



PPA Scientific Computing Applications – “Data Handling” group overview

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Who are we?

- **Dan Flath**
- **Karen Heidenreich**
- **Charlotte Hee**
- **Tony Johnson**
- **Max Turri**

- **Much of what I describe here has been done in collaboration with many others including:**
 - **Tom Glanzman, Warren Focke, Richard Dubois, Norman Graf, Jeremy McCormick, ...**



Fermi Pipeline and Web Tools

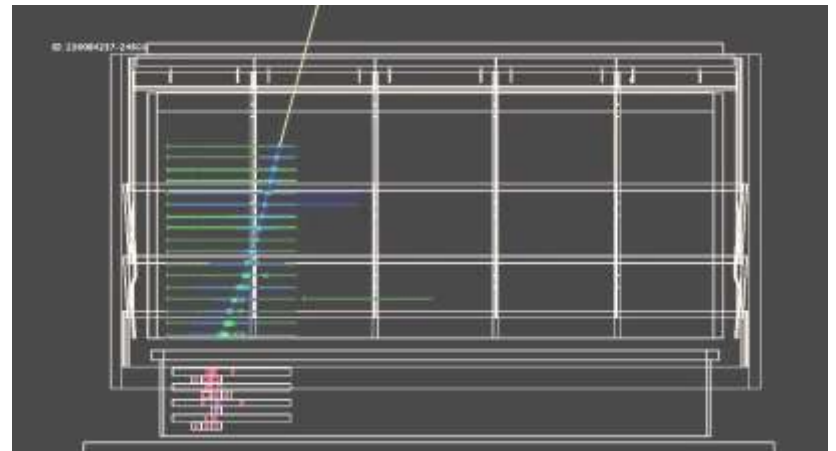
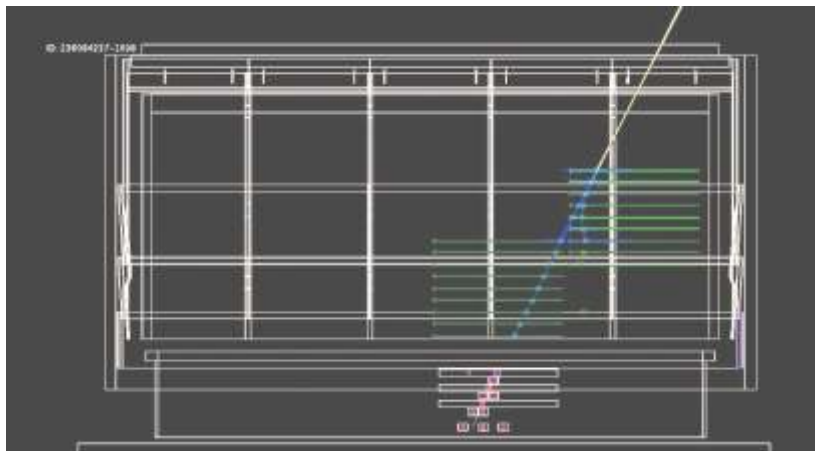
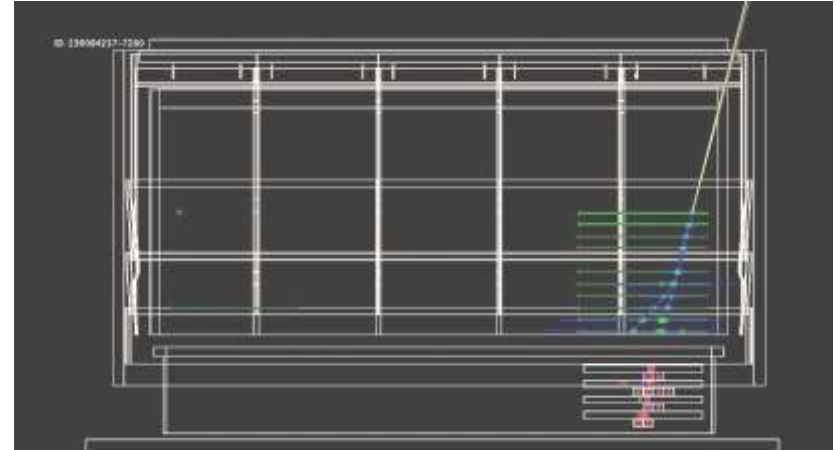
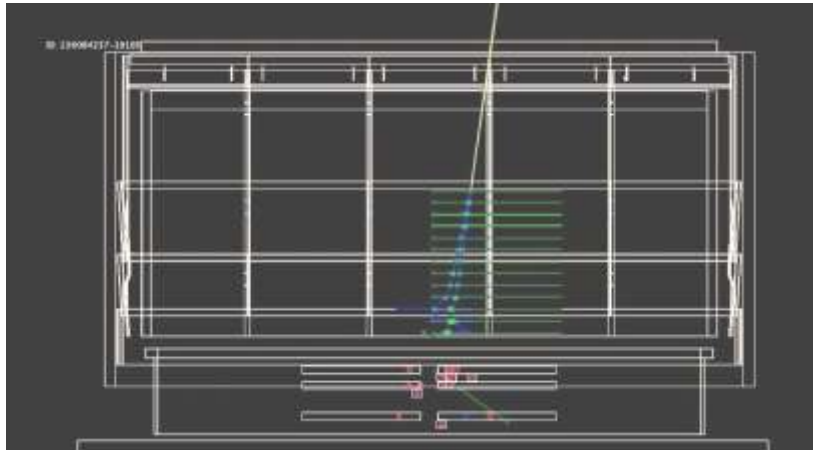


Launched 11 June 2008 – LAT activated 25 June





In Orbit: Single Events in the LAT

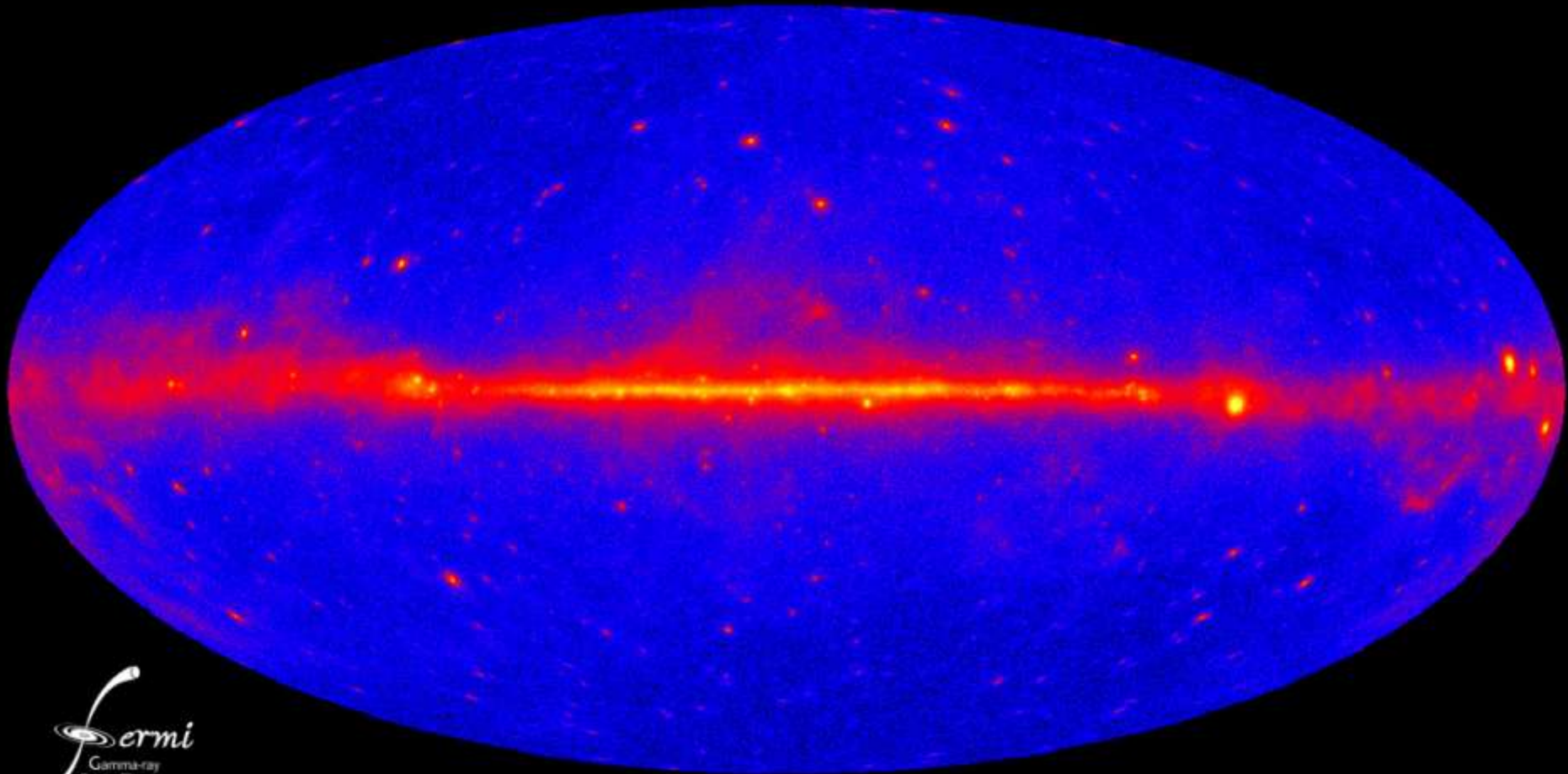


The green crosses show the detected positions of the charged particles, the blue lines show the reconstructed track trajectories, and the yellow line shows the candidate gamma-ray estimated direction. The red crosses show the detected energy depositions in the calorimeter.

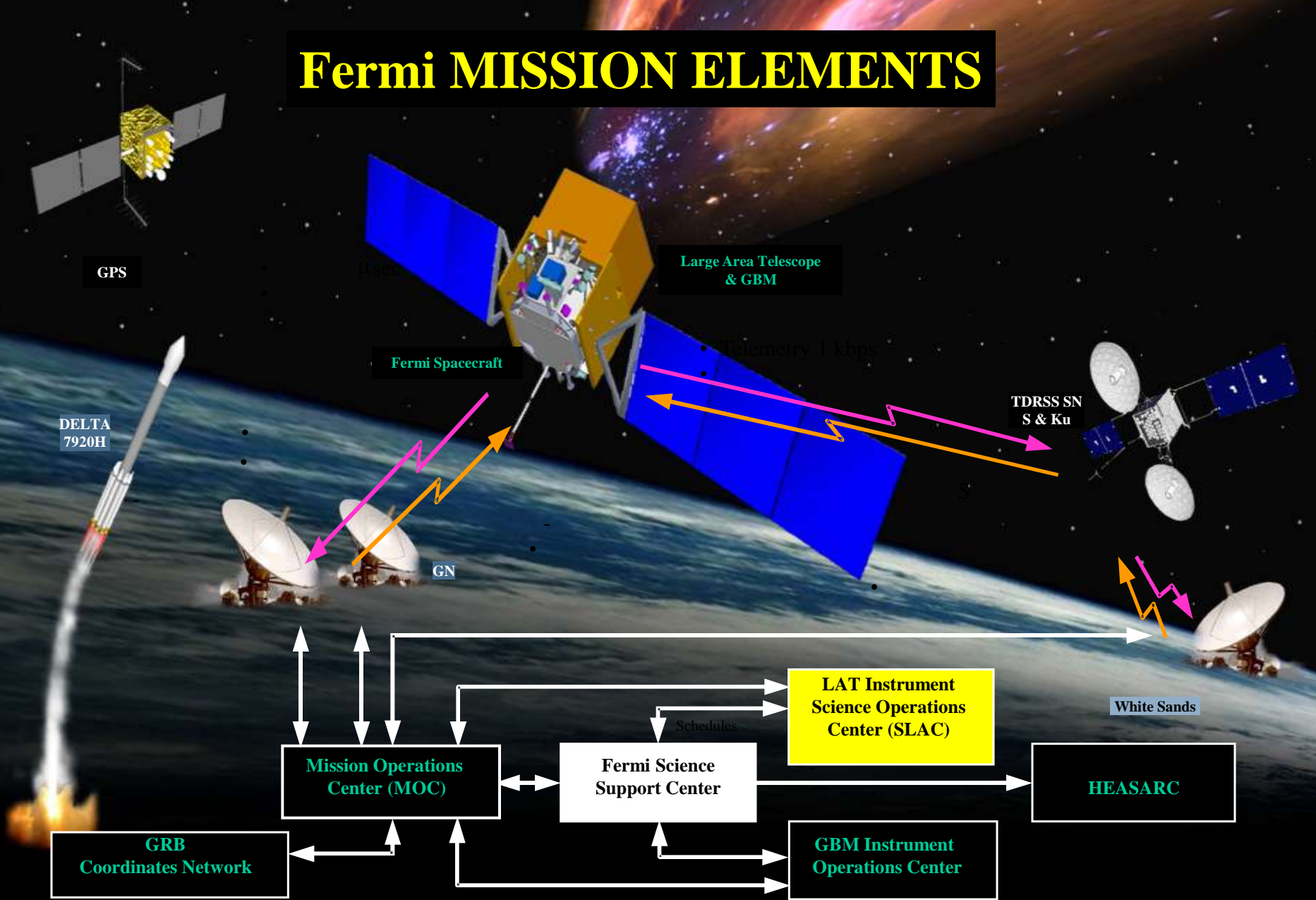
0.25 CPU sec/event to reconstruct: downlink 500 Hz
Each photon event independent of others



Fermi One Year All Sky Map



Fermi MISSION ELEMENTS





ISOC Control Room



- All of the data processing and data quality monitoring can be done from the web
 - No need for anyone in the control room, monitoring load shared globally



Monitoring Pipeline + Data Quality



Fermi LAT Data Processing

Deliveries/Run processing status

Run ID	Run Name	Status	Start Time	End Time	Duration	File Size	File Count
27790000	Complete	Success	2009-10-22 00:00:00	2009-10-22 00:05:00	00:05:00	100 MB	100
27790001	Complete	Success	2009-10-22 00:05:00	2009-10-22 00:10:00	00:05:00	100 MB	100
27790002	Complete	Success	2009-10-22 00:10:00	2009-10-22 00:15:00	00:05:00	100 MB	100
27790003	Complete	Success	2009-10-22 00:15:00	2009-10-22 00:20:00	00:05:00	100 MB	100
27790004	Complete	Success	2009-10-22 00:20:00	2009-10-22 00:25:00	00:05:00	100 MB	100
27790005	Complete	Success	2009-10-22 00:25:00	2009-10-22 00:30:00	00:05:00	100 MB	100
27790006	Complete	Success	2009-10-22 00:30:00	2009-10-22 00:35:00	00:05:00	100 MB	100
27790007	Complete	Success	2009-10-22 00:35:00	2009-10-22 00:40:00	00:05:00	100 MB	100
27790008	Complete	Success	2009-10-22 00:40:00	2009-10-22 00:45:00	00:05:00	100 MB	100
27790009	Complete	Success	2009-10-22 00:45:00	2009-10-22 00:50:00	00:05:00	100 MB	100
27790010	Complete	Success	2009-10-22 00:50:00	2009-10-22 00:55:00	00:05:00	100 MB	100
27790011	Complete	Success	2009-10-22 00:55:00	2009-10-22 01:00:00	00:05:00	100 MB	100
27790012	Complete	Success	2009-10-22 01:00:00	2009-10-22 01:05:00	00:05:00	100 MB	100
27790013	Complete	Success	2009-10-22 01:05:00	2009-10-22 01:10:00	00:05:00	100 MB	100
27790014	Complete	Success	2009-10-22 01:10:00	2009-10-22 01:15:00	00:05:00	100 MB	100
27790015	Complete	Success	2009-10-22 01:15:00	2009-10-22 01:20:00	00:05:00	100 MB	100
27790016	Complete	Success	2009-10-22 01:20:00	2009-10-22 01:25:00	00:05:00	100 MB	100
27790017	Complete	Success	2009-10-22 01:25:00	2009-10-22 01:30:00	00:05:00	100 MB	100
27790018	Complete	Success	2009-10-22 01:30:00	2009-10-22 01:35:00	00:05:00	100 MB	100
27790019	Complete	Success	2009-10-22 01:35:00	2009-10-22 01:40:00	00:05:00	100 MB	100
27790020	Complete	Success	2009-10-22 01:40:00	2009-10-22 01:45:00	00:05:00	100 MB	100

GRS Alerts

Run ID	Alert Type	Alert	Severity	Status
27790000	GRS	GRS Alert	Warning	Resolved
27790001	GRS	GRS Alert	Warning	Resolved
27790002	GRS	GRS Alert	Warning	Resolved
27790003	GRS	GRS Alert	Warning	Resolved
27790004	GRS	GRS Alert	Warning	Resolved
27790005	GRS	GRS Alert	Warning	Resolved
27790006	GRS	GRS Alert	Warning	Resolved
27790007	GRS	GRS Alert	Warning	Resolved
27790008	GRS	GRS Alert	Warning	Resolved
27790009	GRS	GRS Alert	Warning	Resolved
27790010	GRS	GRS Alert	Warning	Resolved
27790011	GRS	GRS Alert	Warning	Resolved
27790012	GRS	GRS Alert	Warning	Resolved
27790013	GRS	GRS Alert	Warning	Resolved
27790014	GRS	GRS Alert	Warning	Resolved
27790015	GRS	GRS Alert	Warning	Resolved
27790016	GRS	GRS Alert	Warning	Resolved
27790017	GRS	GRS Alert	Warning	Resolved
27790018	GRS	GRS Alert	Warning	Resolved
27790019	GRS	GRS Alert	Warning	Resolved
27790020	GRS	GRS Alert	Warning	Resolved

ASP Sig Monitor Process

Run ID	Process	Status	Start Time	End Time	Duration
27790000	ASP Sig Monitor	Success	2009-10-22 00:00:00	2009-10-22 00:05:00	00:05:00
27790001	ASP Sig Monitor	Success	2009-10-22 00:05:00	2009-10-22 00:10:00	00:05:00
27790002	ASP Sig Monitor	Success	2009-10-22 00:10:00	2009-10-22 00:15:00	00:05:00
27790003	ASP Sig Monitor	Success	2009-10-22 00:15:00	2009-10-22 00:20:00	00:05:00
27790004	ASP Sig Monitor	Success	2009-10-22 00:20:00	2009-10-22 00:25:00	00:05:00
27790005	ASP Sig Monitor	Success	2009-10-22 00:25:00	2009-10-22 00:30:00	00:05:00
27790006	ASP Sig Monitor	Success	2009-10-22 00:30:00	2009-10-22 00:35:00	00:05:00
27790007	ASP Sig Monitor	Success	2009-10-22 00:35:00	2009-10-22 00:40:00	00:05:00
27790008	ASP Sig Monitor	Success	2009-10-22 00:40:00	2009-10-22 00:45:00	00:05:00
27790009	ASP Sig Monitor	Success	2009-10-22 00:45:00	2009-10-22 00:50:00	00:05:00
27790010	ASP Sig Monitor	Success	2009-10-22 00:50:00	2009-10-22 00:55:00	00:05:00
27790011	ASP Sig Monitor	Success	2009-10-22 00:55:00	2009-10-22 01:00:00	00:05:00
27790012	ASP Sig Monitor	Success	2009-10-22 01:00:00	2009-10-22 01:05:00	00:05:00
27790013	ASP Sig Monitor	Success	2009-10-22 01:05:00	2009-10-22 01:10:00	00:05:00
27790014	ASP Sig Monitor	Success	2009-10-22 01:10:00	2009-10-22 01:15:00	00:05:00
27790015	ASP Sig Monitor	Success	2009-10-22 01:15:00	2009-10-22 01:20:00	00:05:00
27790016	ASP Sig Monitor	Success	2009-10-22 01:20:00	2009-10-22 01:25:00	00:05:00
27790017	ASP Sig Monitor	Success	2009-10-22 01:25:00	2009-10-22 01:30:00	00:05:00
27790018	ASP Sig Monitor	Success	2009-10-22 01:30:00	2009-10-22 01:35:00	00:05:00
27790019	ASP Sig Monitor	Success	2009-10-22 01:35:00	2009-10-22 01:40:00	00:05:00
27790020	ASP Sig Monitor	Success	2009-10-22 01:40:00	2009-10-22 01:45:00	00:05:00

Fermi LAT Data Quality Monitoring

View Selection Form | Parameters Selection: Example

Root

- Swift Plots
- FastTrackErrors
- Navigation
- Overlays

View: Fraction_Trend_Histo_Fraction_Coverage_Cat

Download (center) see sig off sig on | Download sig sig off

Close Trend/View of Data Files

Y Axis Scale: 0.1 | Max: 1.00

X Axis Scale: 00:00:00.000000000000 | Min: 00:00:00.000000000000

Fermi LAT Telemetry Trending

Version: 3.3.3 (3rd) (3rd version) (3rd)

Time Interval (UTC): 22-Sep-2009 22:40:32.445 (3rd) to 22-Sep-2009 22:40:32.445 (3rd)

Selected path: /Swift/Plate Selected data: GRS000000000000

Download (center) see sig off sig on | Download sig sig off

Y Axis Scale: 0.1 | Max: 425.00

X Axis Scale: 22-Sep-2009 22:40:32.445 (3rd) | Min: 22-Sep-2009 22:40:32.445 (3rd)

Fermi LAT ASP Data Viewer

Version: 3.3.4 (3rd)

Time Interval (UTC): 22-Sep-2009 22:01:49-23-Oct-2009 22:57:09

Selected data: GRS027630072

Parameters Selection: Complete | Product Selection: Complete

Time	GRS ID	GEN	Run ID	RA	DEC	Radius	Fluxes (1-30 Peak)	Fluxes (1-100 Peak)	Fluxes (spectral index)	Peak Flux	Peak Flux Time	Adaptive
02-Oct-2009 16:36:11	27610072	GRS01002000	27610072	-41.970	-13.080	5.280	3.2700E-06	63.887E-03	-0.30 +/- 0.02	0.00	0.00	0.0
							3.4761E-04			0.00		

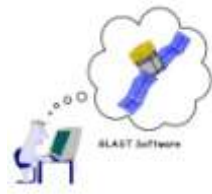
ASP Data

- GRS
- 27790000
- 27790001
- 27790002
- 27790003
- 27790004
- 27790005
- 27790006
- 27790007
- 27790008
- 27790009
- 27790010
- 27790011
- 27790012
- 27790013
- 27790014
- 27790015
- 27790016
- 27790017
- 27790018
- 27790019
- 27790020

Prompt



Data Access



Folder /Data/Flight/Levels/LPA Group FT1

7,312 Items Found, displaying 1 to 300

Name	Type	Parent	Run File	Run File	NET Start	NET Stop	Events	Size	Status	Created Date
027796040	FT1	IS	27796040	27796040	27796040.90160	27796071.00170	30,000	5.7 MB	OK	23-Oct-2009 19:08:22
027796050	FT1	IA	27796050	27796050	27796050.903250	27796045.00120	23,500	2.1 MB	OK	23-Oct-2009 19:19:02
027796070	FT1	IS	27796070	27796070	27796070.90390	27797706.00020	30,100	5.7 MB	OK	23-Oct-2009 19:26:12
027796090	FT1	IA	27796090	27796090	27796090.90470	27791575.00710	15,000	1.4 MB	OK	23-Oct-2009 19:37:49
027796110	FT1	IS	27796110	27796110	27796110.90330	27796096.00020	28,800	2.4 MB	OK	23-Oct-2009 19:53:00
027796140	FT1	IS	27796140	27796140	27796140.90420	27796099.00040	41,000	3.7 MB	OK	23-Oct-2009 19:57:14
027796160	FT1	IS	27796160	27796160	27796160.90420	27796222.00020	22,770	2.1 MB	OK	23-Oct-2009 20:00:09
027796180	FT1	IA	27796180	27796180	27796180.90310	27791575.00710	16,000	1.7 MB	OK	23-Oct-2009 20:00:09
027796210	FT1	IS	27796210	27796210	27796210.90170	27796093.00040	46,800	4.3 MB	OK	23-Oct-2009 20:00:09
027796230	FT1	IS	27796230	27796230	27796230.90440	27796222.00020	46,320	5.3 MB	OK	23-Oct-2009 20:00:09
027796260	FT1	IS	27796260	27796260	27796260.90020	27796094.00020	47,400	4.3 MB	OK	23-Oct-2009 20:00:09
027796280	FT1	IA	27796280	27796280	27796280.90390	27796095.00020	53,000	4.7 MB	OK	23-Oct-2009 20:00:09
027796300	FT1	IS	27796300	27796300	27796300.90440	27796222.00020	46,400	5.3 MB	OK	23-Oct-2009 20:00:09
027796320	FT1	IS	27796320	27796320	27796320.90170	27796093.00040	57,240	5.3 MB	OK	23-Oct-2009 20:00:09



Fermi LAT Data Portal Catalog

Folder /Data/Flight/Levels/LPA Group FT1

FT1 files from level 1 processing of on-orbit data. For description

Created (UTC): 23-Oct-2009 19:07:11

Run File: 27796040

Run File: 27796050

Events: 311,304,300

Size: 16.9 GB

Data Type: FT1

Meta-data

Name	Value	Type
astro-licensing	true	STRING
astro-levell	true	STRING
FT1Run_Level_1_LPA_data	FT1Run_Level_1_LPA_data	STRING
LL_PC_PACK_U1	027796040	STRING
runid	27796040	NUMBER



Folder /Data/Flight/Levels/LPA Group FT1

Dataset r0277967692 version 0

Standard Data

Name	Value
Created (UTC)	23-Oct-2009 19:30:46
Run File	277967690
Run File	277967690
Events	13,000
Size	1.4 MB
Format	FT1
Type	FT1
Runid	277967690
Parent	0277967690
Links	Download History

Meta-data

Name	Value	Type
LL_PC_PACK_U1	0277967690	STRING
astro-licensing	0277967690	STRING
astro-levell	0277967690	STRING
FT1Run_Level_1_LPA_data	0277967690	STRING
runid	277967690	NUMBER
runid	277967690	NUMBER
Creator	LLPC-1.75	STRING
astro-licensing	LPA	STRING
astro-levell	0277967690	STRING

Location

File	Status	Checked (UTC)	Location
BLAC	OK	23-Oct-2009 19:01:29	file:///glst/ftp/astro/PPA/Science/Data/Flight/Levels/LPA/Group1/LPA/Level1/FT1/0277967690_0001.FT1
BLAC_PROD	OK	23-Oct-2009 19:29:44	file:///glst/ftp/astro/PPA/Science/Data/Flight/Levels/LPA/Group1/LPA/Level1/FT1/0277967690_0001.FT1

GLAST Download Manager

File: Edit: Help

Buttons: Add, Remove, Details, Clean Up, Start downloading, Pause downloading

File Name	File Size	Status
027796040_FT1.FT1	13.8 MB	Download
027796050_FT1.FT1	2.9 MB	Download
027796090_FT1.FT1	613.1 KB	Download
027796070_FT1.FT1	478.1 KB	Download
027796180_FT1.FT1	609.1 KB	Download
027796110_FT1.FT1	291.2 KB	Download
027796160_FT1.FT1	174.4 KB	Download
027796210_FT1.FT1	12.4 KB	Download

Progress

Total Download Size: 35.9 GB Downloaded So Far: 5.3 MB

Download Rate: 270.7 KB/sec Time Remaining: 18:11:49



Wired4 Event Display for GLAST



WIRED4

- Java based experiment independent 3D event display
- Many features including
 - Custom views, Dynamic Cuts

For GLAST set up as web start application integrated into data catalog

- Started by single-click on data catalog web interface. No prior installation required
 - Except Java itself – but always there thanks to EVO
- Dialog allows user to select events of interest
- Web service used to find location of files containing requested events from database
- CORBA server used to fetch “HepRep” description of event
- Event display appears...

Name	Type	Files	Events	Size	Created	Links
all	Group	25	1,250,000	1.8 GB	12-Jan-2000 21:29:06	Files
all	Group	25	0	11.8 MB	12-Jan-2000 21:37:01	Files
sg	Group	25	1,250,000	1.3 GB	12-Jan-2000 21:37:15	Files
no	Group	25	0	0 B	12-Jan-2000 21:38:59	Files
gn	Group	25	1,250,000	88.8 MB	12-Jan-2000 21:39:27	Files
LOHAR	Group	25	0	237.8 MB	12-Jan-2000 21:39:38	Files
no	Group	25	1,250,000	3.8 GB	12-Jan-2000 21:39:38	Files
event	Group	25	1,250,000	579.8 MB	12-Jan-2000 21:39:23	Files
recon	Group	25	1,250,000	4.3 GB	12-Jan-2000 21:38:59	Files
recon	Group	25	1,250,000	841.3 MB	12-Jan-2000 21:38:02	Files
reco	Group	25	1,250,000	0.2 GB	12-Jan-2000 21:37:50	Files
recoflat	Group	25	0	84.6 MB	12-Jan-2000 21:37:26	Files

HepRep GLEAM Server

Event List

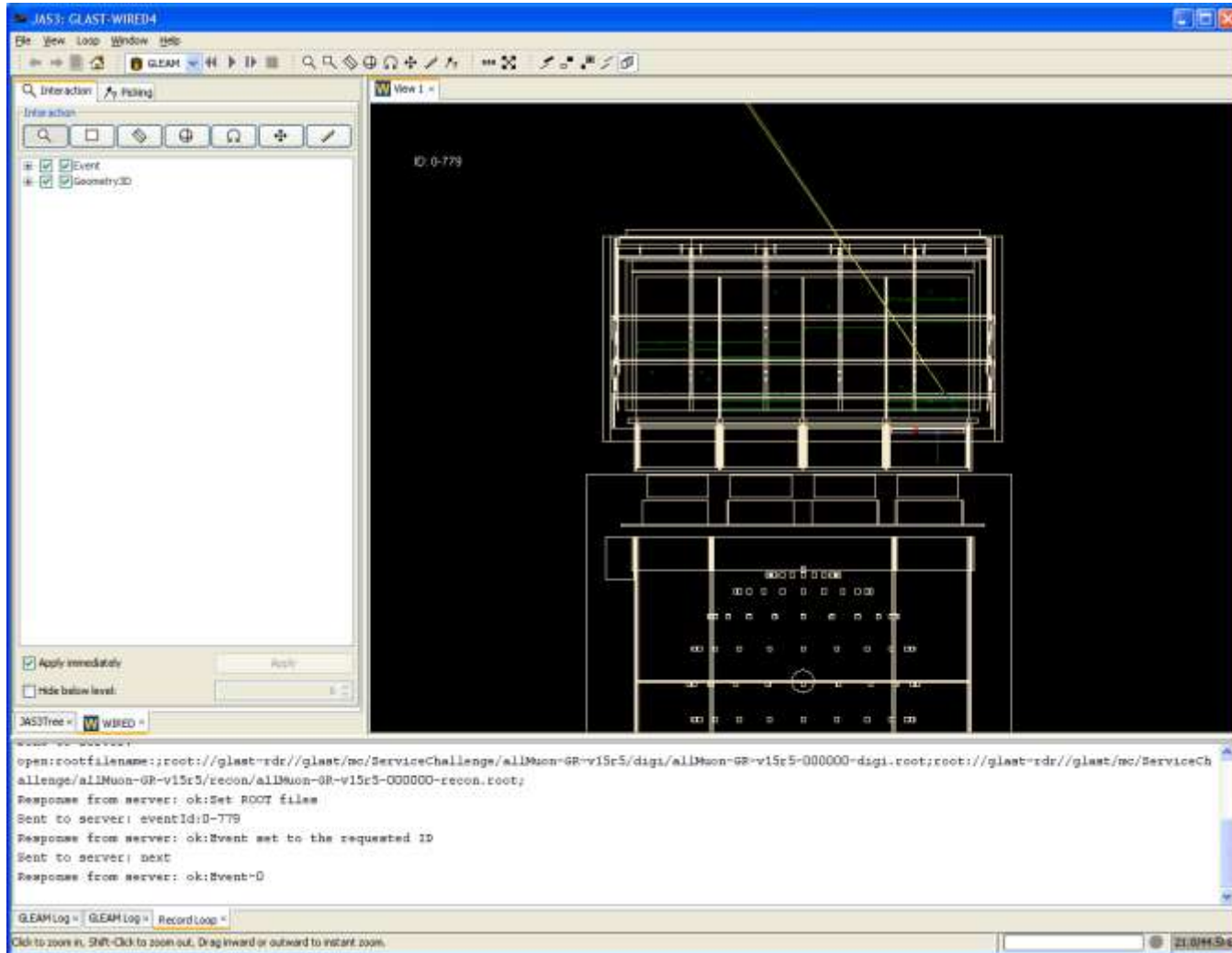
38000 118
38000 228
38000 357
38000 274
38000 410
38000 419
38000 506
38000 626
38000 749
38000 865

Event List File

Cancel OK <<Previous Next >> Search



WIRED4 Event Display for GLAST





“Astro” Server Web Interface



The P6_public_v1 event sample currently contains 190,185,596 events covering the time period 2008-08-04 15:43:36 UTC (239,557,418 MET) to 2009-10-22 11:23:53 UTC (277,903,436 MET) .

Number of events selected: 369311

Parameter	Value
Job Name	%u-%t-%n <i>Arbitrary name: %u=user name, %t=job type, %n=unique id</i>
Event Sample	P6_public_v1 Event selection help
Energy Range	Min: <input type="text"/> Max: <input type="text"/> <i>MeV (Leave blank for no limit)</i>
Time Range	Min: <input type="text"/> Max: <input type="text"/> <i>Mission elapsed time (MET) (Leave blank for no limit)</i>
Position	RA: 40.1 DEC: 61.225 <i>degrees (Leave blank for full sky)</i> or astronomical object: <input type="text"/> using NED <input type="checkbox"/> <i>overrides ra, dec above help</i>
Radius	10.0 <i>degrees</i>
Event Class	Diffuse
Output (FT2 Files)	<input checked="" type="checkbox"/> 30 second (fits) <input type="checkbox"/> 1 second (fits)
Output (Event Data)	<input checked="" type="checkbox"/> FT1 (fits) <input type="checkbox"/> LS1 (fits) <input type="checkbox"/> Merit (root) <input type="checkbox"/> Event-List (text)
Debug Mode	False
User Comment	LS I 61+303
Expert Options	<input type="text"/> help <input type="button" value="Proceed"/>

Parameter	Value
Job Name	%u-%t-%n
Event Source	P6_public_v1
Minimum energy	
Maximum energy	
Minimum MET	
Maximum MET	
RA	40.1
DEC	61.225
Galactic Object	
Radius	10.0
Event Class	Diffuse
Output (FT2 Files)	30-second
Output (Event Data)	FT1
Debug	false
User Comment	LS I 61+303
Expert Options	
<input type="button" value="Back"/> <input type="button" value="Submit"/>	



Astro job submitted

Your job tonyj-AstroServer-00040 has been submitted.
 Your data will be available for download from <ftp://ftp-glast.slac.stanford.edu/glast.u27/DataServer/1256243366055>
 You will be sent an e-mail at tonyj@slac.stanford.edu when your job has completed.
 You can monitor your job's progress using the [Pipeline](#)

Up to higher level directory

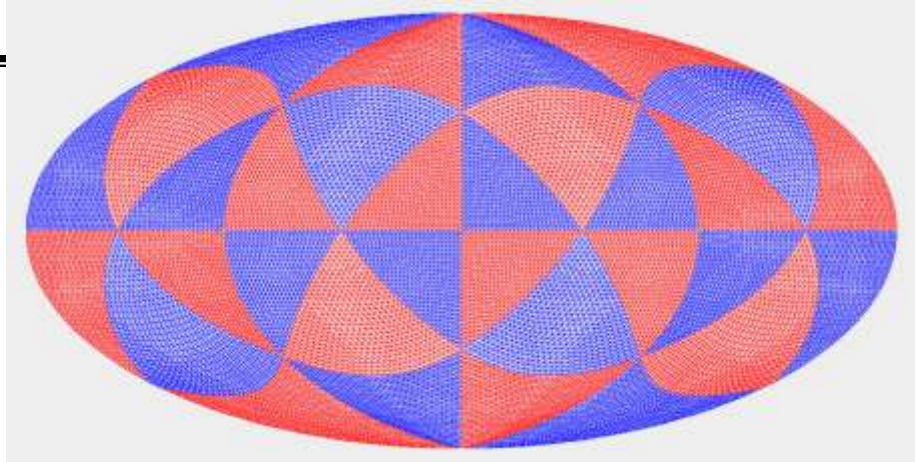
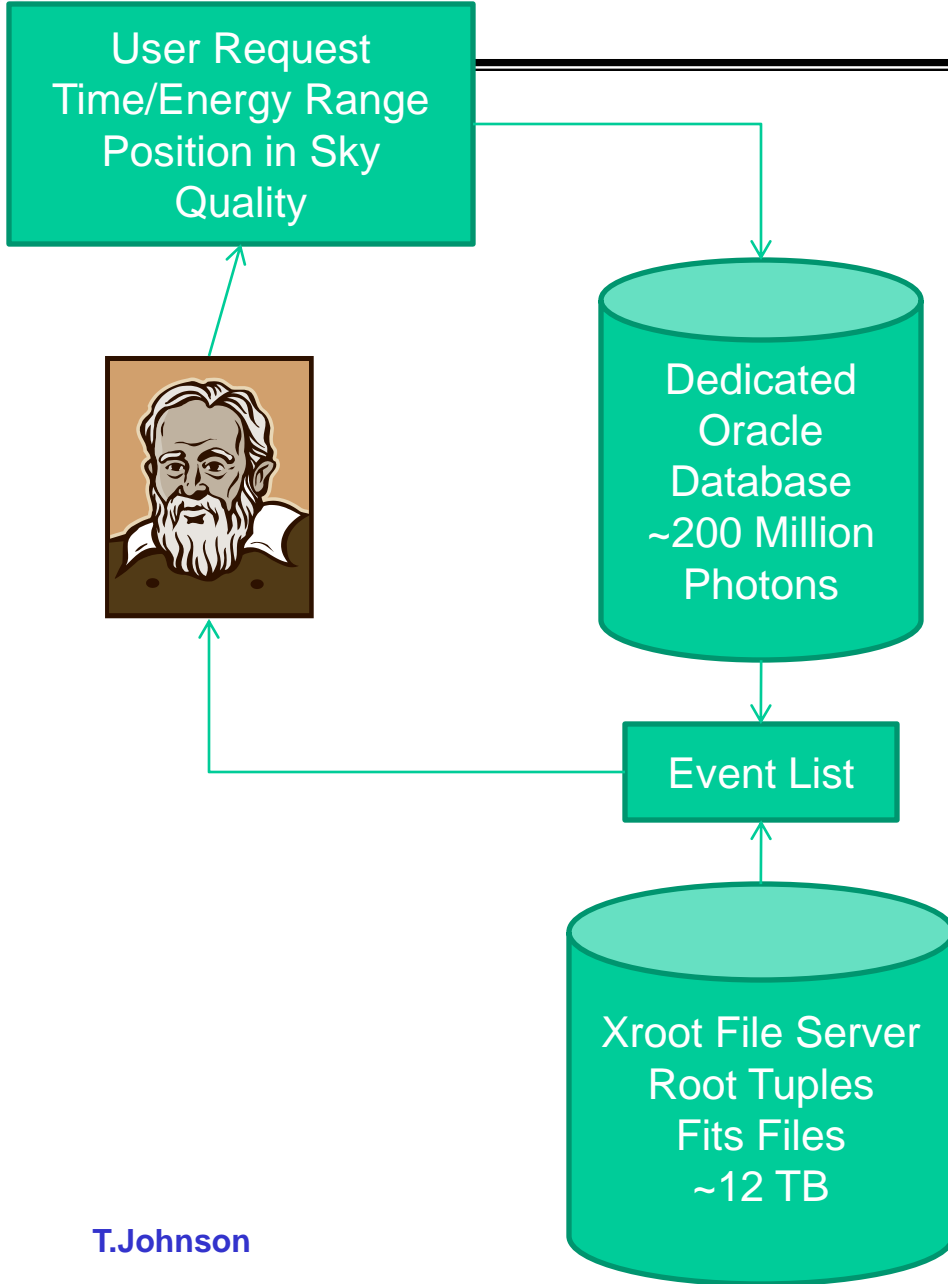
Name	Size	Last Modified
tonyj-AstroServer-00040-README.html	4 KB	10/22/2009 8:31:00 PM
tonyj-AstroServer-00040-ft1.fits	33351 KB	10/22/2009 8:30:00 PM
tonyj-AstroServer-00040-ft2-30s.fits	144206 KB	10/22/2009 8:46:00 PM

Note: Clicking on the Status column will take you to the pipeline task that ran the job. Clicking on the Job column will allow you to rerun this task, or a similar one. Clicking on the Output Directory column will take you to the output.

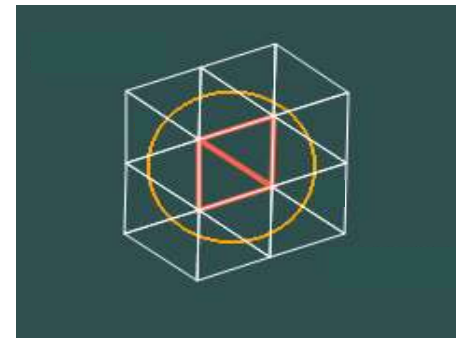
JobID	Job	Owner	Task	Type	Status	Output Directory	More Information
00-000-00000	tonyj-AstroServer-00040	tonyj	astroserver	Submit	Done	LS I 61+303	
00-000-00001	tonyj-AstroServer-00041	tonyj	astroserver	Submit	Done		
00-000-00002	tonyj-AstroServer-00042	tonyj	astroserver	Submit	Done		
00-000-00003	tonyj-AstroServer-00043	tonyj	astroserver	Submit	Done		
00-000-00004	tonyj-AstroServer-00044	tonyj	astroserver	Submit	Done		
00-000-00005	tonyj-AstroServer-00045	tonyj	astroserver	Submit	Done		
00-000-00006	tonyj-AstroServer-00046	tonyj	astroserver	Submit	Done		
00-000-00007	tonyj-AstroServer-00047	tonyj	astroserver	Submit	Done		
00-000-00008	tonyj-AstroServer-00048	tonyj	astroserver	Submit	Done		
00-000-00009	tonyj-AstroServer-00049	tonyj	astroserver	Submit	Done		
00-000-00010	tonyj-AstroServer-00050	tonyj	astroserver	Submit	Done		
00-000-00011	tonyj-AstroServer-00051	tonyj	astroserver	Submit	Done		
00-000-00012	tonyj-AstroServer-00052	tonyj	astroserver	Submit	Done		
00-000-00013	tonyj-AstroServer-00053	tonyj	astroserver	Submit	Done		
00-000-00014	tonyj-AstroServer-00054	tonyj	astroserver	Submit	Done		
00-000-00015	tonyj-AstroServer-00055	tonyj	astroserver	Submit	Done		
00-000-00016	tonyj-AstroServer-00056	tonyj	astroserver	Submit	Done		
00-000-00017	tonyj-AstroServer-00057	tonyj	astroserver	Submit	Done		
00-000-00018	tonyj-AstroServer-00058	tonyj	astroserver	Submit	Done		
00-000-00019	tonyj-AstroServer-00059	tonyj	astroserver	Submit	Done		
00-000-00020	tonyj-AstroServer-00060	tonyj	astroserver	Submit	Done		



"Astro" Server Implementation



Within the database events are indexed by time, energy and position using a hierarchical triangular mesh (HTM). Database partitions are used to split the data into 1 week time bins and 32 position bins within each time bin, each containing 1024 HTM regions (shown above) . The use of HTM triangles makes it easy to identify which regions are entirely contained in the user request, and which are partially contained and require finer selection (below).

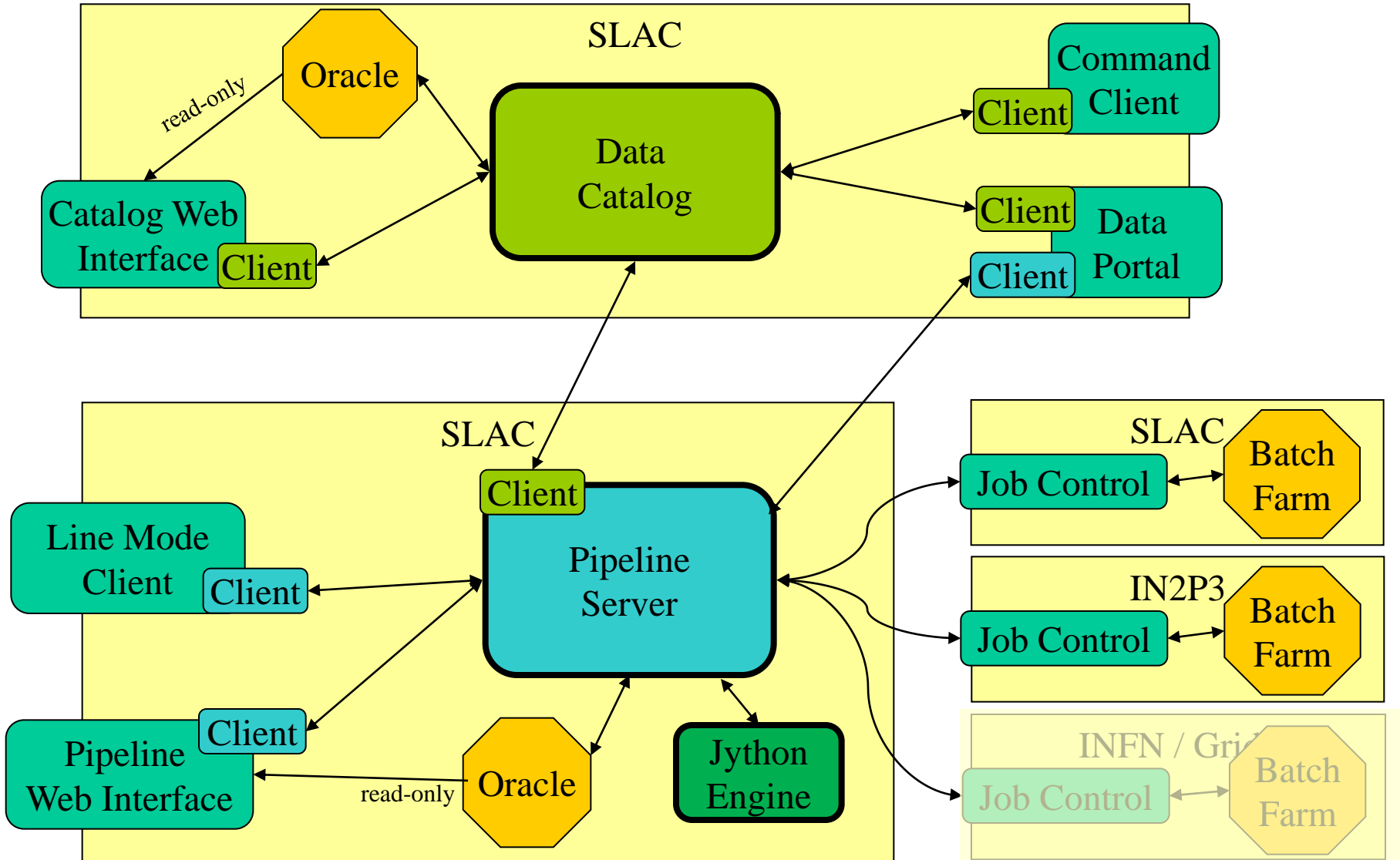




Pipeline Introduction

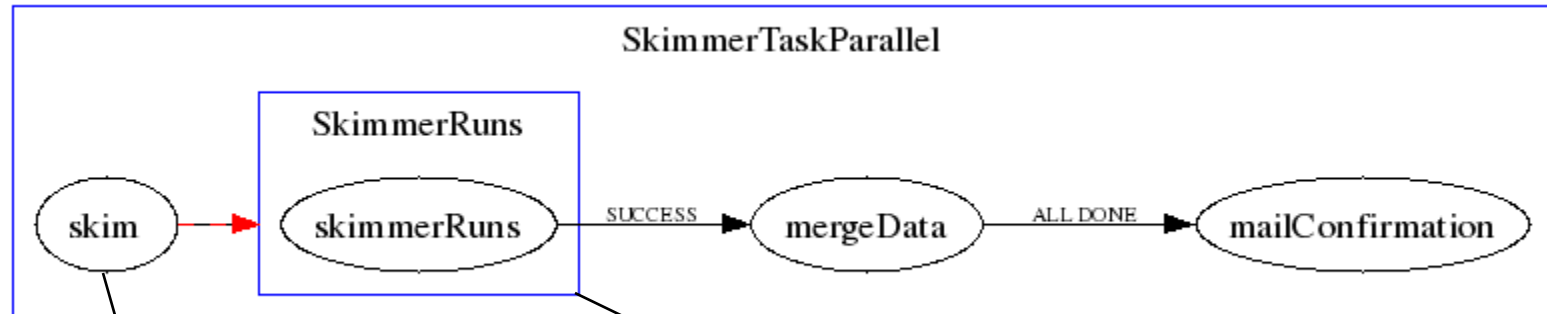
- **Pipeline design goals**
 - **Automated submission and monitoring of batch jobs**
 - **Very high reliability**
 - **Ability to define graph of jobs to be run**
 - **Ability to parallelize processing tasks**
 - **Ability to perform simple computations as part of job graph**
 - **E.g. Compute how many parallel streams to create as a function of the number of events to be processed**
 - **Ability to “Roll Back” jobs (whether successful or not)**
 - **Capability to automatically compute sub-graph of jobs to rerun**
 - **Maintain full history of all data processing**
 - **Data catalog to keep track of all data products**
 - **Web interface for monitoring jobs and submitting new tasks**
 - **Plus command line client, and programmatic API**

Pipeline and Data Catalog Components





Pipeline Task specification (XML)



```

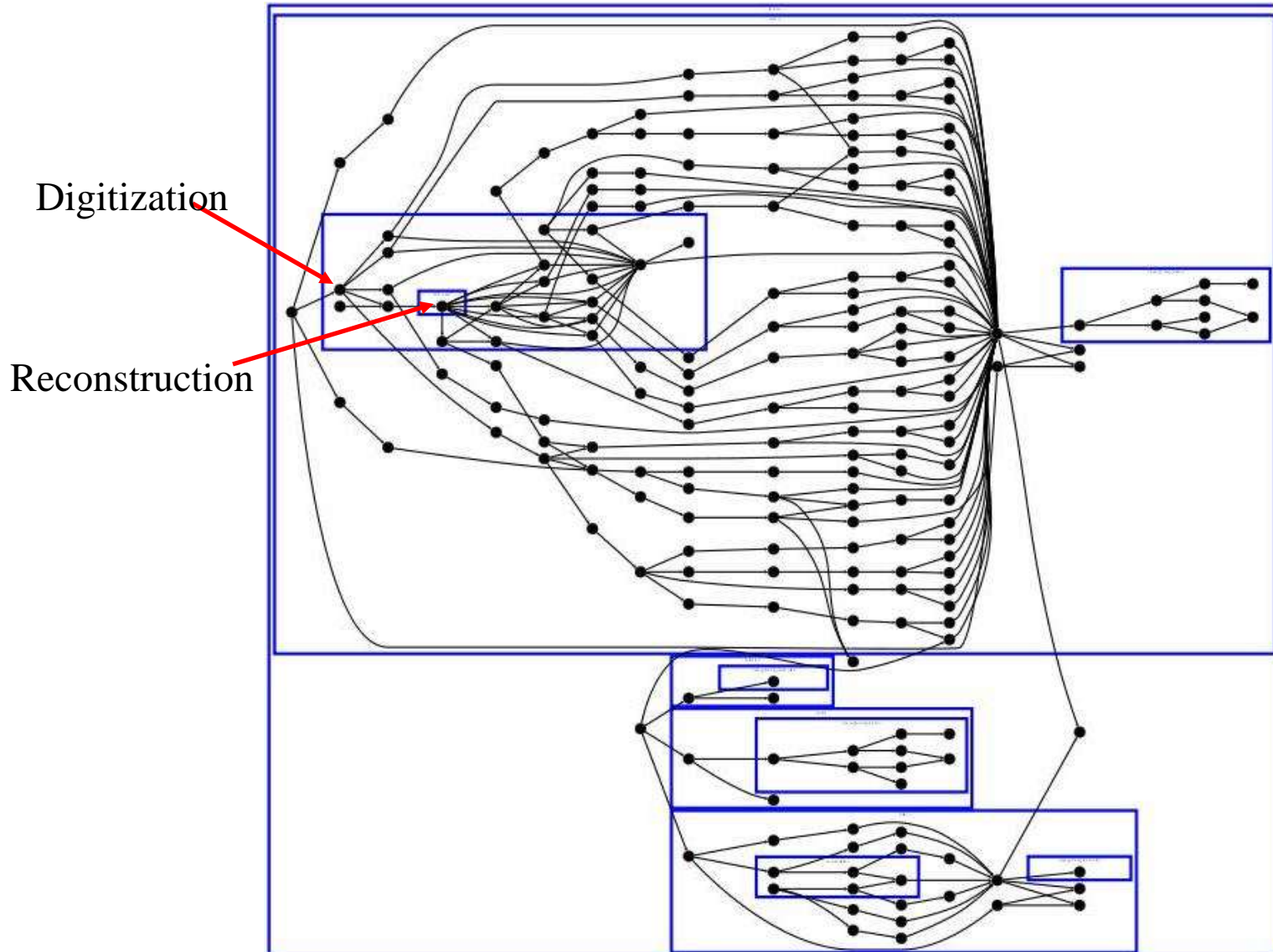
<process name="skim">
  <script>
    <![CDATA[
from java.util import HashMap
start = 0
chunk_size = DP_FILE_LINES/DP_SUBTASKS + 1
for i in range(DP_SUBTASKS):
  vars = HashMap()
  vars.put("DP_START", start)
  end = min( start + chunk_size, DP_FILE_LINES )
  vars.put("DP_END", end)
  if end>start:
    pipeline.createSubstream("SkimmerRuns",i, vars)
  start = end
]]>
  </script>
  <createsubtasks>
    <subtask>SkimmerRuns</subtask>
  </createsubtasks>
</process>
  
```

```

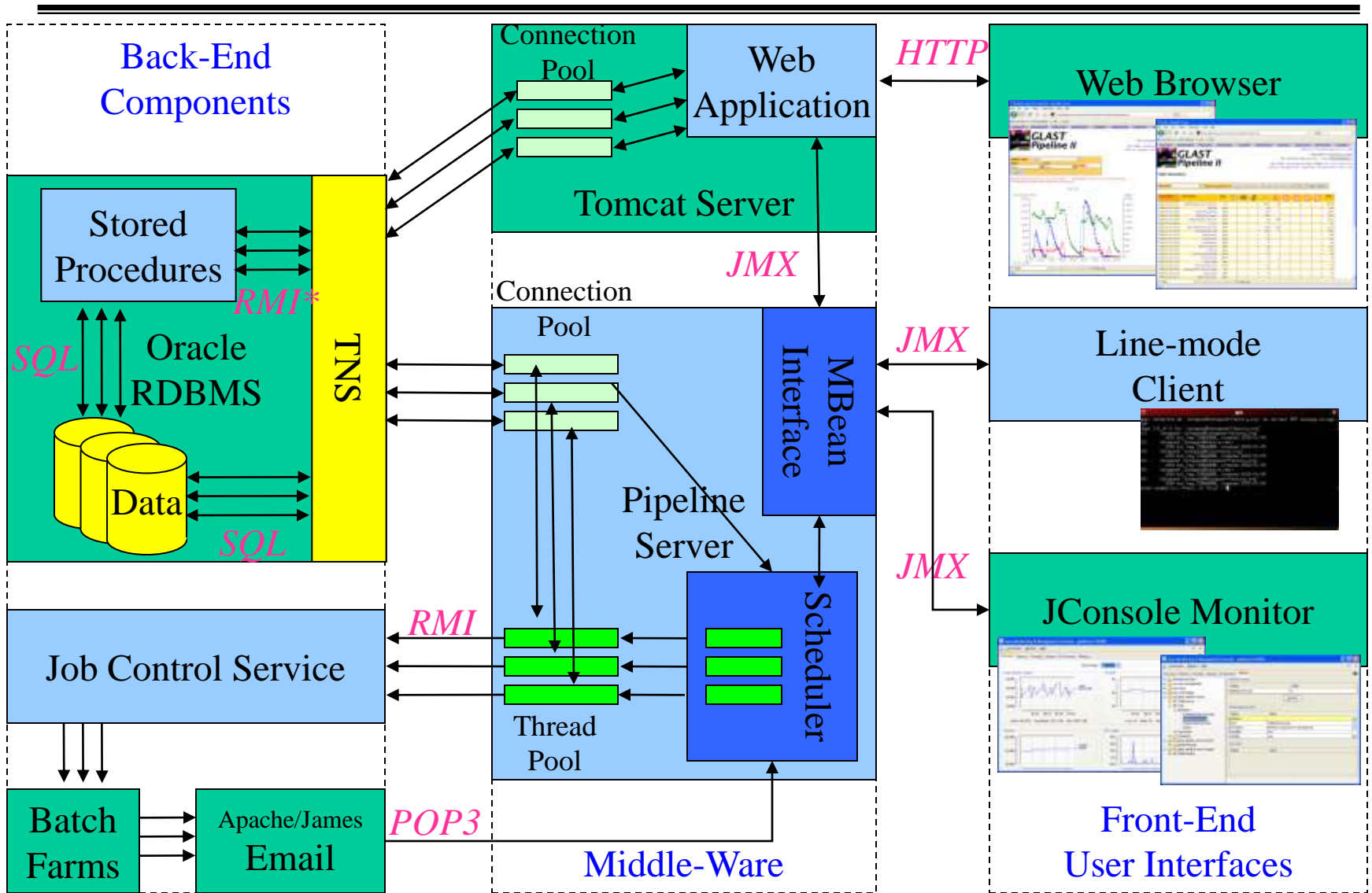
<task name="SkimmerRuns" type="Data" version="1.0">
  <process name="skimmerRuns">
    <variables>
      <var name="streamID">${format(pipeline.stream,"%04d")}</var>
    </variables>
    <job maxCPU="${DP_SKIMMER_MAXCPU}">
      cat ${DP_FILE_LIST} | head -${DP_END} | tail -${(DP_END-DP_START)} > partlist
      export SK_FILE_LIST_FILE=partlist
      export SK_OUT_DIR=${DP_OUT_DIR}/${streamID}
      export SK_ENFORCE_OUTPUT_FILES=false
      export SK_MAX_FILE_SIZE=0
      export SK_OUT_FILE_BODY=${DP_JOBNAME}-${streamID}
      mkdir -p ${SK_OUT_DIR}
      $SK_DIR/bin/skimmer
    </job>
  </process>
</task>
  
```



Level 1 Task Specification



Pipeline Implementation





Pipeline Web Interface



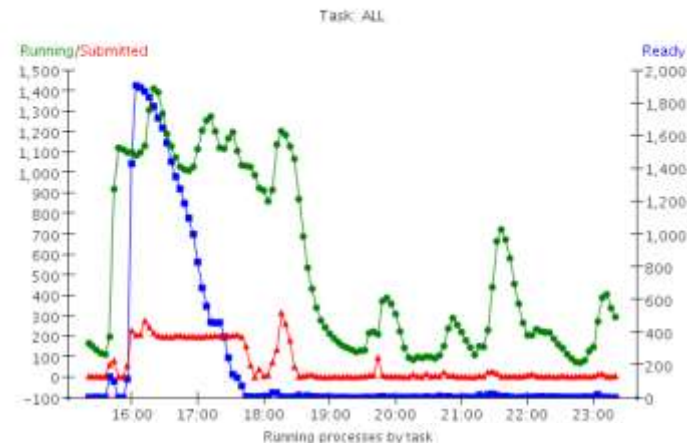
Task Filter: Regular Expression (?) Active in Last 30 days Latest Task Versions

Last Active	Task Name	Type	▼	👤	🚫	✅	❌	🔄	🛑	🛑	🛑	Total
2008-10-30 23:12	L1Proc	Data	0	0	0	78	1	0	0	0	0	84
2008-10-30 22:47	HalfPipe	Data	0	0	0	488	0	0	0	0	0	488
2008-10-30 22:39	nonEventReporting	Data	0	0	0	2207	14	0	0	0	0	2221
2008-10-30 22:13	GRB_blind_search	Data	0	0	0	1008	9	0	0	0	0	1017
2008-10-30 22:13	GRB_afterglow_launcher	Data	0	0	0	283	3034	0	0	0	0	3317
2008-10-30 22:12	GRB_refinement_launcher	Data	0	0	0	5596	1620	0	0	0	0	7216
2008-10-30 22:10	AspInsertIntervals	Data	0	0	0	1397	14	0	0	0	0	1411
2008-10-30 22:10	AspLauncher	Data	0	0	0	408	3	0	0	0	0	413
2008-10-30 21:31	DRP_monitoring	Data	0	0	0	211	7	0	0	0	0	218
2008-10-30 20:23	PGWave	Data	0	0	0	110	0	0	0	0	0	110
2008-10-30 19:47	allHEE200GeV-GR-v15r39p1	MC	0	0	0	29861	437	0	16	0	0	30304
2008-10-30 19:37	launchReport	Data	0	0	0	255	0	0	0	0	0	255
2008-10-30 16:28	Level0Krootd	Data	0	0	0	30	0	0	0	0	0	30
2008-10-30 15:01	SkimmerTaskParallel	SKIM	0	0	0	80	8	0	0	0	0	88
2008-10-30 13:12	SkimmerTask	SKIM	0	0	0	33	10	0	0	0	0	43
2008-10-30 12:42	ReproTestB	Data	0	0	0	0	2	0	0	0	0	2
2008-10-30 10:40	AstroSkimmerTask	SKIM	0	0	0	262	81	0	0	0	0	343
2008-10-30 03:55	backgnd-GR-v15r40-Limbo2	MC	0	0	0	10	0	0	0	0	0	10
2008-10-29 12:31	satL1Status	Data	0	0	0	62	0	0	0	0	0	62
2008-10-29 12:16	satMonitorPulsar	Data	0	0	0	0	4	0	0	0	0	4
2008-10-29 08:12	GRB_afterglow	Data	0	0	0	137	3	0	0	0	0	140
2008-10-29 08:07	backgnd-GR-v15r40-Limbo	MC	0	0	0	3610	0	0	0	0	0	3610
2008-10-29 07:55	backgnd-GR-v15r39p1-FullDay	MC	0	0	0	70000	0	0	0	0	0	70000
2008-10-29 02:44	GRB_refinement	Data	0	0	0	107	11	0	0	0	0	118

Select Task: All Tasks

Start: None End: None or last: 8

Starting Date: Thu Oct 30 15:20:00 PDT 2008 - Ending Date: Thu Oct 30 23:20:00 PDT 2008
121 records found from table Minutes with group by 4



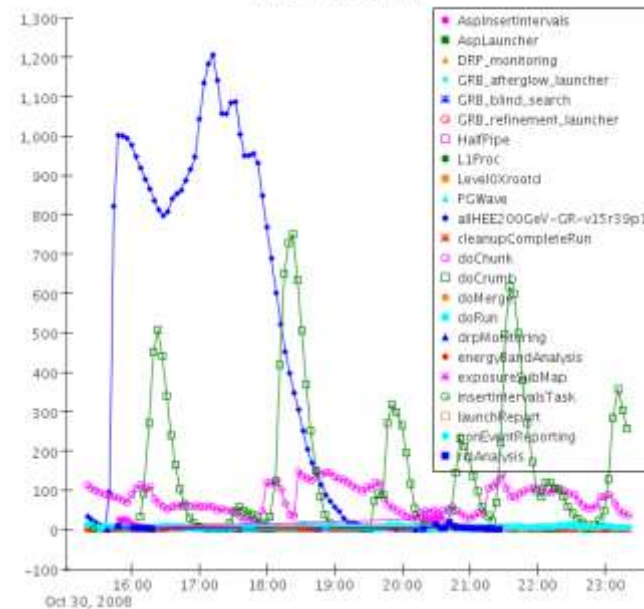
Message Viewer

Task: Severity: INFO

30/Oct/2008 23:57:14 None

622 items found, displaying 1 to 20:

Time	Level	Task	Process	Stream	Message	Detail
11-Oct-2008 00:38:28	INFO	DRP_monitoring.roAnalysis.energyBandAnalysis	fitEnergyBand	247082405.4.1	Received status report: STARTED	
11-Oct-2008 00:38:29	INFO	L1Proc.doRun.doChunk.doChunk	recon	81031004.247111885.5700176.T200	Received status report: ENDED	ro=0
11-Oct-2008 00:38:28	INFO	L1Proc.doRun.doChunk	reconThread	81031004.247111885.16188	Received status report: ENDED	ro=0
11-Oct-2008 00:38:29	INFO	DRP_monitoring.roAnalysis.energyBandAnalysis	fitEnergyBand	247082405.4.0	Received status report: STARTED	
11-Oct-2008 00:38:28	INFO	DRP_monitoring.roAnalysis.energyBandAnalysis	fitEnergyBand	247082400.10.1	Received status report: STARTED	
11-Oct-2008 00:38:28	INFO	L1Proc.doRun	mergeDigitizer	81031004.247111885	Received status report: STARTED	
11-Oct-2008 00:38:28	INFO	DRP_monitoring.roAnalysis.energyBandAnalysis	fitEnergyBand	247082400.10.0	Received status report: STARTED	
11-Oct-2008 00:38:28	INFO	DRP_monitoring.roAnalysis	sourceAnalysis	247082400.11	Received status report: ENDED	ro=0
11-Oct-2008 00:38:28	INFO	L1Proc.doRun.doChunk	fastReconThread	81031004.247111885.8032090	Received status report: STARTED	
11-Oct-2008 00:38:28	INFO	DRP_monitoring.roAnalysis.energyBandAnalysis	fitEnergyBand	247082400.13.0	Received status report: STARTED	
11-Oct-2008 00:38:28	INFO	DRP_monitoring.roAnalysis	sourceAnalysis	247082000.27	Received status report: ENDED	ro=0
11-Oct-2008 00:38:28	INFO	DRP_monitoring.roAnalysis.energyBandAnalysis	fitEnergyBand	247082400.13.1	Received status report: STARTED	
11-Oct-2008 00:38:28	INFO	DRP_monitoring.roAnalysis.energyBandAnalysis	fitEnergyBand	247082402.14.1	Submitted job to SLACDATA, id=427316	
11-Oct-2008 00:38:26	INFO	DRP_monitoring.roAnalysis.energyBandAnalysis	fitEnergyBand	247082400.14.0	Submitted job to SLACDATA, id=427315	

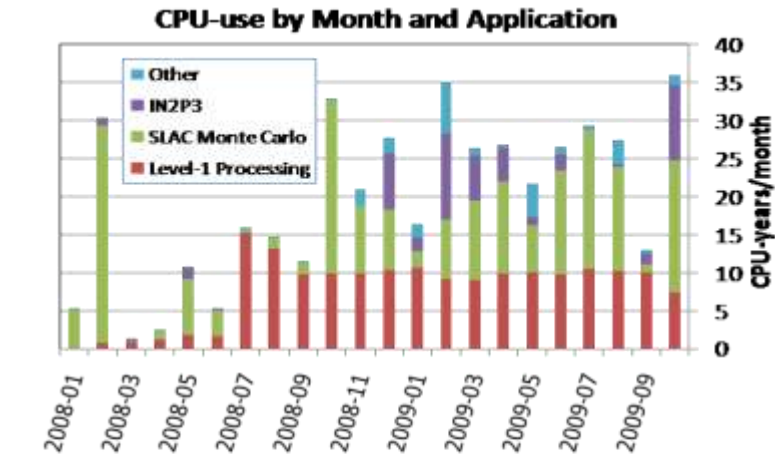




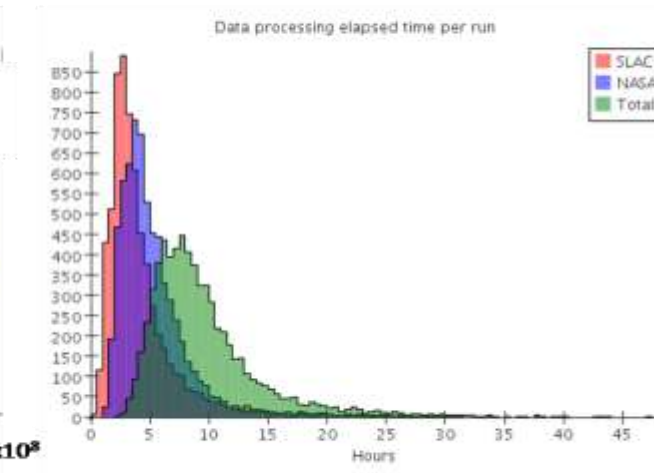
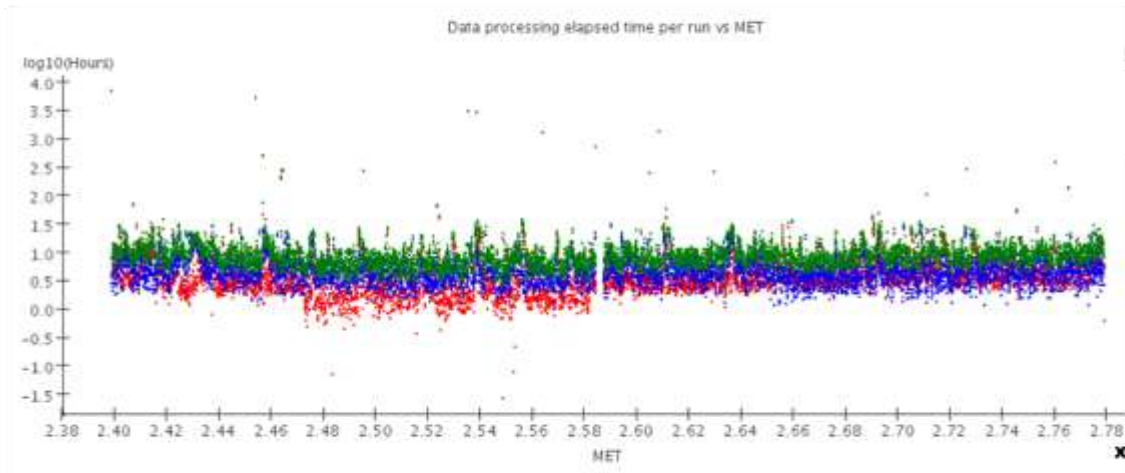
Pipeline Performance and Reliability



Pipeline reliability. AutoRetry allows failed jobs to be rerun without manual intervention.



CPU-years delivered by the pipeline per month.



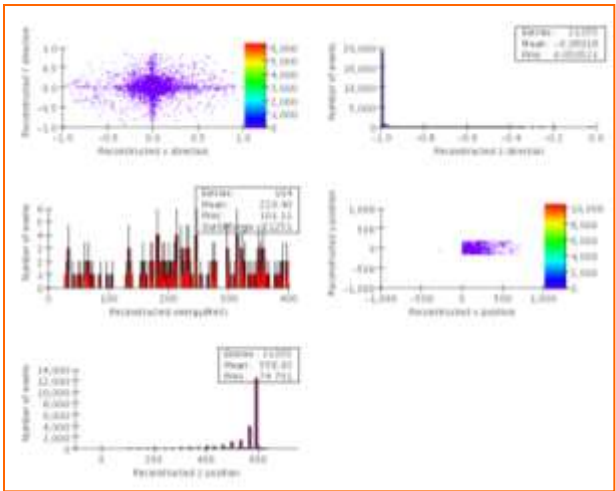
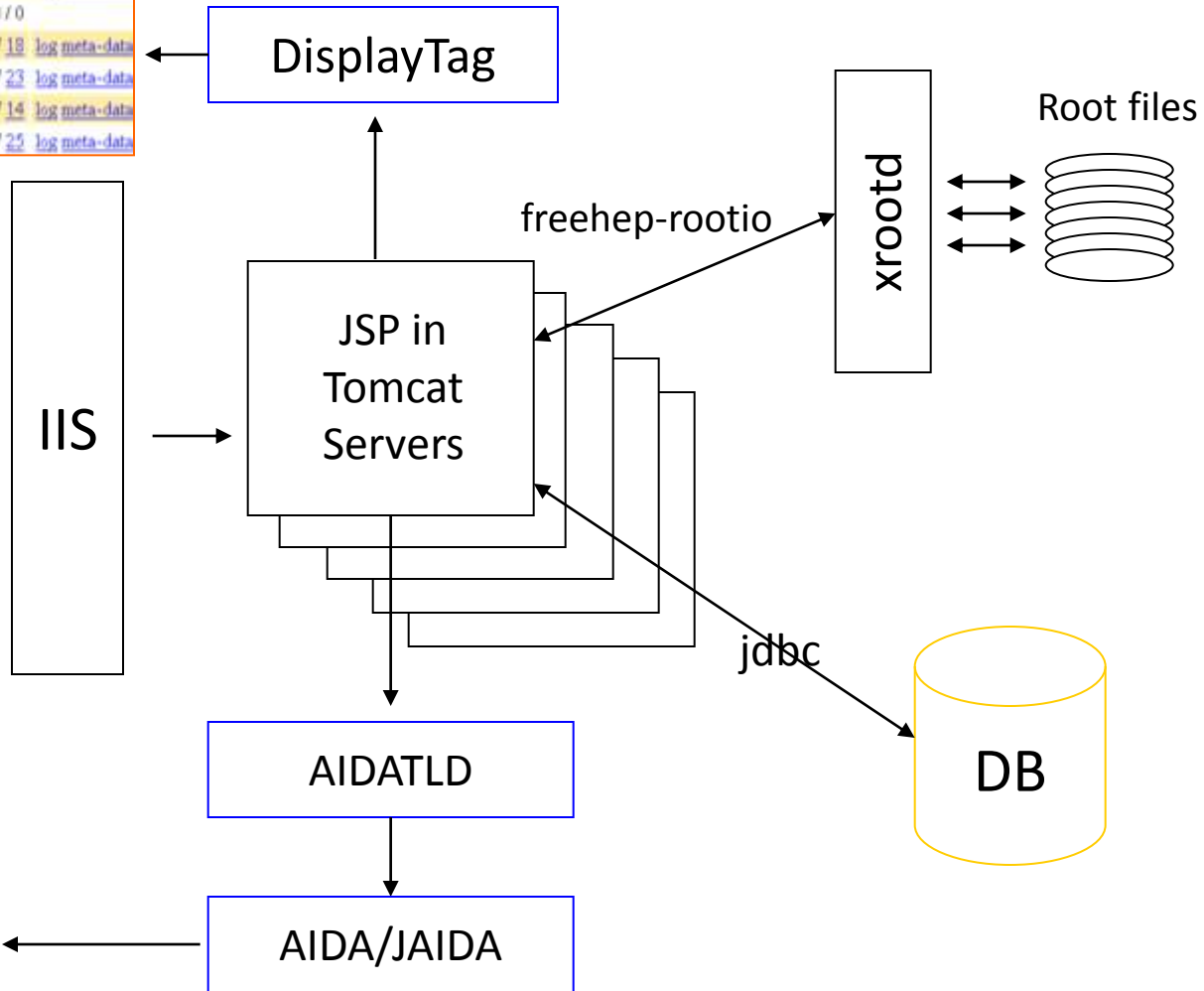
Elapsed time between data being recorded on satellite and arriving at SLAC (red), and between arriving at SLAC and being totally processed (blue), and total elapsed time (green). Most data is fully processed <24 hours after being taken.



Text Name	Date	CPU (secs)	Memory (MB)	Plots (All Fail)	Links
✗ ACDDig	Apr 10, 2006	0	NA	0/0	
✗ ACDDTop	Apr 10, 2006	0	NA	0/0	
✓ AllGamma	Apr 11, 2006	8805	377	111/17	log meta-data
✓ BackGndAvg	Apr 10, 2006	10	1	0/0	log meta-data
✗ CALSingleCrystal	Apr 10, 2006	5	1	0/0	
✓ VerticalGamma100GeV	Apr 11, 2006	30596	278	110/18	log meta-data
✓ VerticalGamma100MeV	Apr 11, 2006	8138	416	110/23	log meta-data
✓ VerticalGamma10GeV	Apr 11, 2006	8926	318	110/14	log meta-data
✓ VerticalGamma1GeV	Apr 11, 2006	8657	391	110/25	log meta-data

User's request

<http://glast-ground.slac.stanford.edu/>



Adding interactivity to web applications



- Most of our Fermi web applications deliberately built with simple technology
 - Plain JSP pages + tag libraries
 - SQL embedded in JSP
 - Available at the time we started Fermi
 - Uniform technology
 - Easily accessible to non experts
 - Easy to rapidly customize
- We have recently started looking at “Google Web Toolkit” GWT for adding interactivity (AJAX) to web applications
 - Looks promising

The screenshot shows the EXO DAQ GUI web application. The browser address bar indicates the URL is `http://www.data.slc.stanford.edu/ExoDaqGui/Gwt/`. The page title is "EXO DAQ GUI" and the version is "1.0-SNAPSHOT". The user is identified as "tony".

The interface is divided into several sections:

- Run Options:** Contains dropdown menus for "Drift HV" (set to Off), "APD HV" (set to Off), "Trigger" (set to Standards), and "Hardware" (set to 2010-02-01). There is a text input for "Comment" and a checkbox for "Log data to disk".
- Run Status:** A table-like display showing:

Run state:	ended
Run:	114
Run start:	March 4, 2010 8:18:19 PM MST
Run started by:	apw
Run end:	March 4, 2010 8:15:42 PM MST
Run ended by:	apw
Triggers:	Events: 0
Current file:	
File number:	0
Disk space available:	0
Configuration ID:	0
- Run Control:** Includes buttons for "Begin", "Pause", "Restart", and "End".
- Messages:** A scrollable log window showing system messages such as "EvoControl stopped", "Caught process signal 15", "EvoControl started", "Data run started", "Data run ended", and "EvoControl started/stopped".



Web Tools/Pipeline for other Experiments

- We have cleaned up many of our web tools to remove any vestigial Fermi dependence, and set up a portal at:
 - <http://srs.slac.stanford.edu/>
 - Can easily be configured for different experiments, e.g.
 - <http://exo-data.slac.stanford.edu/>
- We have set up a second “non-Fermi” version of pipeline server and data catalog
 - Currently starting to be used for EXO, CDMS and AGIS
 - EXO will use pipeline for data processing starting next summer
 - CDMS are using the pipeline for MC data processing
- We are working with Fermi Italian and French collaborators to create a job submission daemon to work with the Grid
 - We would like to extend pipeline to be able to submit jobs to the “Cloud”



Other Web Tools

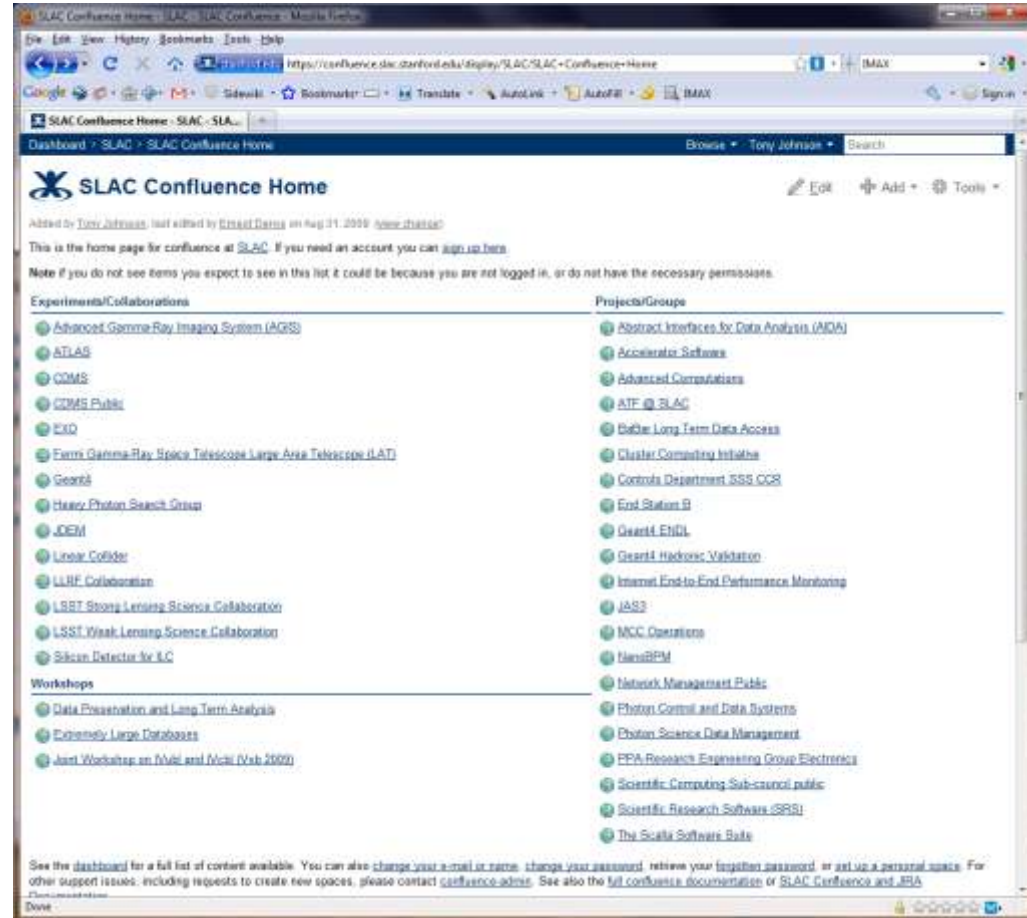
In addition to building our own web tools we try to introduce existing commercial and open-source tools especially those which enhance distributed collaboration



Confluence



- **Confluence first used at SLAC by Fermi.**
 - **Used very extensively for scientific collaboration, discussion of results.**
- **Adopted by many other groups at SLAC**
 - **Confluence and JIRA now maintained at SLAC by CD (Ernest Denys)**





Confluence

Home - Fermi Gamma-Ray Space Telescope Large Area Telescope (LAT) - Confluence - Mozilla Firefox

Home

Confluence overview for Fermi Gamma-Ray Space Telescope

Confluence maintains a number of different confluence spaces, including:

- LAT Calendar
- Algorithms
- Det-Commissioning Detector
- Beam Test ZEM
- Calorimeter
- Code Mapping
- Data Handling
- Data and Service Challenges
- Flight Integration and SAR/CCB
- Good Practices
- LAT Multiconnector Coordination Group
- LAT Science Groups
- LAT Science Public
- Infrastructure: Hyperbolic
- ISOC
- JIRA
- JMS
- LSE
- Message
- Online
- SAS - Science Analysis Systems
- SAS Developer Corner
- SAS, JIRA, ISS, & Summaries
- Science Tools
- System Tests
- System Tests Reports
- Tracker
- Trapper
- Workbook

Popular Pages

Recently Updated

- J. Eric Goetz: Process for approving outlier detections (2 minutes ago)
- Monica Doglio: Sun_30M sample - check of flight sources (7 minutes ago)
- Luigi Tibaldo: Cos & Cas paper - analysis with Likelihood v1.0.0 (8 minutes ago)
- Monica Doglio: re_Lat_FL_sar10.py (14 minutes ago)
- Tally Sussel: LAT_1E-month_science_list_analysis (27 minutes ago)
- Arjan: Orbital cluster population paper comments page

See the [dashboard](#) for a full list of content available. You can also [change your email or name](#), [change your password](#), [review your profile page](#), or [set up a personal space](#). For other support issues, including requests to create new spaces, please contact [confluence-admin](#). See also the [full confluence documentation](#) or [SAC Confluence and JIRA Documentation](#).

See the [User Workbook](#) for an introduction to most things to do with LAT data analysis.

Cross-Comparison of Exposures between Survey and Pointed Observations

Cross-Comparison of Exposures between Survey and Pointed Observations

Observations

I compare here counts and exposure maps from pointed observations with the ones from the on-going period in survey mode that started just after the shut-down.

I used the first light plus three pointed observation periods described [here](#).

For each observation, the first graph of the line is the same as the one already shown [here](#). It is the number of diffuse-class photons with energy between 100 MeV and 1000 MeV and zmax=100.

I added all the runs that followed the shut-down (up to a few hours ago, largest data set) and extracted a flux that I used as a reference.

The second graph is obtained by multiplying this flux by the exposure of each observation period. If the exposure is correct, this should be the number of photons expected for this period.

The third graph is the residual. It is the difference between the expected number of photons and the one obtained during the period. I divided this difference by a statistical uncertainty taken into account, fluctuations from both the real and expected photon counts.

I used the first light dataset to check the method, the corresponding residual shows a good agreement between the two large survey periods. The period residuals are globally within the statistical uncertainty except at low exposure, far from the target, where the expected counts seem over-estimated showing a possible over-estimation of the exposure.

Good agreement is for "Vela + 1025 targets", exposure for "1025 target + Lmb following" and "1025 target + Sky Survey 7" seem slightly over-estimated when the one for "Vela + 1025 Stars" looks under-estimated.

As always, more statistics will help but given all the tests performed during the pointed observations, I have the impression that the pointed and survey observations are consistent. The exposure of large angle may need some more attention.

First-Light

Done



JIRA



- JIRA also used by Fermi and many other groups
- Excellent web-based issue tracking system
- Can be extensively customized
 - For instance with custom workflows we use it to keep track of release approval process and simulation requests

The screenshot shows the JIRA web interface for the 'LAT Data Server' project. The main content area is divided into several sections:

- Project Information:** Project Lead: Tony Johnson, URL: http://slac.stanford.edu/DataServer/
- Components and Versions Table:**

Components	Versions
Astro Server	12 1.1 2
Fdr Skimmer	3 2.0 (alpha) 1
Fdr Skimmer	28 2.0 (beta) 2
Ment Skimmer	14 2.0 5
Pruner backend	3 2.1 1
No Component	4 2.2 2
	Astro Server 1.4 8
	Simple Summer 1.8 0
	Unscheduled 34
- Project Summary:**
 - Open: 64 (36%)
 - Resolved: 92 (52%)
 - Closed: 21 (12%)
- Open Issues:**
 - By Priority:
 - Blocker: 1 (2%)
 - Critical: 1 (2%)
 - Major: 56 (88%)
 - Minor: 6 (9%)
 - By Assignee:
 - Charliffe Hee: 1 (2%)
 - Daniel Elati: 4 (6%)
 - Tony Johnson: 59 (92%)



Discussion forums



Linear Collider Forum: Welcome to the forum - Mozilla Firefox

http://forum.linearcollider.org/index.php?r=index&id=065-f213a56c2c7348244-5ce98cb29

Members Search Help Control Panel Logout [tony] Home Admin Control Panel

Welcome tony, your last visit was on Wed, 10 March 2010 09:57

Show: Today's Messages :: Unread Messages :: Unanswered Messages :: Show Posts :: Message Navigator

Admin: | Groups Manager | Accounts Pending Approval (4)

Forum	Messages	Topics	Last message
General			
Announcements Moderator(s): NemesGal	7	7	Mon, 03 August 2009 By: suzuki
General Questions Moderator(s): NemesGal	65	15	Thu, 15 October 2009 By: bustan
ILC Detector Readout A forum to discuss the read ahead for the ILC detectors. Moderator(s): NemesGal	6	5	Sun, 27 May 2007 By: tony
Physics - Physics Working Groups			
Higgs Physics Higgs working group discussions. Moderator(s): dash	7	6	Fri, 06 May 2005 By: jstube
Analysis and Reconstruction - Linear Collider Reconstruction and Analysis			
Analysis Tools General discussion of analysis tools	86	28	Thu, 07 January 2010 By: suzuki
Reconstruction General reconstruction discussion	73	32	Mon, 18 January 2010 By: hardick
Results Got some cool results to share. This is the place to post them.	8	0	n/a
Tracking & Vertexing Forum for discussions related to tracking and vertexing.	102	38	Thu, 04 March 2010 By: suzuki
Individual Particle Reconstruction aka "Energy Flow", "Particle Flow", E-Flow, P-Flow, PFA	3	2	Fri, 13 June 2008 By: tony
ILUDET Telescope Discussions about ILUDET pool beam telescope -- mainly analysis software and DAQ issues.	27	8	Tue, 20 October 2009 By: suzuki
Simulation - Detector Response Simulation			
Full Simulations Discussion of tools and techniques not covered by any more specific forum.	13	5	Fri, 20 February 2010 By: suzuki
Mokka Forum for discussing Mokka	279	118	Mon, 22 February 2010 By: suzuki
LCDG4 Geant4 simulation program for the ALCPG.	13	7	Thu, 07 July 2005 By: lisa
Common Simulation Framework Open discussion on development of a common simulation framework or toolkit.	3	3	Sat, 05 June 2004 By: lisa
etc.	11	11	Wed, 27 January 2010

forum.linearcollider.org

FreeHEP Forum: Welcome to the forum - Mozilla Firefox

http://forum.freehep.org/index.php?r=index&id=083ce58ec3af95994e6ed8892e0289

Private Messaging Members Search Help Control Panel Logout [tony] Home Admin Control Panel

Welcome tony, your last visit was on Thu, 11 March 2010 07:55

Show: Today's Messages :: Unread Messages :: Unanswered Messages :: Show Posts :: Message Navigator

Admin: | Custom Avatar Queue (1) | Groups Manager

Forum	Messages	Topics	Last message
FreeHEP Java Library - Discussion, comments and questions about the FreeHEP Java Library			
Announcements Announcements of new releases etc. Moderator(s): dash	11	9	Fri, 20 July 2007 By: suzuki
Vector Graphics Discussion of the vector graphics package .	537	116	Thu, 03 December 2009 By: suzuki
AIDA Discussion of the FreeHEP implementation of AIDA (AIDA + AIDA-J + CERN/BDAS/aida)	857	212	Sun, 24 January 2010 By: suzuki
HePRep Discussion on HePRep (High Energy Physics Representatives for Event Display) and its HePRep Java implementation	3	2	Mon, 09 April 2007 By: suzuki
Maven Plugins Plugins developed by FreeHEP for use with Maven	304	48	Wed, 10 February 2010 By: suzuki
General General discussion on topics for which no specific forum exists.	45	37	Wed, 20 January 2010 By: suzuki
Developer Developer's forum	129	36	Fri, 13 March 2009 By: suzuki
JAS - Discussion of JAS Analysis Studio			
Announcement Announcements of new versions, plugins, etc. Moderator(s): suzuki	13	7	Thu, 06 April 2006 By: Lafit
JAS3 Discussion of JAS3 - the newest version of JAS.	303	118	Tue, 06 October 2009 By: suzuki
JAS2	5	2	Tue, 16 September 2004 By: jstube
WIRED - Discussion of World-Wide-Web Interactive Remote Event Display			
Announcement Announcements of new releases etc. Moderator(s): dash	4	4	Fri, 05 August 2005 By: suzuki
WIRED-4 Discussion on the JAS WIRED Plugin.	28	9	Fri, 01 February 2008 By: suzuki
WIRED-3 Discussion on stand-alone and LCD JAS plugin version of WIRED.	5	2	Thu, 02 December 2004 By: suzuki
Test Category - Just a test category			

forum.freehep.org



Other collaborative tools

- **CVS, Subversion, Sventon, Nagios, Hudson and FreeHEP**

The collage displays four screenshots of collaborative tools:

- Top Left:** A screenshot of the Hudson web interface showing a list of build jobs with columns for Name, Next Starts, Duration, and Status.
- Top Right:** A screenshot of the Nagios monitoring interface showing a list of hosts and their status.
- Bottom Left:** A screenshot of the Hudson web interface showing a detailed view of a build job, including a table of build results.
- Bottom Right:** A screenshot of the FreeHEP Java Libraries website, featuring an introduction, news, and components sections.



Collaboration User Databases





Java for visualization, reconstruction and analysis



Why Java for HEAP?

- **Java is a pure Object Oriented Language**
- **Simpler to learn and use than C++**
 - **Language design emphasizes ease-of-use, programmer productivity**
 - Not hampered by historical baggage backwards compatibility with C
 - **Lack of direct access to pointers eliminates large source of common errors in C++**
 - Especially for less expert developers
 - **Garbage collector takes care of freeing unused objects**
 - Avoids many common programming errors
 - Avoids distorting OO design by removing need for “ownership” of Objects
 - **Very powerful standard libraries build-in**
 - Cross-platform GUI development
 - Huge number of open-source libraries
 - Libraries for scientific computing
 - Apache commons-math, JSci, FreeHEP, ...
 - **Physicist gets to concentrate on writing clean OO code to perform analysis tasks**
 - Not understanding core dumps and learning difference between a pointer and a reference.
- **Java is increasingly a (maybe the) mainstream OO language**
 - Taught in many university courses
 - Overtaken C++ in popularity for “open-source” projects
 - Very widely used especially in the areas of
 - Web application development
 - Graphical enterprise applications
 - Other fields of science, especially astronomy, biology, ...



Why Java for HEAP?

- **Platform independent, compile once just runs everywhere**
 - **Linux, Windows, Mac OSX**
 - Saves a lot of time when supporting code on many platforms
 - **Makes possible tools such as Java WebStart where user clicks a button on a web page to start an application with no need to have pre-installed any software.**
- **Full runtime access to information about classes (methods, member variables etc)**
 - Directly usable by scripting languages, analysis toolkits, IO
 - Replaces need to invent these mechanisms ourselves (c.f. CINT dictionary)
- **Performance of Java code is close to that of C++**
 - Although Java is initially compiled to machine independent “byte-codes” these are converted to machine code at runtime
 - Dynamic (runtime) optimization can take into account actual usage patterns
 - Not available to static optimizers used by Fortran, C++
 - Garbage collection often more efficient than user written malloc/free (or new/delete)
 - Many benchmarks available on the web
 - Some show C++ faster than Java, others show Java faster than C++
 - Our experience is that overhead of garbage collection and factors like array bounds checking makes (well-written) Java slightly slower than (well-written) C++, but overhead is typically small
 - Often raw performance is irrelevant compared to savings in development time
 - Which in turn can lead to cleaner more optimized code to begin with



Why Java for HEAP



- **Excellent tools (in many cases free)**
 - **IDE's**
 - Eclipse, Netbeans, IDEA, ...
 - Typically integrate editing, code completion, documentation viewing, refactoring, debugging, WYSIWYG GUI development, performance analysis, ...
 - These IDE's now support many languages including C++
 - Java has lead the way in excellent IDE support
 - **JMX**
 - Ability to connect to running program to view statistics, memory usage and control program execution,
 - Perform memory and thread dumps on running programs
 - Support for user defined “mbeans” for dynamic access to program functionality
 - **Build tools, ant, maven**
 - Maven allows a project to be build from source with a single command that:
 - Downloads correct versions of all dependencies
 - Compiles the code
 - Runs unit and integration tests
 - Deploys library to allow it do be used as dependency for other projects
 - Also allows web site, documentation and reports to be generated and deployed in a single command
 - Configured with a single declarative project description (in XML)



Why Java for HEAP



The screenshot shows the Netbeans IDE with the following components:

- Project Explorer:** Lists various packages under 'org.kohn.recon.tracking' and 'org.kohn.util'.
- Source Editor:** Displays the source code for `java.lang.Object`. The `equals` method is highlighted, showing its implementation and Javadoc comments. The comments describe the contract of the `equals` method, including reflexivity, symmetry, transitivity, and consistency.
- Navigator:** Shows the class hierarchy for `java.lang.Object`.
- WCS Output:** Shows the command prompt output for running the application.

Netbeans IDE

The screenshot shows the Java Monitoring & Management Console with the following components:

- Overview:** Displays four performance graphs:
 - Heap Memory Usage:** Shows memory usage over time, with a peak around 2.0 GB.
 - Threads:** Shows the number of threads over time, peaking at approximately 30.
 - Classes:** Shows the number of classes over time, peaking at 4,000.
 - CPU Usage:** Shows CPU usage percentage over time, peaking at 0.2%.
- Class Hierarchy:** A tree view showing the loaded classes, including `org.gast.databat.server` and `org.gast.databat.server.logger`.
- Statistics:** A table showing key performance indicators for the application.

Name	Value
ActiveCount	0
CompletedTaskCount	22968
CurrentProfileSize	4
LoadedProfileSize	10
MaxHeapSize	31
PostSize	0
TaskCount	22968

Jconsole 38/??

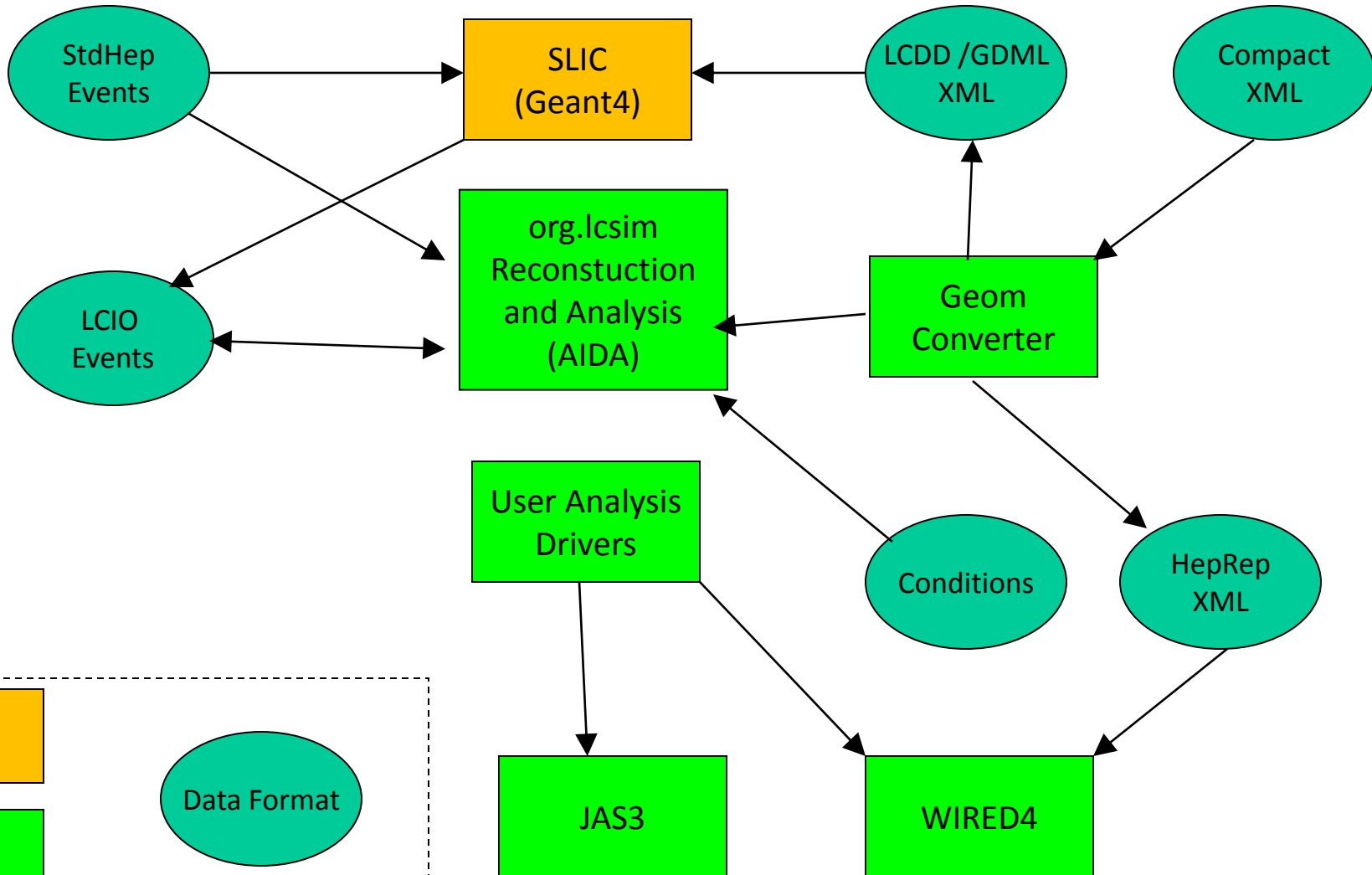


ILC Detector Development

- **Goal of ILC detector development is to study a variety of different possible detector configurations/technology for a future linear collider.**
- **Work has been ongoing for many years**
 - **Typically involves people who only work part time on this project**
 - **Students, post-docs typically work for 1 or 2 years then move on to something else**
- **Software needs to be flexible, very easy to learn and use**
 - **At past workshops we have distributed software suite on CD with goal “15 minutes from zero to physics”.**
 - **Windows, Mac, Linux**



ILC Reconstruction/Simulation/Analysis Framework as used by SiD detector



C++

Java

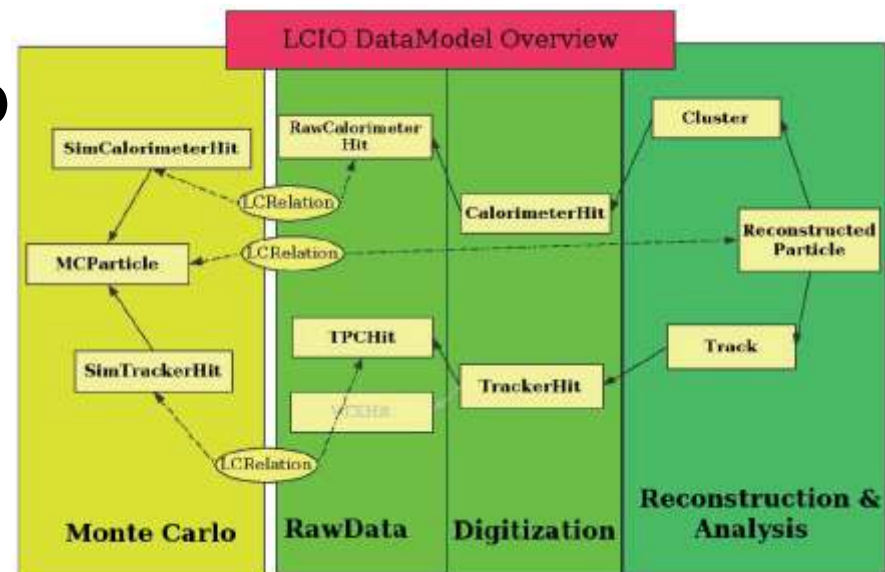
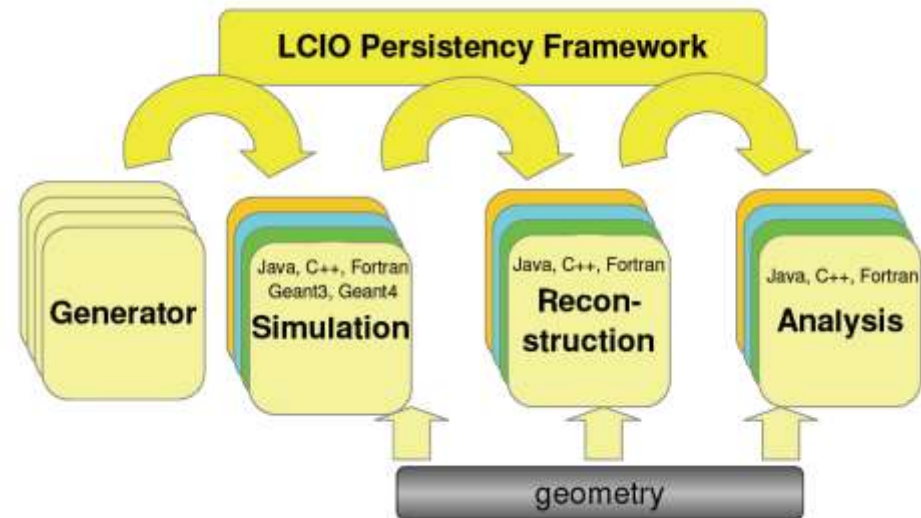
Data Format

I. Johnson



LCIO Persistency Framework

- **Object model and persistency**
 - **Events**
 - Monte Carlo
 - Raw
 - Event and run metadata
 - **Reconstruction**
 - **Parameters, relations, attributes, arrays, generic objects, ...**
- **All the ILC simulators write LCIO**
 - **Enables cross-checks between data from different simulators**
 - **Read/write LCIO from**
 - Fast MC / Full Simulation
 - Different detectors
 - Different reconstruction tools





org.lcsim: Examples

JAS3

File Edit View Tuple Loop LCIO Tools Window Grid Help

Examples ->

org.lcsim examples

These examples are written using the Java language. After opening them you need to compile and load them, and then use feed data to them using the Run menu.

Analysis101	Intro to analysis with AIDA.
BooleanCondition	Add a boolean value to the EventHeader and read it back again from a different Driver.
Cheater	ReconCheater example that makes perfect clusters, tracks, and reconstructed particles.
ClusterFinding	Find clusters using the Nearest Neighbor clustering.
DigitSimExample	Digitization example using the Digitsim package.
EventGenerator	Simple diagnostic event generator.
FastMC	Run the Fast MC.
JetFinding	Use the Jet Finder.
LCIOOutput	Write LCIO output.
NestedDriverExample	Nest analysis Drivers.
PrintEventHeader	Print the EventHeader of each event.
SkipEvent.java	Skip events using the NextEventException.
TrivialPFA.java	An example PFA using full cheating.

org.lcsim Jython examples for advanced users

These examples are written in Jython. They have to be executed from within of executing Java examples as well. You will have to provide data sample. Tutorial visit [Writing a Jython Driver](#).

mainLoop.py	The Main Jython wrapper to load any other Java or Jyt
Analysis102.py	A modified Jython version of Analysis101.java. Analysis simultaneously in mainLoop.py.

JAS3

File Edit View Tuple Loop LCIO Window Help

outfile.scio

DataSets
outfile.scio

Examples x LCISim Event x ClusterFinding.java x Analysis101.java x

```

1 import org.lcsim.util.aida.AIDA;
2 import hep.physics.vec.VecOp;
3 import java.util.List;
4 import org.lcsim.event.EventHeader;
5 import org.lcsim.event.MCParticle;
6 import org.lcsim.util.Driver;
7
8 public class Analysis101 extends Driver
9 {
10     private AIDA aida = AIDA.defaultInstance();
11
12     public void process(EventHeader event)
13     {
14         // Get the list of MCParticles from the event
15         List<MCParticle> particles = event.get(MCParticle.class,event.MC_PARTICLES);
16         // Histogram the number of particles per event
17         aida.cloud1D("nTracks").fill(particles.size());
18         // Loop over the particles
19         for (MCParticle particle : particles)
20         {
21             aida.cloud1D("energy").fill(particle.getEnergy());
22             aida.cloud1D("cosTheta").fill(VecOp.cosTheta(particle.getMomentum()));
23             aida.cloud1D("phi").fill(VecOp.phi(particle.getMomentum()));
24         }
25     }
26 }

```

classpath:/org/lcsim/plugin/web/examples/Analysis101.java

5.87/7.43MB



org.lcsim: Examples

JAS3
File Edit View Tuple Loop LCIO Window Help

Examples x LCSim Event x ClusterFinding.java x Analysis101.java x

Run:0 Event: 0

Event

LCIO Event Header

Run	0
Event	0
Time Stamp	Fri Mar 11 14:25:13 PST 2005
Detector Name	sdjan03

Blocks

Name	Type
HcalEndcapHitsNNClusters	org.lcsim.recon.cluster.nn.NearestNeighborCluster
HcalBarrHitsNNClusters	org.lcsim.recon.cluster.nn.NearestNeighborCluster
EcalEndcapHitsNNClusters	
EcalBarrHitsNNClusters	
MuonEndcapHitsNNClusters	
MuonBarrHits	
MCParticle	
TkrBarrHits	
EcalBarrHitsNNClusters	
HcalBarrHitsNNClusters	
MuonEndcapHits	
LumEndcapHitsNNClusters	
EcalBarrHits	
EcalEndcapHits	
HcalBarrHits	
HcalEndcapHits	
LumEndcapHits	
MuonBarrHits	
MuonEndcapHits	
LumEndcapHitsNNClusters	
MCParticle	

Analyzed 1 records in 406ms

JAS3
File Edit View Tuple Loop LCIO Window Help

Examples x LCSim Event x ClusterFinding.java x Analysis101.java x

Run:0 Event: 0

Collection: EcalBarrHits size:424 flags:a0000000

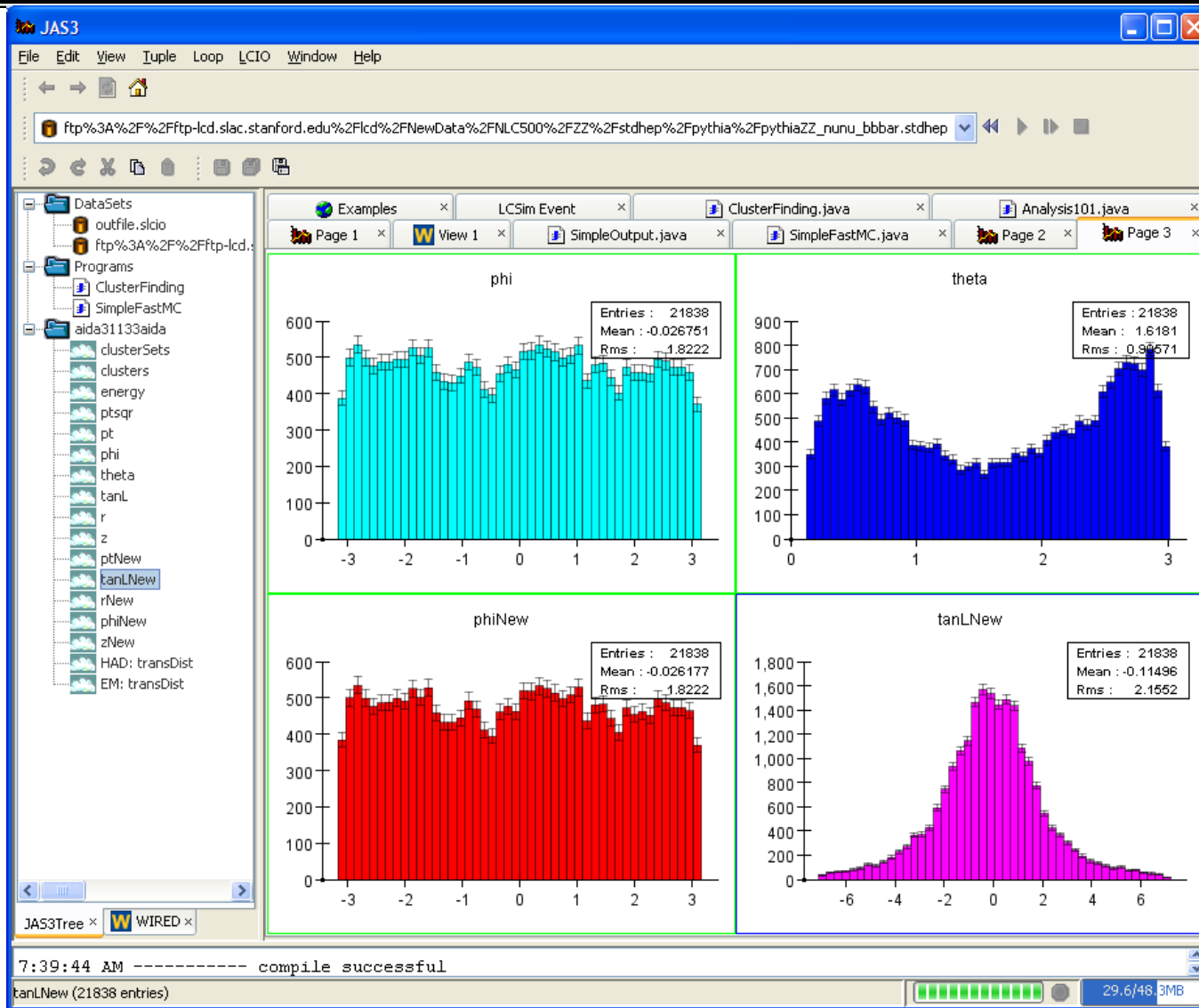
layer	system	barrel	theta	phi	energy	x	y	z
0	2	0	333	1595	4.0386E-4	1210.1	-395.70	426.89
1	2	0	333	1594	1.1317E-4	1213.4	-401.80	428.57
9	2	0	341	1593	6.0089E-5	1249.8	-419.05	398.53
1	2	0	333	1595	.0025117	1214.9	-397.26	428.57
2	2	0	333	1595	3.3759E-4	1219.7	-398.81	430.24
0	2	0	416	881	1.1273E-4	-1257.9	-196.82	16.667
1	2	0	416	880	3.5485E-4	-1263.6	-192.87	16.733
2	2	0	416	880	1.1914E-4	-1268.5	-193.62	16.798
3	2	0	416	880	1.0678E-4	-1273.5	-194.38	16.863
4	2	0	416	880	1.3202E-4	-1278.4	-195.13	16.929
5	2	0	416	880	1.0821E-4	-1283.3	-195.89	16.994
6	2	0	416	880	1.4717E-4	-1288.3	-196.64	17.060
7	2	0	416	880	1.1575E-4	-1293.2	-197.40	17.125
8	2	0	416	880	1.2397E-4	-1298.2	-198.15	17.191
9	2	0	416	880	1.3174E-4	-1303.1	-198.90	17.256
10	2	0	416	879	1.1775E-4	-1308.8	-194.77	17.322
11	2	0	416	879	1.3348E-4	-1313.7	-195.50	17.387
12	2	0	416	879	3.6082E-4	-1318.7	-196.24	17.453
13	2	0	416	879	1.1621E-4	-1323.6	-196.97	17.518
14	2	0	416	879	1.0455E-4	-1328.6	-197.71	17.583
15	2	0	416	879	1.0607E-4	-1333.5	-198.45	17.649
16	2	0	416	879	1.2895E-4	-1338.5	-199.18	17.714
17	2	0	416	879	1.2762E-4	-1343.4	-199.92	17.780
18	2	0	416	879	1.0228E-4	-1348.4	-200.65	17.845

Analyzed 1 records in 406ms

7.22/7.43MB



org.Icsim: Plot Viewing



Using org.lcsim with WIRED4



JAS3

File Edit View Tuple Loop Window Grid Help

panpyttbarsixjets-0-100_SLIC_v2r0p0_acme0605.slcio

Interaction Picking Settings Cuts

Interaction

Types

- DetectorType
- EventType
- HcalEndcapHits
- EcalBarrHits
- EcalEndcapHits
- LuminosityMonitorHits
- MCPParticle
 - Neutral
 - Charged
- MuonEndcapHits
- TkrEndcapHits
- VtxBarrHits
- VtxEndcapHits
- ForwardEcalEndcapHits
- TkrBarrHits
- HcalBarrHits
- MuonBarrHits

Instances

- Detector
- Event

Apply immediately Apply

Hide Types below level: 2

Hide Instances below level: 2

JAS3Tree x WIRED x

Click to zoom in, Shift-Click to zoom out, Drag inward or outward to instant zoom.

36.5/50.0MB



Design Goals

- **Keep technology simple for flexibility**
 - **Goals change frequently**
 - **Plain JSP pages + tag libraries**
 - **SQL embedded in JSP**
- **Design for portability and reuse**
 - **Always manpower limited**
 - **E.g. pipeline**
- **Modular systems with loosely coupled interfaces**
 - **AIDA, HepRep, LCIO**
 - **Make use of industry standard solutions wherever possible**
 - **Maintain ability to move forward with new technologies**
 - **Small independent applications which work seamlessly together**
 - **Developed in independent timescales**



Future Plans

- **We have clearly developed more stuff than we can support with the small group that we have**
 - **Many items are barely/not supported now**
 - **JAS, WIRED, AIDA, Plotter**
- **But still new items we would like to explore**
 - **More interactive web applications**
 - **GWT looks like a promising direction**
 - **Database optimization**
 - **More usage of Oracle 11g features**
 - **Optimization using Oracle Streams AQ**
 - **Ability to exploit many-processor architecture**
 - **Threading support and concurrency utilities in Java make this an obvious target**
 - **Cloud computing**
 - **Using cloud computing tools at SLAC**
 - **Use of remote cloud computing facilities**
 - **Collaborate with Root team, others....**



Interactions with CD

- **We have worked very closely with CD in many areas:**
 - **Unix support**
 - **Batch farm**
 - **Oracle/mysql support**
 - **Confluence/JIRA support**
- **There remain some areas where I think collaboration could be enhanced**
 - **General support of web tools and technology**
 - **E.g. Single sign-on**
 - **Collaborative tools (e.g. forum software)**
 - **Account management**
 - **Security issues**



Conclusions

- **We attempt to design software which can be reused by many experiments**
 - **Particularly appropriate as SLAC moves away from the ERA of one large experiment towards many smaller experiments**
- **Most of our interactions with CD are very positive**
 - **We seek to build strong collaborations with CD and other groups at the lab**