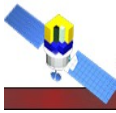
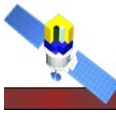
Calibrating the electronics response



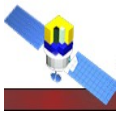
- Electronics response
  - Pedestals, MIP peaks in ADC/ TOT counts
  - Hardware thresholds in ADC counts
  - Linearity between ranges in ACD, CAL
  - Electronics Noise
- Input from three sources
  - Test charge injection (TCI)
  - Pedestal running (random triggers)
  - Response to selected particles (MIPs, CNOs)
- Software requirements
  - Analysis of TCI / pedestal data
  - Selection of calibration events
  - Generally simple and robust algorithms

Calibrating Efficiencies



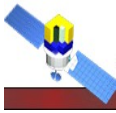
- Single channel efficiency
  - Dead channel maps
  - Time-walk related inefficiency
  - Effects of zero-suppression
- Trigger efficiency
  - Efficiency for each "physics" condition in L1
    - TRK 3 in a ROW, CAL Lo, CAL Hi, AcdVeto
  - Efficiency for various Onboard Filter "lines"
    - Need better understanding of Onboard Filter

Alignments



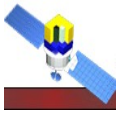
- Tracker
  - Plane to plane
  - Tower to Tower
  - Checks on twists, shears & other systematic effects
- Tracker – Cal
  - Tower by Tower
- Tracker – ACD
  - Tile by Tile
- Alignment Issues
  - Require large, clean samples of tracks
  - Temperature dependent

Timing & Telemetry data



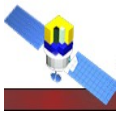
- Master Clock flutter
- Livetime
- Relative timing of events
- Position corrections

Environmental Calibrations



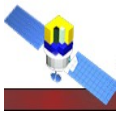
- Particles Background
  - Rates
  - Spectra & Orientation
  - Leakage into Photon Sample
- SAA characterization

Physics Level calibrations



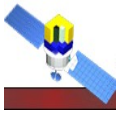
- Tracker spatial resolution, PSF
- Cal energy resolution
- Efficiency Hypercube
  - Hopefully these are stable over long timescales, but this needs to be checked

What Do All These Have in Common



- Calibration defined by:
  - Input data "collection" (list of runs & events)
  - Version of reconstruction/ calibration code
    - Calibration constants used in recon/ calibration
- Calibration has a validity period
  - Times and conditions under which a calibration should be used
    - Want to correlate validity periods with collection periods
- Calibration can be verified with a monitoring plot
  - Simple figure that shows visually how calibration was extracted
    - Want to overlay fit results as appropriate
- Calibration can be trended
  - Look from development over time
- Calibration can be grouped/ correlated w/ others

Web Based Interface, Top Level View



Channel Field to isolate 1 ore more channels

Shortcut to most recent

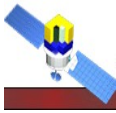
Acd	Channel:			
	Pedestals	Current	Search:	History
	Mip Peaks	Current	Search:	History
Cal	Channel:			
	Pedstals	Current	Search:	History
	LEX8 Gains	Current	Search:	History
	LEX1 Gains	Current	Search:	History
Tkr	Channel:			
	Dead Strips	Current	Search:	History
Align	Channel:			
	Layers	Current	Search:	History
….				

Drill down to detailed pages
With summary plots

Look for calibrations
Which match validity
criteria

Go to trending
plots page

Web Based Interface, summary level view



AcdPedestals

Input Validity	Collection Name 05/03/02 12:03:13 - Infinity		
000-0	241.5	plot	history
000-1	832.6	plot	history
001-0	396.1	plot	history
001-1	346.2	plot	history
...			

Channel

Value

Plot from which The calibration was extracted

Link to the trending Generation and validity History of this calibration

Web Based Interface, history view

Strip history chart showing input data and validity times for this calibration

AcdPedestals Channel 0-000

0x0000	241.5	plot	input_coll_01	05/03/01 - 05/03/03
0x0001	832.6	plot	input_coll_02	05/03/03 - 05/03/05
0x0002	396.1	plot	input_coll_03	05/03/06 - 05/03/07
0x0003	346.2	plot	input_coll_04	05/03/07 - 05/03/09
...				

Calibration Key

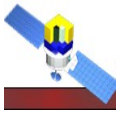
Value

Link to validation plots

Link to input data

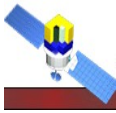
Validity Data

Web Based Interface, search criteria



- Channel
  - Physical and electronics spaces
  - One or more channels
    - Example (Cal, Tower 16, Layer 3, Log *)
    - Example (Acd, GARC 0, GAFE 1)
- Time
  - Date, time
  - Time stamp (seconds, nanosec since epoch start)
- Run
  - Which calibration will be used to process a run
    - Need to build from timestamps
- LAT configuration
  - Calibration depends on LAT configuration

Web Based Interface, single calibration view



Calibration: Top Level, Version v0r0, Key 0x0000
Validity Range: 05/03/01 – 05/03/03

Acd	Channel:			
	Pedestals	GARC	GAFE	
	Mip Peaks	GARC	GAFE	
Cal	Channel:			
	Pedstals	Tower	Layer	Log
	LEX8 Gains	Tower	Layer	Log
	LEX1 Gains	Tower	Layer	Log
Tkr	Channel:			
	Dead Strips	Tower	LayerSide	
Align	Channel:			
	Layers	Tower	LayerSide	
….				

Calibration Name

Search for a single channel by name

Drill down to single channel calibrations