to electronic space Run NtupleCompare Data Analysis Examples
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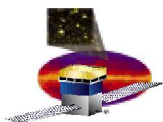
If you can't find it here, let us know!

Done



What Kind of Data Do We Take?

- **End2End runs:**
 - 1 and 2 towers
 - Series of 1h runs with different configurations
 - Base line run – flight settings (End2End ID 1-1)
 - Change one parameter at a time
 - Read out TKR from right (left) side only (2-7,2-6)
 - Lower TKR DAC settings (2-3)
 - Overlay high rate pulse generator (N-N)
 - Only CAL LO allowed to open the trigger window (3-2)
 -
- **VDG runs:**
 - 1 tower only
 - Lots of different configurations



SVAC Data Runs

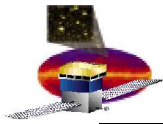
- **SVAC data runs:**
 - **Every time we add new towers in the grid**
 - **20h of data taking**
 - **Three types of runs:**
 - **B-2: Baseline, no TEM diagnostics (4h)**
 - **B-10: 4-range readout and high energy muon gain (15h)**
 - **B-13: Like B-10, but no CAL zero-suppression (1h)**
- **This data is for you!**
 - **Is this what you want?**
 - **More? Less?**
 - **Let us know!**
 - **Have you looked at it?**
- **Every time someone looks at the data we find problems and 'features':
We depend on you for data analysis and instrument characterisation!**

Where to Find Data?

LAT Instrument Analysis Group

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Done

Runs Database

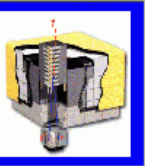
Runs Database cont'

Shift Run Info - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www.slac.stanford.edu/cgi-wrap/eLog.pl/list

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GLAST Shift Logbook Shift Run Info

[GLAST Home](#) [Help](#) [Shift Index](#) [List Runs](#)

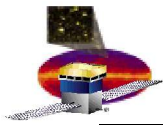
Run Range: (e.g. 2500-2550 2567)
Run Date Range: taken from to (use format YYYY-MM-DD)
Duration (s): (e.g. > 1000) **No. of events:** (e.g. > 1000)
Completion status: **Particle Type:**
Instrument Type: **Orientation:**
I&T Test ID/Config ID: (e.g. 0/1) **example** **No. of towers:** (e.g. 1)
TKR Serial No.: **example** **CAL Serial No.:** **example**
Script Name: (e.g. calf_mu*) **Schema file:** (e.g. em2cal*)
Suite Name: (e.g. LPT)
Suite Date Range: taken from to (use format YYYY-MM-DD)
FITS file: (e.g. *2805*)
Site: **Phase:**

Searchable

Run information

Run/Shift Report	Status	E2E ID	Serial No. (TEM ID)	Test Script Name	Test Output	SVAC Reports	Events / Errors	Duration (s)	Root Files	Start(GMT)	Particle	Orientation
135003760 Shift Summary	PASSED	B/10	(TkrFM2,FM103,1) (TkrFM1,FM102,5) (TkrFMA,FM104,0) (TkrFM3,FM106,9) (TkrFMB,FM105,4) (TkrFM5,FM107,8)	end2end	Report Dir	digi recon config	372131/51	1748	digi recon merit svac	2005-07-08 21:02:49	Cosmics	Vertical

Done



Runs Database: Run Information

Run status

Bay positions

SVAC reports

Link to Root Files

Orientation

Run/Shift Report	Status	E2E ID	Serial No. (TEM ID)	Test Script Name	Test Output	SVAC Reports	Events / Errors	Duration (s)	Root Files	Start(GMT)	Particle	Orientation
135003760 Shift Summary	PASSED	B/10	(TkrFM2,FM103,1) (TkrFM1,FM102,5) (TkrFMA,FM104,0) (TkrFM3,FM106,9) (TkrFMB,FM105,4) (TkrFM5,FM107,8)	end2end	Report Dir	digi recon config	372131/51	1748	digi recon merit svac	2005-07-08 21:02:49	Cosmics	Vertical

Link to LogBook

End2End ID

Number of events, duration

Particle type

Online report and configuration files

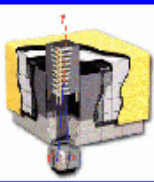
Runs Database: Root Files

Shift Run Info - Mozilla Firefox

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http://www.slac.stanford.edu/cgi-wrap/eLog.pl/list

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GLAST Shift Logbook Shift Run Info

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Run Range: (e.g. 2500-2550 2567)
Run Date Range: taken from to (use format YYYY-MM-DD)
Duration (s): (e.g. > 1000) **No. of events:** (e.g. > 1000)
Completion status: **Particle Type:**
Instrument Type: **Orientation:**
I&T Test ID/Config ID: (e.g. 0/1) [example](#) **No. of towers:** (e.g. 1)
TKR Serial No.: [example](#) **CAL Serial No.:** [example](#)
Script Name: (e.g. calf_mu*) **Schema file:** (e.g. em2cal*)
Suite Name: (e.g. LPT)
Suite Date Range: taken from to (use format YYYY-MM-DD)
FITS file: (e.g. *2805*)
Site: **Phase:**

Done

Root Files: Where Art Thou?

Complete Unix path to all Root files



The screenshot shows a Mozilla Firefox browser window titled "Untitled Document - Mozilla Firefox". The address bar contains the URL <http://www.slac.stanford.edu/cgi-wrap/eLog.pl/list>. The browser displays a list of root files organized into four categories:

- Digi root files**
`/nfs/fam/g/glast/u16/Integration/rootData/135003760/v5r0608p1/grRoot/digitization-v3r1p23_135003760_digi_DIGL.root`
- Recon root files**
`/nfs/fam/g/glast/u16/Integration/rootData/135003760/v5r0608p1/calib-v1r0/grRoot/recon-v3r1p23_135003760_recon_RECON.root`
- Merit root files**
`/nfs/fam/g/glast/u16/Integration/rootData/135003760/v5r0608p1/calib-v1r0/grRoot/recon-v3r1p23_135003760_merit_merit.root`
- SVAC root files**
`/nfs/fam/g/glast/u16/Integration/rootData/135003760/v5r0608p1/calib-v1r0/svacTuple/emRootv0r0/svacTuple-v3r1p23_135003760_svac_svac.root`

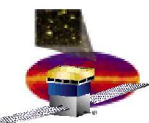
The status bar at the bottom of the browser window shows "Done".



All You Want Is Only One Click Away

- **Runs Database:**
 - **Great for searching**
 - **Learn to use it!**
- **But to make your life even easier**
- **Main IA page:**
 - **Links to complete lists of End2End and SVAC data runs**
 - **Run numbers**
 - **Run statistics**
 - **Configuration summary**

1-Click Run Information



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http://www-glast.slac.stanford.edu/IntegrationTest/SVAC/Instrument_Analysis/Instrument_Analysis.html

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Done

Summary Runs Lists

Adobe Reader - 4tower_e2eRuns-2.pdf

File Edit View Document Tools Window Help

GLAST LAT Project IA Meeting – June 10,2005

Summary of 4 tower data

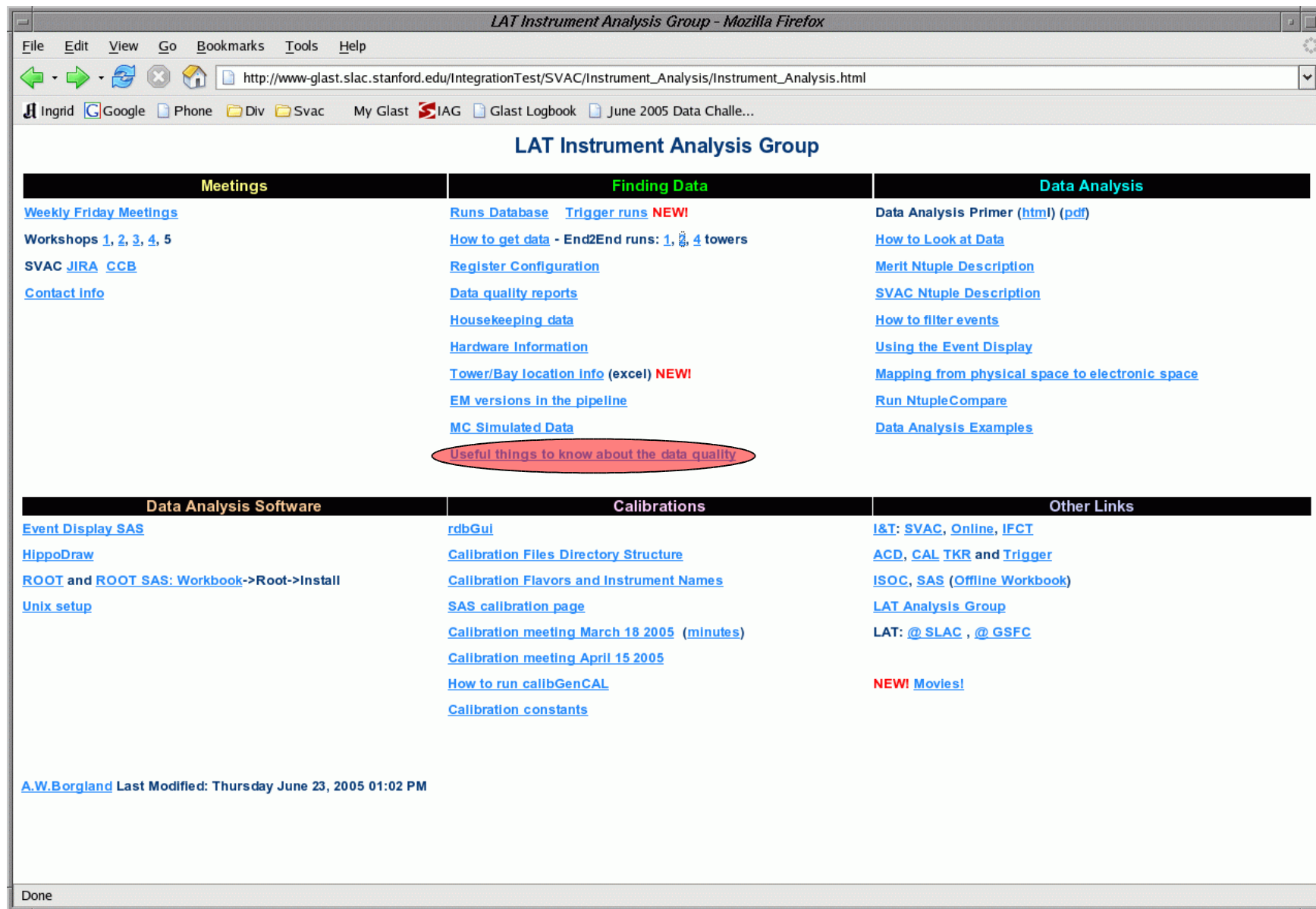
E2E ID	Run ID	Events	Time	Trigger Rate	Errors	Description	TEM Diag	1 track (%)	Event Size (Bytes)	Raw (MBytes)	Digi (MBytes)	Recon (GBytes)	Digi/Raw	Recon/Digi
B	10	135002769	61997	452	137.2	6 CAL High Energy muon gain, four range readout	ON	73	2436	144	174	0.767	1.21	4.5
	10	135002770	61976	451	137.4	9 CAL High Energy muon gain, four range readout	ON	73	2436	144	174	0.768	1.21	4.5
	10	135002773	61975	455	136.2	6 CAL High Energy muon gain, four range readout	ON	73	2436	144	174	0.769	1.21	4.5
	10	135002774	61987	452	137.1	5 CAL High Energy muon gain, four range readout	ON	73	2436	144	174	0.769	1.21	4.5
	10	135002775	61987	450	137.7	5 CAL High Energy muon gain, four range readout	ON	73	2436	144	174	0.771	1.21	4.5
	10	135002776	62003	452	137.2	5 CAL High Energy muon gain, four range readout	ON	73	2435	144	175	0.767	1.22	4.5
	10	135002777	61980	452	137.1	5 CAL High Energy muon gain, four range readout	ON	73	2436	144	174	0.77	1.21	4.5
	10	135002778	61996	451	137.5	4 CAL High Energy muon gain, four range readout	ON	74	2436	144	174	0.768	1.21	4.5
	10	135002779	61992	455	136.2	2 CAL High Energy muon gain, four range readout	ON	74	2436	144	174	0.769	1.21	4.5
	10	135002780	61443	447	137.5	5 CAL High Energy muon gain, four range readout	ON	73	2440	143	173	0.764	1.21	4.5
	13	135002719	22359	175	127.8	4 Zero suppression OFF, four range readout	ON	75	6706	143	192	0.274	1.34	1.5
	13	135002720	22360	175	127.8	0 Zero suppression OFF, four range readout	ON	75	6706	143	192	0.274	1.34	1.5
	13	135002721	22356	177	126.3	2 Zero suppression OFF, four range readout	ON	75	6707	143	192	0.27	1.34	1.4
	13	135002722	22358	175	127.8	1 Zero suppression OFF, four range readout	ON	75	6707	143	192	0.27	1.34	1.4
	13	135002723	22360	174	128.5	1 Zero suppression OFF, four range readout	ON	74	6706	143	192	0.274	1.34	1.5
	13	135002724	22360	175	127.8	2 Zero suppression OFF, four range readout	ON	75	6706	143	191	0.273	1.34	1.5
	13	135002725	22358	174	128.5	2 Zero suppression OFF, four range readout	ON	74	6707	143	192	0.277	1.34	1.5
	13	135002726	22357	174	128.5	3 Zero suppression OFF, four range readout	ON	74	6707	143	192	0.278	1.34	1.5
	13	135002727	22360	178	125.6	2 Zero suppression OFF, four range readout	ON	75	6706	143	192	0.274	1.34	1.5
	13	135002728	22360	176	127.0	1 Zero suppression OFF, four range readout	ON	74	6706	143	192	0.274	1.34	1.5
	13	135002729	22360	174	128.5	2 Zero suppression OFF, four range readout	ON	75	6706	143	192	0.274	1.34	1.5
	13	135002730	22359	175	127.8	1 Zero suppression OFF, four range readout	ON	74	6706	143	192	0.276	1.34	1.5
	13	135002731	22360	175	127.8	3 Zero suppression OFF, four range readout	ON	75	6706	143	192	0.275	1.34	1.5
	13	135002732	22362	175	127.8	2 Zero suppression OFF, four range readout	ON	75	6705	143	192	0.276	1.34	1.5
	13	135002733	22361	175	127.8	1 Zero suppression OFF, four range readout	ON	75	6706	143	192	0.273	1.34	1.5
	13	135002734	22359	174	128.5	3 Zero suppression OFF, four range readout	ON	75	6706	143	192	0.273	1.34	1.5
	13	135002735	22359	174	128.5	6 Zero suppression OFF, four range readout	ON	75	6706	143	192	0.273	1.34	1.5
	13	135002736	22358	177	126.3	2 Zero suppression OFF, four range readout	ON	74	6707	143	192	0.275	1.34	1.5
	13	135002337	22359	174	128.5	0 Zero suppression OFF, four range readout	ON	74	6706	143	192	0.275	1.34	1.5
	13	135002338	22357	176	127.0	2 Zero suppression OFF, four range readout	ON	74	6707	143	192	0.278	1.34	1.5
	13	135002339	17655	138	127.9	1 Zero suppression OFF, four range readout	ON	75	6711	113	151	0.214	1.34	1.5

We would like subsystems to please start looking at B/10 runs to evaluate whether statistics are adequate

E. do Couto e Silva 1

123% 1 of 1

Useful Things To Know About The Data



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http://www-glast.slac.stanford.edu/IntegrationTest/SVAC/Instrument_Analysis/Instrument_Analysis.html

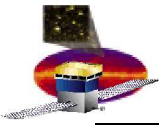
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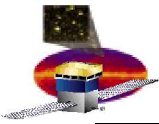
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Done



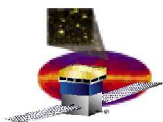
Calibrations and Data Taking

- When we add towers in the grid:
 - Calibrate TKR
 - Done both outside and inside the grid
 - Calibrate the **new CALs**:
 - In the grid
 - Previously installed CALs are not recalibrated
 - Take short test runs to verify calibrations and configurations
 - Take End2End/SVAC data runs
- All the End2End and SVAC data runs:
 - **Calibrated!**



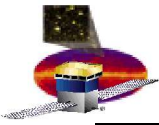
One Tower Data

- No major problems with the data!
- Trigger window:
 - 5 ticks wide
 - 1 tick is 50 ns
- Event ID:
 - Rolls over at 131072
 - Multiple events may have the **same** event ID



Two Tower Data

- No major problems with the data!
- Trigger window:
 - **Increased!**
 - **12 ticks wide**
 - **Can be seen with GemCondArrivalTime variables**
- Joy of multiple towers!
 - Which tower triggered?
 - Use `GemTkrVector[iTower]`, `GemCalLeVector[iTower]` etc
 - Can not know which tower opened the trigger window!
- Event ID:
 - **Unique!**
 - Now 32 bits
 - No more roll overs at 131072
 - **Initialization bug:**
 - First event may have event ID equal to 131073
 - Coming from the Online side so reprocessing will not help



Four Tower Data

- The easy life was over :-(
 - **The missing trigger word:**
 - **Procedural effect:**
 - Power on the GASU when set to external clock
 - » Trigger word is missing
 - We don't do that anymore
 - **Affected:**
 - All B-2 runs
 - Most of the B-10 runs
 - All B-13 runs are OK!
 - **Runs list from main IA page contains the runs you can use.**
- Event ID initialization bug is still there.

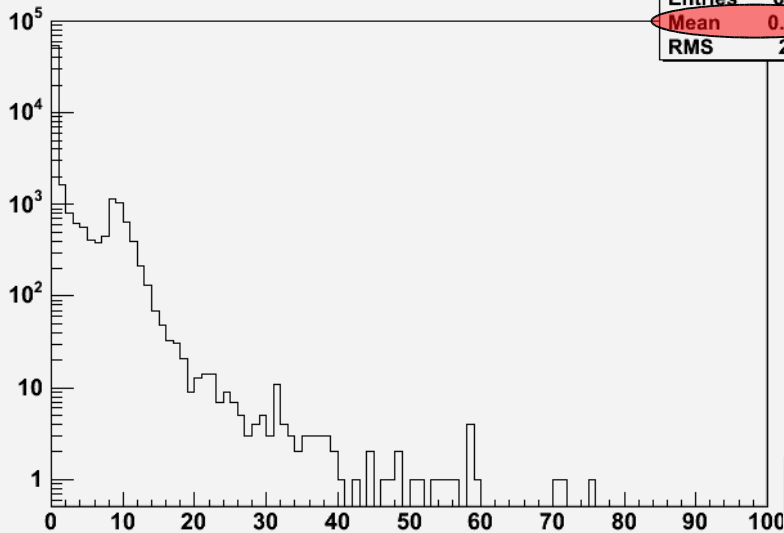


Four Tower Data: CAL threshold Settings

- Two problems with the CAL online threshold settings:
 - Only affected the two new CALs:
 - FM103 and FM 102
 - Grid positions 1 and 5
 - Affects the **online** settings!
 - CAL LO 100 MeV settings not correct:
 - Set to one fixed value
 - Chosen to be a little on the high side
 - Not a big problem – just be aware of it
 - LAC (zero-suppression) thresholds not correct:
 - Loop bug with same thresholds repeated in several layers
 - Some thresholds too low:
 - » Read out way too many xtals
 - » CALs with correct settings: 1 xtal/event
 - » CALs with incorrect settings: 68 and 44 xtals/event

Busy Shipping CAL Data

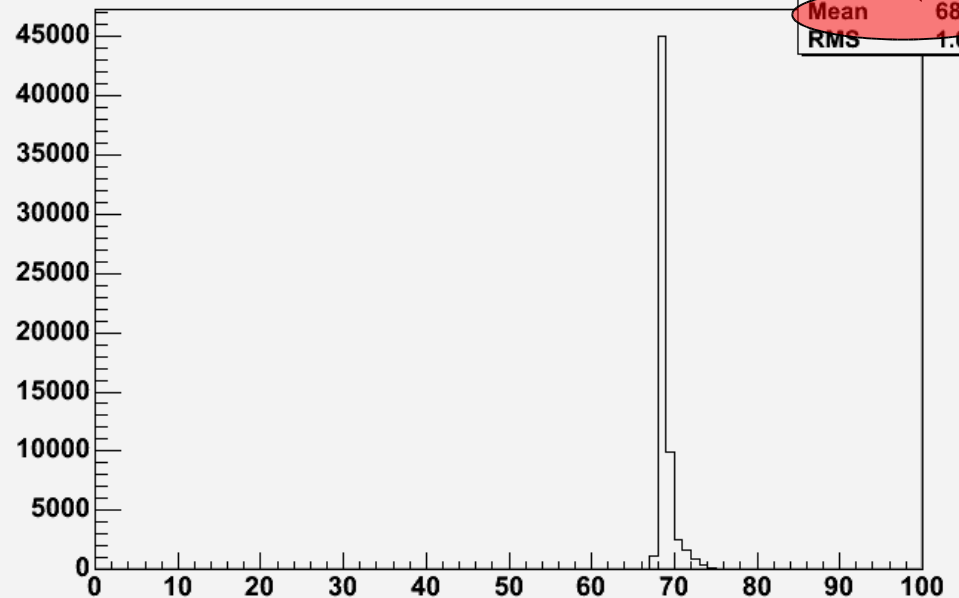
Number of CAL digis tower 0 - 4 tower B10

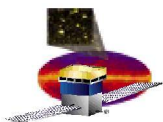


Tower 0

Tower 1

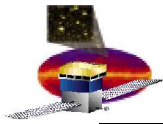
Number of CAL digis tower 1 - 4 tower B10





CAL Digi # CAL Recon

- We read out many more xtals than before:
 - You will see this in digi.root
- In CalRecon:
 - Energy cut!
 - Most of the extra (noise) xtals are rejected:
 - Only 10% increase
 - This is what you will see in the ntuples.
- But of course:
 - It seriously affects:
 - Event sizes
 - Dead time
- And of course
 - These were problems with the online settings
 - Recalibration will not fix this for this data!



Four Tower Data: 1-Shot Trigger

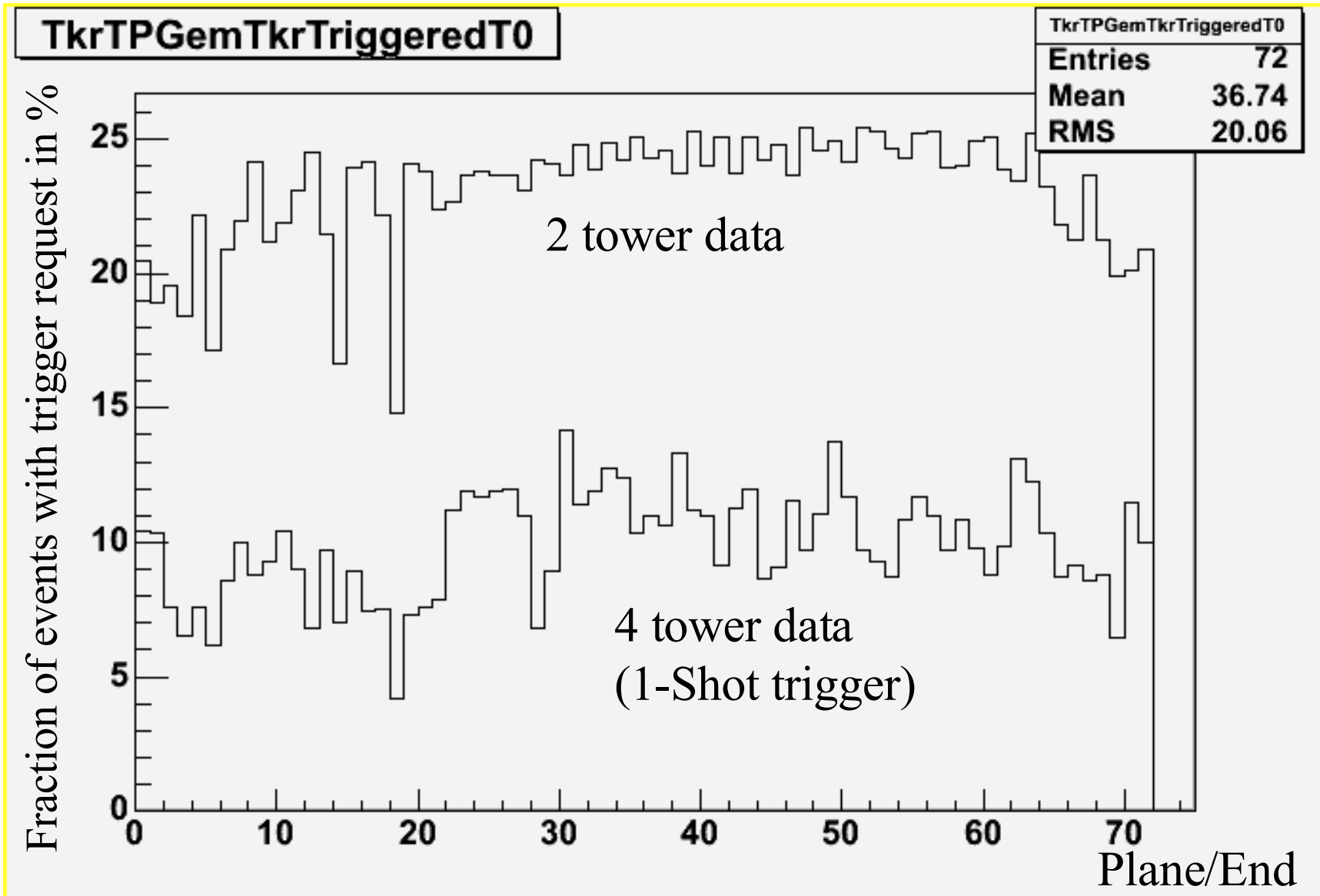
- We enabled the 1-shot trigger!
 - **TKR trigger requests stay on for fixed time:**
 - Independent of pulse as long as it goes above threshold
 - Set to 700 ns
 - Much shorter than the 'natural' trigger time
 - **See Steve's presentation in the May 25 Trigger meeting for details:**
 - Should not change anything on ground
 - » When set to 700 ns
 - Main justification is because of heavy ions saturation in TKR on orbit
 - Other issues – see Steve's talk
- Unfortunately we did not take a 4 tower run with the old TKR trigger:
 - **Makes comparisons between 1-shot and old trigger more difficult**
- 1-shot trigger:
 - **Default trigger for all subsequent data taking on ground and on orbit!**



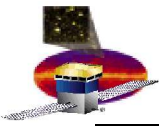
1-Shot Trigger and TEM Diagnostics

- TEM diagnostics should always be used with care:
 - Use them with care if at all!
 - Understand to what level they can be used:
 - Work in progress by Electronics/DAQ Hardware group
 - Not available on orbit
 - This is why the baseline runs (1-1, B-2) are without the TEM diagnostics
- In 4 tower data:
 - TKR trigger requests per plane down by a factor 2
 - As seen by the TEM diagnostics
 - 3-in-a-row combinations down by a factor 10
 - Again, as seen by the TEM diagnostics
- Latching efficiency of TEM diagnostics:
 - Affected by timing changes when using 1-shot trigger and 700 ns
 - 'Understood'/Work in progress by the trigger group.
- NB!
 - Trigger itself is OK. This only affects the (TKR) TEM diagnostics!

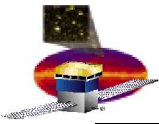
Four Tower Data and TEM Diagnostics



Six Tower Data

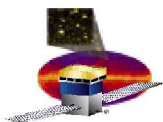


Thank you Eric
for the cartoon!



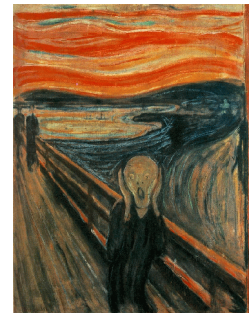
Six Tower Data

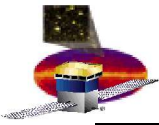
- Remember what I said about not shooting the messenger
- Changes with respect to 4 tower data:
 - **Enabled a 10 Hz periodic trigger**
 - Great for having an unbiased sample not related to detector occupancy/activity
 - We do not use any special readout of these event:
 - » i.e. They are read out like any other event
 - » So no 4-range, non-zero suppressed read out for example
 - **We now sample the TEM diagnostics 6 ticks (300 ns) earlier than before:**
 - Trigger study show we should recover most of the TEM diagnostics
 - Haven't had time to verify this yet.
- We had lots of crashes when making digi files for these runs:
 - **Investigated by Heather and Ric Claus**
 - **Really bad news**



Six Tower Data: Oh No

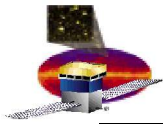
- **Configuration error!**
- Before the SVAC data runs:
 - We verify the different configurations:
 - CAL and TKR thresholds, Trigger delays etc
 - Registers that are 'close' to offline physics analysis
 - But we do not look at all the registers
- Some CAL GCCC FIFOs in towers 8 and 9 were misconfigured:
 - Increased probability of FIFO full
 - i.e. Dropped contributions
 - This was not properly recorded
- Affected all SVAC six tower data runs!
- We're looking into this right now, but
- **You can not trust the CAL data in the six tower runs!**





While We're At The Bad News

- CAL Calibrations for 4 and 6 towers:
 - You can only trust the lowest energy range!
 - i.e. If you see more than 1 GeV in a xtal do not look!
- TKR TOT calibrations:
 - The raw TOT is OK
 - This is what we have in the SVAC ntuple
 - The calibrated TOT for 2, 4 and 6 tower data should not be used!
- SVAC ntuple variable:
 - 'TkrNumClusters' incorrectly filled for 2 and 4 tower data
- We will fix these problems and reprocess the data in the very near future!



Monte Carlo

LAT Instrument Analysis Group - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www-glast.slac.stanford.edu/IntegrationTest/SVAC/Instrument_Analysis/Instrument_Analysis.html

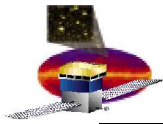
Ingrid Google Phone Div Svac My Glast IAG Glast Logbook June 2005 Data Challe...

LAT Instrument Analysis Group

Meetings	Finding Data	Data Analysis
Weekly Friday Meetings Workshops 1, 2, 3, 4, 5 SVAC JIRA CCB Contact info	Runs Database Trigger runs NEW! How to get data - End2End runs: 1, 2, 4 towers Register Configuration Data quality reports Housekeeping data Hardware Information Tower/Bay location info (excel) NEW! EM versions in the pipeline MC Simulated Data Useful things to know about the data quality	Data Analysis Primer (html) (pdf) How to Look at Data Merit Ntuple Description SVAC Ntuple Description How to filter events Using the Event Display Mapping from physical space to electronic space Run NtupleCompare Data Analysis Examples
Data Analysis Software	Calibrations	Other Links
Event Display SAS HippoDraw ROOT and ROOT SAS: Workbook->Root->Install Unix setup	rdbGui Calibration Files Directory Structure Calibration Flavors and Instrument Names SAS calibration page Calibration meeting March 18 2005 (minutes) Calibration meeting April 15 2005 How to run callbGenCAL Calibration constants	I&T: SVAC, Online, IFCT ACD, CAL TKR and Trigger ISOC, SAS (Offline Workbook) LAT Analysis Group LAT: @ SLAC , @ GSFC NEW! Movies!

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Done




Monte Carlo

Monte Carlo Simulated Data - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www-glast.slac.stanford.edu/IntegrationTest/SVAC/Instrument_Analysis/UsefulStuff/MC.html

Ingrid Google Phone Div Svac My Glast IAG Glast Logbook June 2005 Data Challe...



Monte Carlo Simulated Data

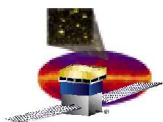
For all configurations there are two directories. The 'batch' directory contains all the individual files, including job options and log files. The main directory contains concatenated Merit, SVAC, digi, recon and mc root files. All MC samples are made with real calibration constants. Please make sure you use the same release for MC and data when making comparisons.

EngineeringModel v5r0608p1:
Six tower surface muons: Files can be found [here](#).
Six tower surface muons with new ToT parameters: Files can be found [here](#).
Six tower surface muons with new ToT parameters and no TKR noise: Files can be found [here](#).
Six tower surface muons with new ToT parameters and TKR noise set to 10^{-6} : Files can be found [here](#).
Four tower surface muons: Files can be found [here](#).
Two tower surface muons: Files can be found [here](#).
Two tower surface muons without any calibrations: Files can be found [here](#).
Two tower surface muons, new and experimental ToT parameters: Files can be found [here](#).
Two tower surface muons, new and experimental ToT parameters, no TKR noise hits: Files can be found [here](#).

EngineeringModel v4r060302p23:
Two tower surface muons: Files can be found [here](#).

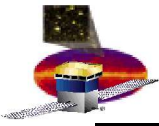
EngineeringModel v4r060302p18:
One tower surface muons: Files can be found [here](#).
One tower VDG: Files can be found [here](#).
Two tower surface muons: Files can be found [here](#).

[A.W.Borgland](#) Last Modified: Saturday July 09, 2005 09:50 PM



Summary

- I hope you now will be able to find all the information you need from the IA web pages!
 - But if you have questions you can always come and see us!
- Since the last Workshop we have taken:
 - 1 tower data
 - 2 tower data
 - 4 tower data
 - (6 tower data)
- Hopefully you now have a better understanding of
 - The data taking process
 - What kind of runs we have taken
 - The problems we have had
- We need feedback from you!
 - Are we taking the right kind of data?
 - Anything you would like?
- And to keep up with data taking and analysis, join us in the
 - **Weekly Friday Instrument Analysis meeting**



And

Dave Smith has been here at SLAC since last year as the local CAL expert.

He's now leaving us and going back to France.

He has been a great help for CAL related tasks, in particular the calibrations, and we will miss him a lot!!!!

Merci beaucoup!