

# Cal calibration validation and trending – Software Status

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# Overview

- Relatively well integrated, but not 100% complete suite of python scripts in calibGenCAL developed over last few years to handle Cal calibration validation and trending.

# Cal calibration deliverables

- Offline calibration files (XML)
  - CAL\_Ped, CAL\_IntNonlin, CAL\_LightAsym, CAL\_MeVPerDAC
- For Online use
  - DACSlopes file
    - offline XML file format
    - Linear models for (LAC,FLE,FHE,ULD) threshold vs MeV
  - Onboard pedestals, gain (C '.h' header file).
    - Built from offline calibration files
- LATC config (XML)
  - calibGenCAL is no longer responsible for generating configs, that is ConfigSystem.
  - calibGenCAL only provides the DACSlopes calibration file
- Unofficial calibration files
  - ADC2NRG (offline XML format)
    - not used externally but good for trending of overall response for each ADC range.

# Validation tools

- Generally plot distributions, log warnings when calibs exceed set limits
  - adc2nrgVal, asymVal,, intNonlinVal, mevPerDACVal, pedVal, tholdCIVal, dacSlopesVals
- `calibSetVal`
  - Check for consistency across full set of calibrations.
- `dacVal`
  - Compares DAC settings against `dacSlopes` input
    - Maybe should be part of `ConfigSystem`

# Calibration 'Diff' Tools

- Plot difference histograms / scatter plots between 2 epochs of same calibration type.
  - asymDiff, inlDiff, mpdDiff, pedDiff, adc2nrgDiff
- configData
  - Package contains in depth LATC Cal configuration reports & diff reports.

# Software Architecture

- Obviously we are going to need more plots & functionality in future.
  - E.g. no trending of > 2 epochs.
- Current software architecture is straightforward, consistent, comprehensive.
  - All validation scripts written in python, using pyROOT for plotting & fitting
    - Python executables & needed 3<sup>rd</sup> party libraries, now fully supported by GLAST\_EXT
  - Consistent python library provides XML i/o for all calibGenCAL deliverables
    - As well as many intermediate file types
  - XML2TXT & TXT2XML converter scripts provided for all deliverables, allowing for import / export into other analysis systems.
  - All part of calibGenCAL package
  - Existing scripts will be good starting point / example code for more sophisticated analysis.

# Running the tools

- All calibGenCAL python scripts have .sh and .bat launcher scripts are in PATH and perform any needed setup steps.
  - For mpdDiff.py, the launcher scripts are mpdDiff.bat and mpdDiff.sh.
- All calibGenCAL python scripts and C++ executables are put in PATH environment variable by 'cmt config' step
- All calibGenCAL scripts and executables print out a usage description when invoked with no commandline arguments.