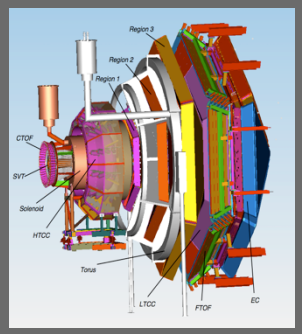
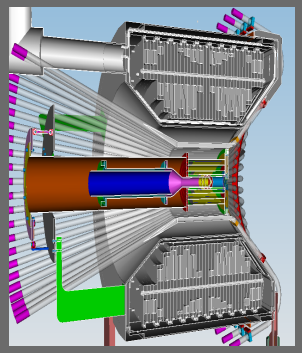
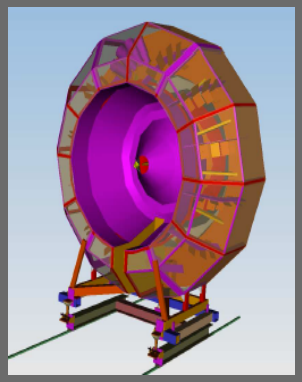
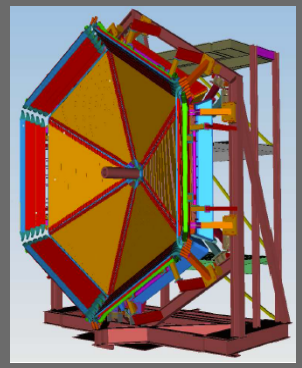


CalCom Activity Report

CLAS Collaboration Meeting

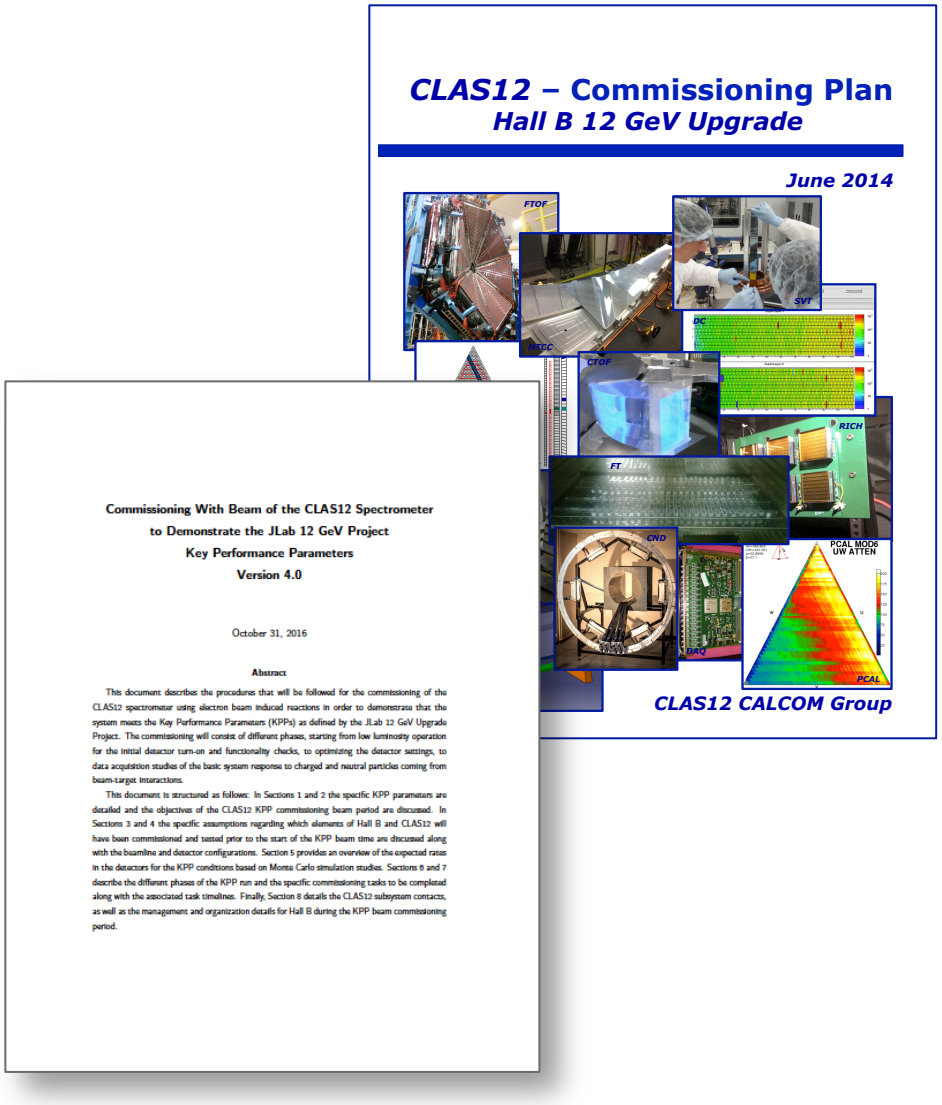
March 29, 2017

Since last meeting…

- Release of KPP Commissioning Plan
- Simulation studies for optimization of KPP configuration and KPP plots preparations
- KPP template slides
- Calibration Challenge in Dec. 2016 (see CLAS12-Note 2017-002)
- CLAS12 monitoring
- Continued calibration development and actual detector calibrations in preparation for KPP
- KPP!
- KPP data calibrations

CLAS12 KPP Run

- KPP Commissioning Plan presented at Dec. 2016 CLAS12 ERR
  - 6.4 GeV
  - No solenoid
  - C12 wire mounted on harp ladder
  - Focused on forward detectors
  - Partial installation of central detectors
  - Low luminosity: 10^{32}-10^{33} $cm^{-2}s^{-1}$
  - Few days of running

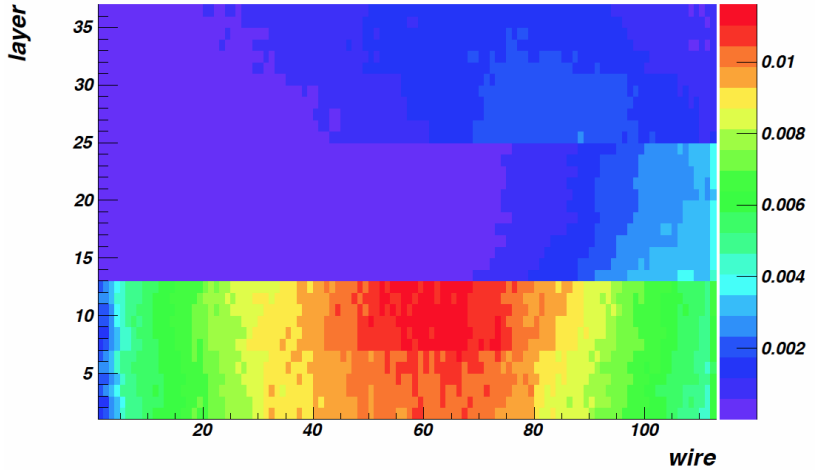


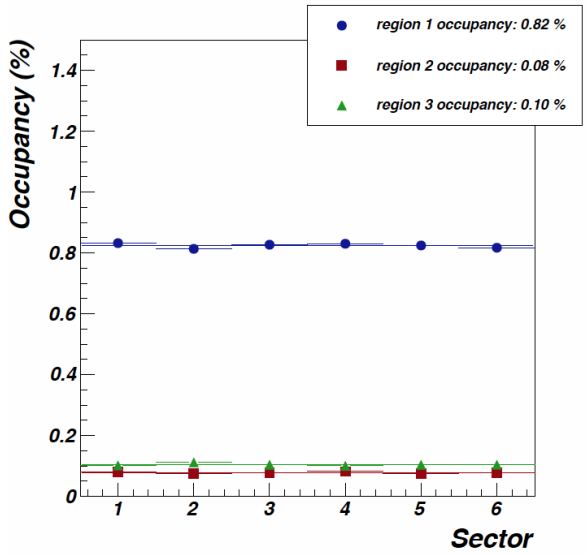
https://www.jlab.org/Hall-B/calcom/cwb-kpp.pdf

KPP background studies

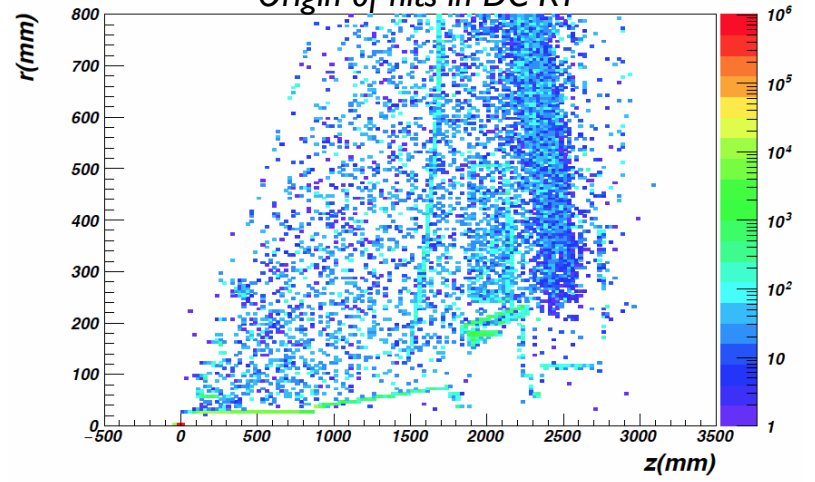
Drift chamber occupancies, no solenoid

L=10^{33} cm^{-2} sec^{-1}

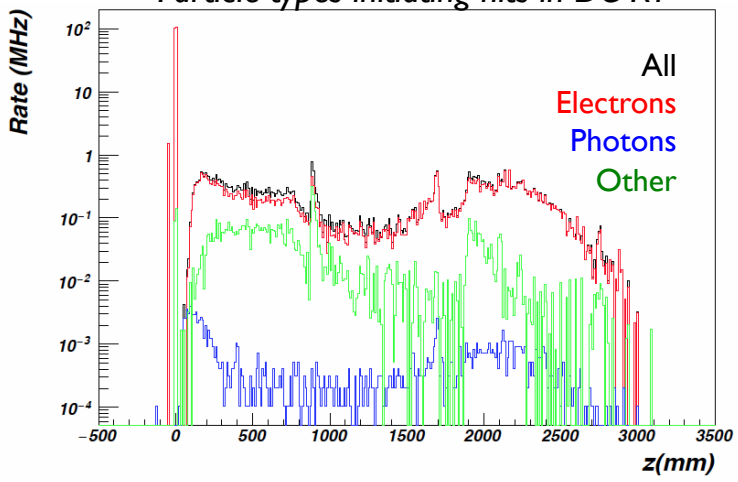




Origin of hits in DC R1



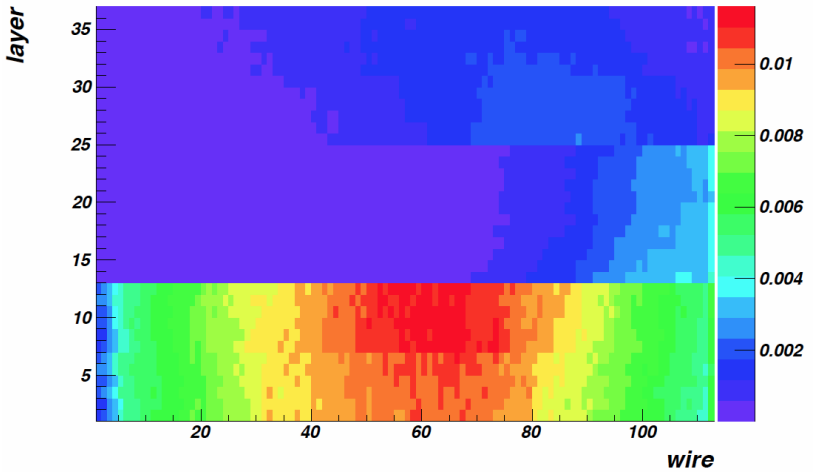
Particle types initiating hits in DC R1

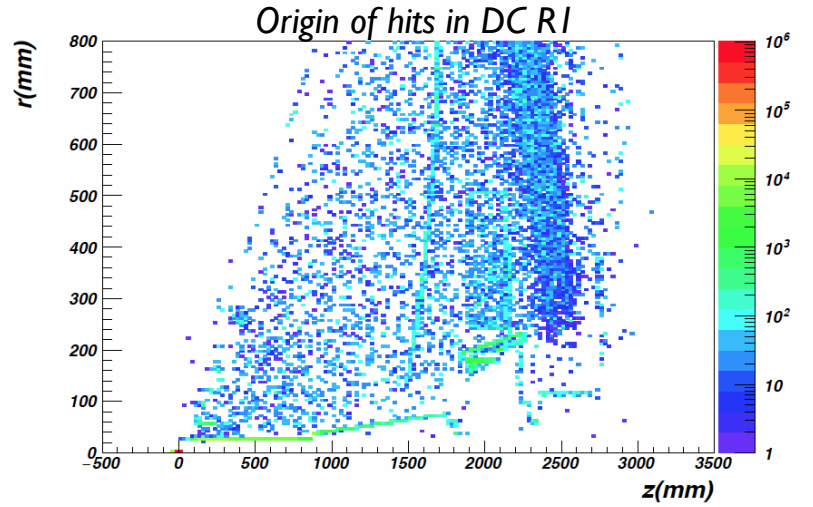


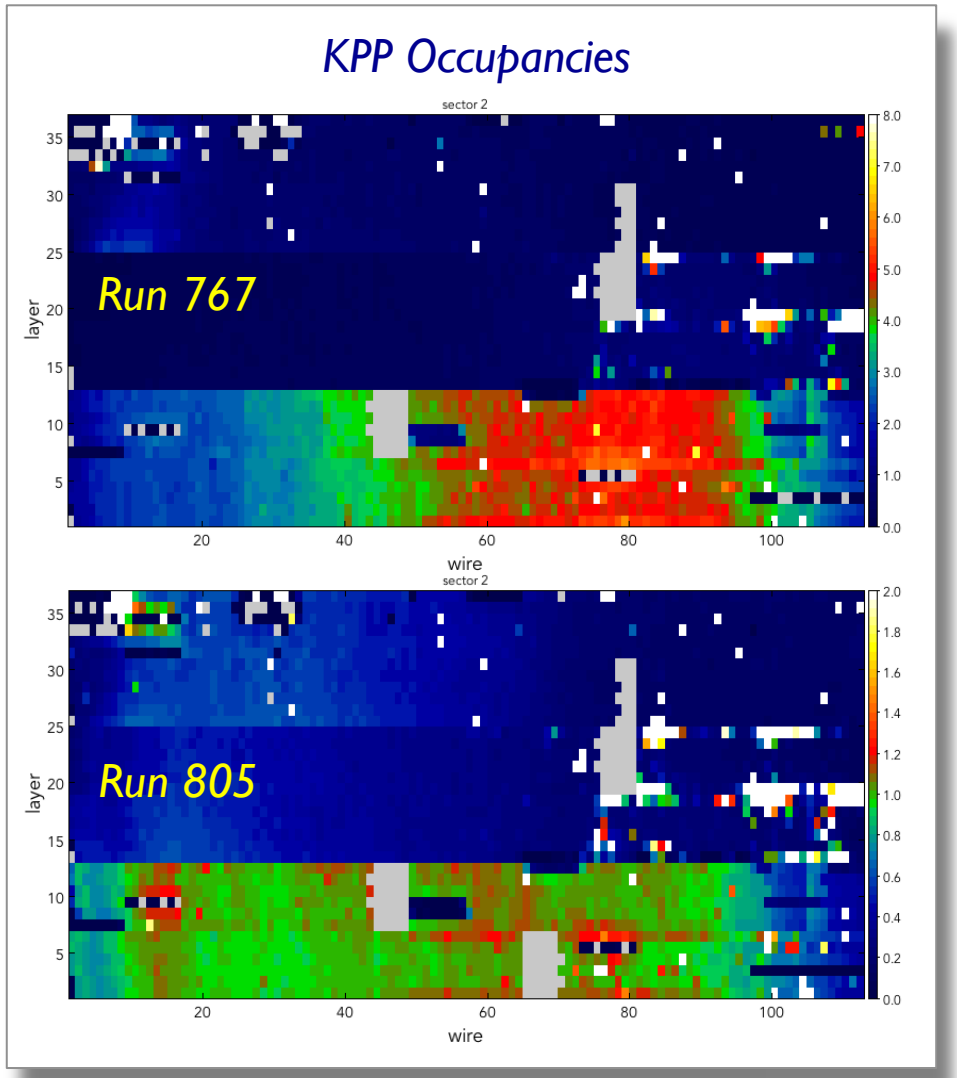
KPP background studies

Drift chamber occupancies, no solenoid

L=10^{33} cm^{-2} sec^{-1}







Calibration Challenge

Test of the full calibration procedure:

- Generate pseudo-data with "wrong" calibration constants
- Run calibrations for different systems in appropriate sequence
- Extract calibration constants and save them to DB
- Evaluate calibration quality by:
  - looking at monitoring plots
  - comparing reconstruction output with extracted and original constants

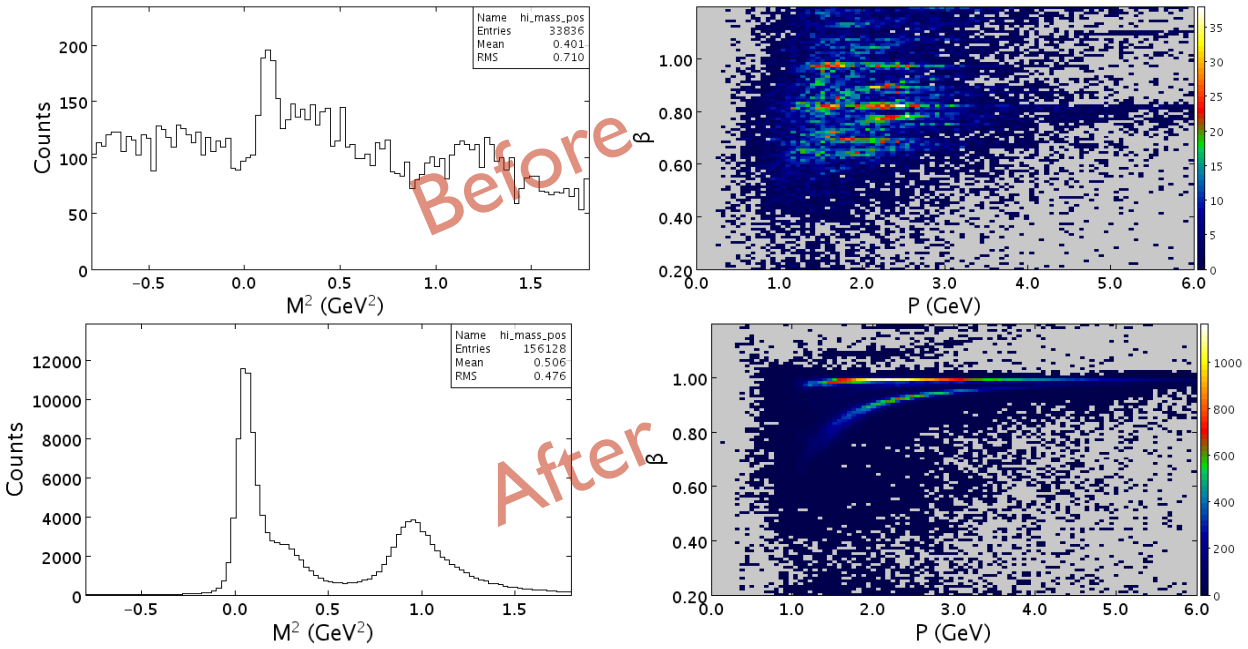
- New challenge in preparation for the Engineering run in July

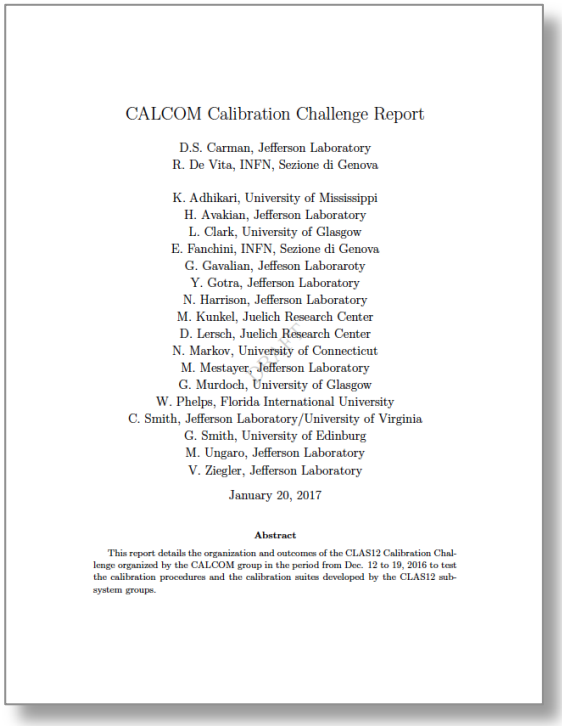
- Who:
  - Analysis Coordinator
  - Calibrator team
  - DB manager
  - "Chef" for data processing
- When:
  - December 12-19 2016 (1 week time)
- How:
  - Generate pseudo-data with Pythia and 10^{34} luminosity background
  - 1 shift (8 h) worth of data
  - Daily meetings and milestones for coordination and progress tracking

Calibration Challenge

- Participants: FTOF, DC, FT, CTOF, CND
- Results evaluation by comparison of calibration constant values and performance plots
- Findings, issues, lessons learned

Example: Mass and beta vs. p for positive particles from FTOF





CALCOM Calibration Challenge Report

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L. Clark, University of Glasgow
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N. Harrison, Jefferson Laboratory
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D. Lersch, Juelich Research Center
N. Markov, University of Connecticut
M. Mestayer, Jefferson Laboratory
G. Murdoch, University of Glasgow
W. Phelps, Florida International University
C. Smith, Jefferson Laboratory/University of Virginia
G. Smith, University of Edinburg
M. Ungaro, Jefferson Laboratory
V. Ziegler, Jefferson Laboratory

January 20, 2017

Abstract

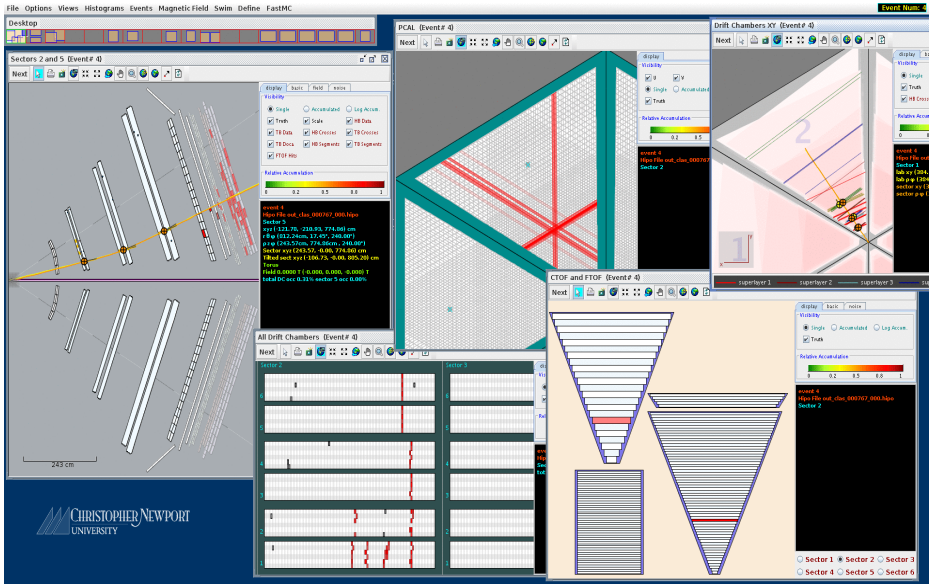
This report details the organization and outcomes of the CLAS12 Calibration Challenge organized by the CALCOM group in the period from Dec. 12 to 19, 2016 to test the calibration procedures and the calibration suites developed by the CLAS12 subsystem groups.

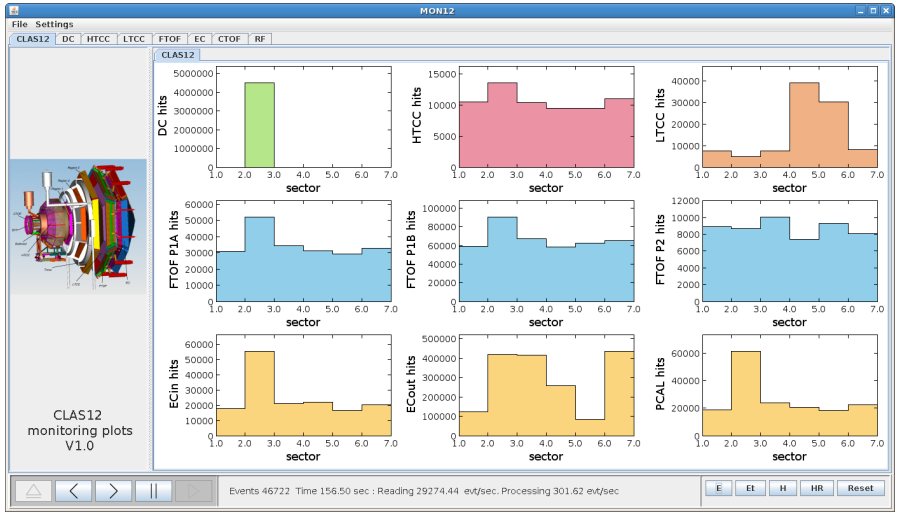
CLAS12-Note 2017-002

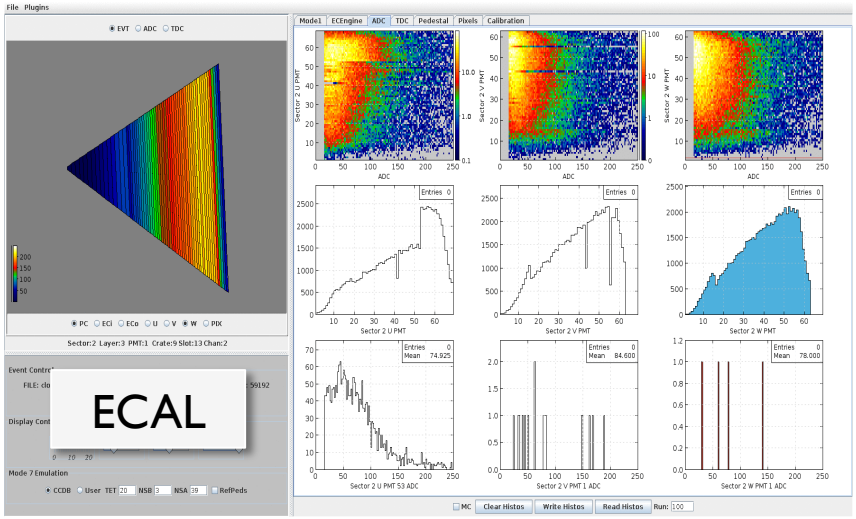
CLAS12 monitoring GUIs

Expert and Shift Taker GUIs developed in COATJAVA

- CED: CLAS12 event display (D. Heddle)
- MON12: shift taker GUI showing occupancies and raw data distributions for CLAS12 systems (RDV)
- Detector specific expert GUIs for detailed monitoring from pulse views to reconstructed information (C. Smith)

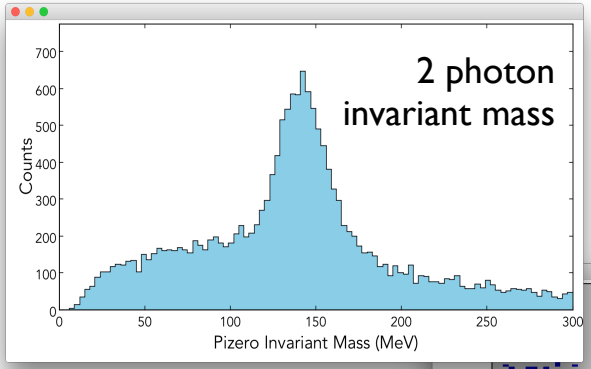


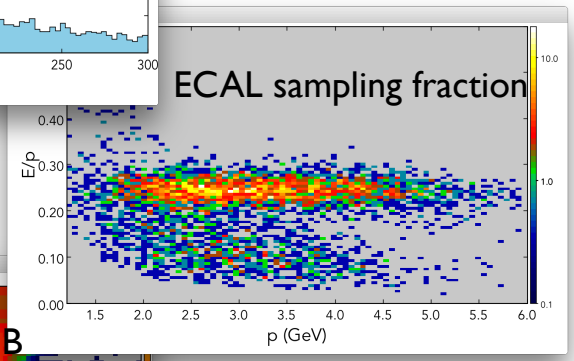


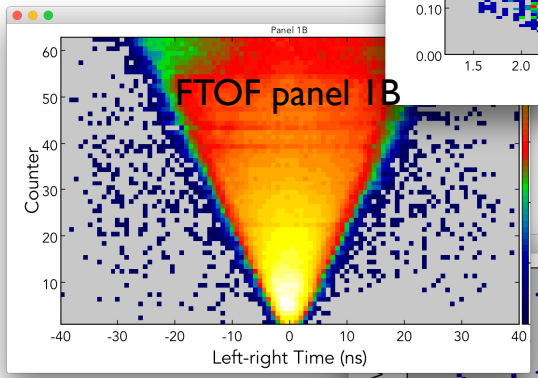


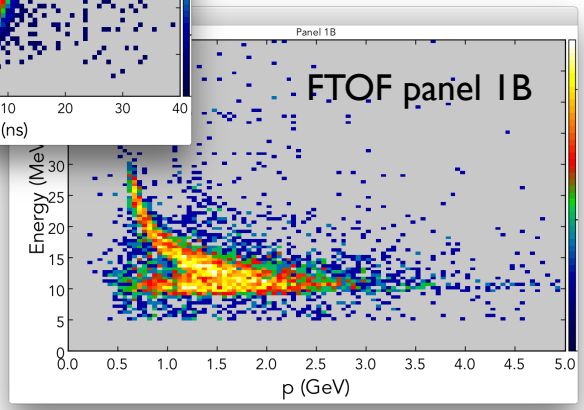
Calibration of KPP data

- Focus on forward detectors: ECAL, FTOF, DC
  - ECAL: energy calibration (gain and attenuation length) based on pions
  - FTOF: gain, attenuation length, effective velocity, left-right timing offsets completed, first iteration of time walk, paddle-to-paddle in progress
  - DC: first iteration of T0 and time-to-distance calibration
- Great opportunity to test procedures, identify issues and improve algorithms
- Limitations due to single sector DC
- Alternative procedure to calibrate detectors in all sectors being developed







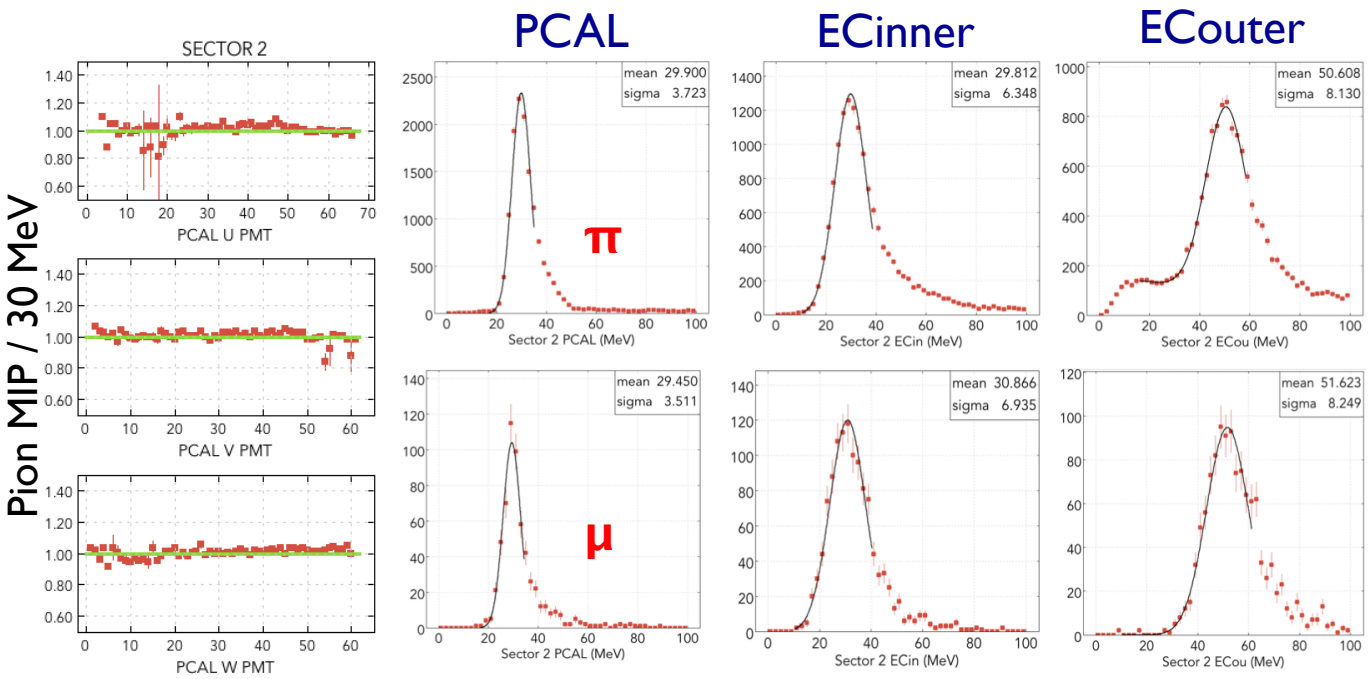


PCAL/EC Calibration

KPP MIP PIONS

Reconstructed energy clusters from pion triggers show correct MIP energy based on cosmic muon calibration

Preliminary results show validation of gain and attenuation correction procedures incorporated into calibration suite.



Further KPP energy calibration studies (1-2 months)

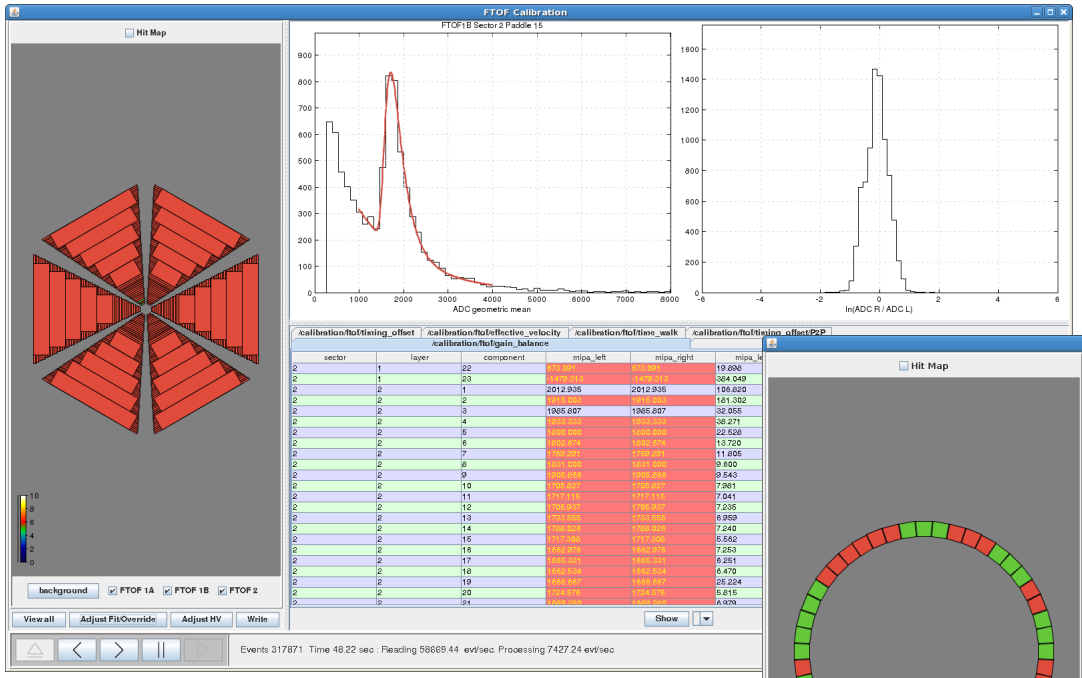
- Calibration of PCAL Sectors 1 and 4 using only pions (requires full KPP dataset)
- Feasibility of CLAS12 pre-scaled pion MIP trigger for gain monitoring and calibration
- Pizero invariant mass and resolution
- Electron E/P and energy resolution vs. GEMC simulation

Work remaining before engineering run (finish by mid-summer)

- Timing calibration suite (RF, FADC-based corrections). Probably use FTOF methods
- Method to provide suitably normalized calibration constants to FADC/VTP trigger

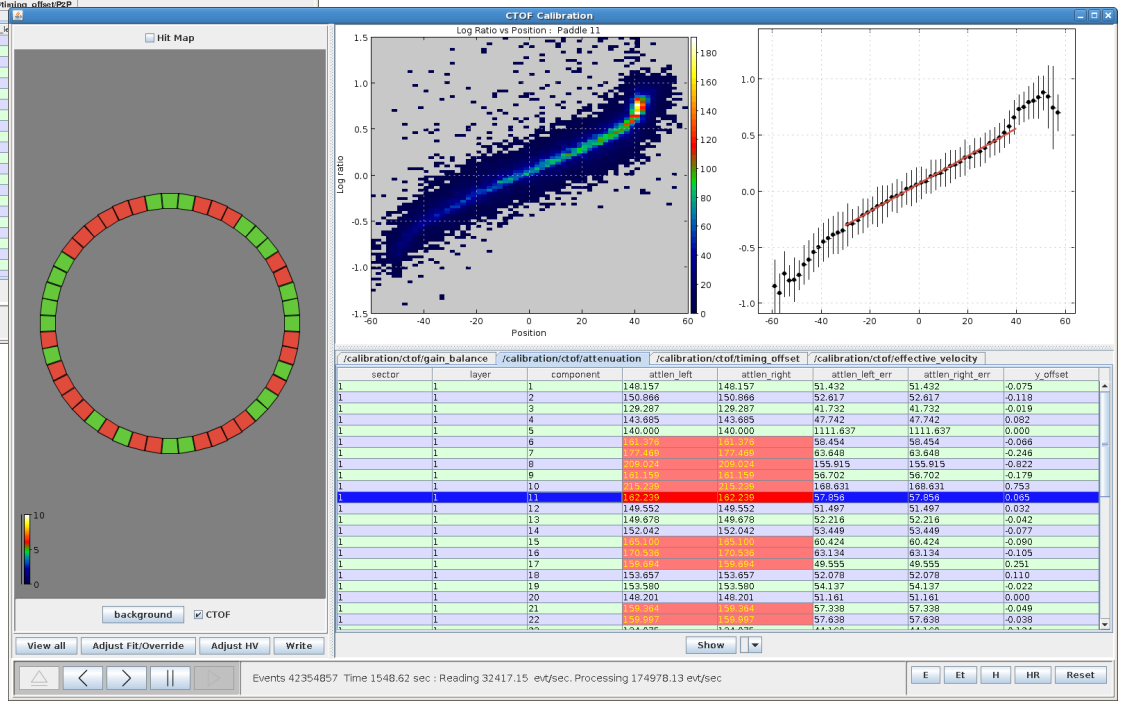
TOF Calibration

FTOF Calibration Suite



- KPP beam data under calibration using java-based code suites
- Final time counter time offsets being studied

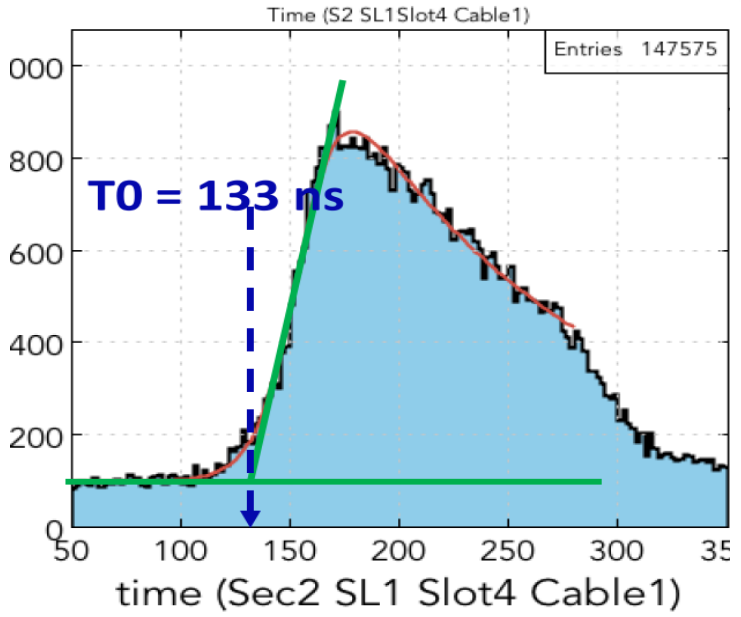
CTOF Calibration Suite

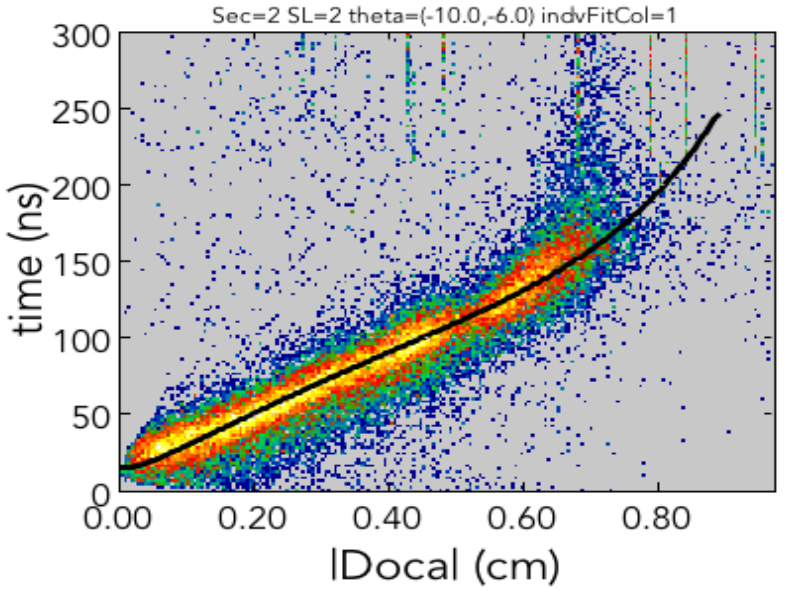


- gain balance
- PMT time difference
- attenuation length
- time walk
- paddle-to-paddle/RF offsets

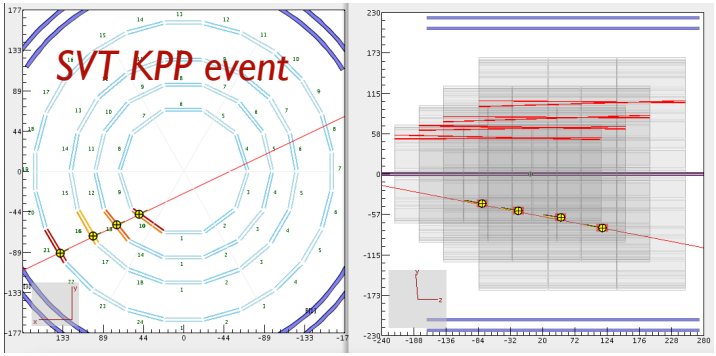
DC Calibration

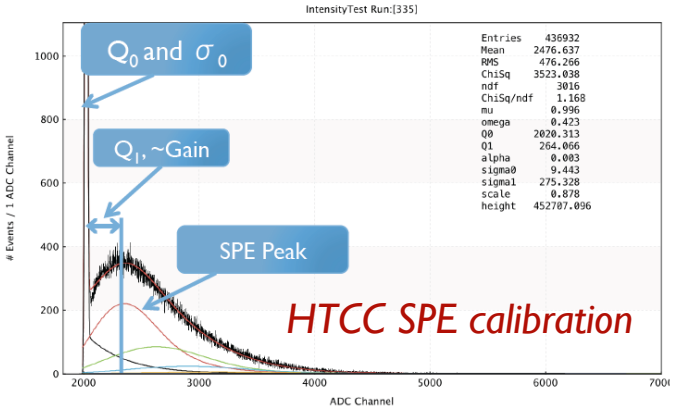
- GUI driven calibration suite is well in progress
  - Automated method for T0 corrections is ready to use
  - Machinery for the time-to-distance calibration is about 95% complete
    - Tests with KPP data underway
  - GUI development is underway
  - First working version of the suite is expected in about 2 weeks

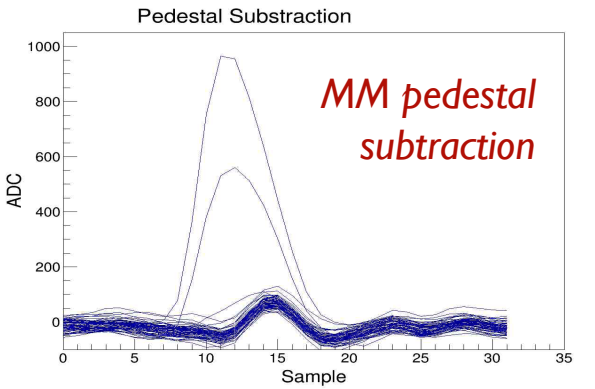


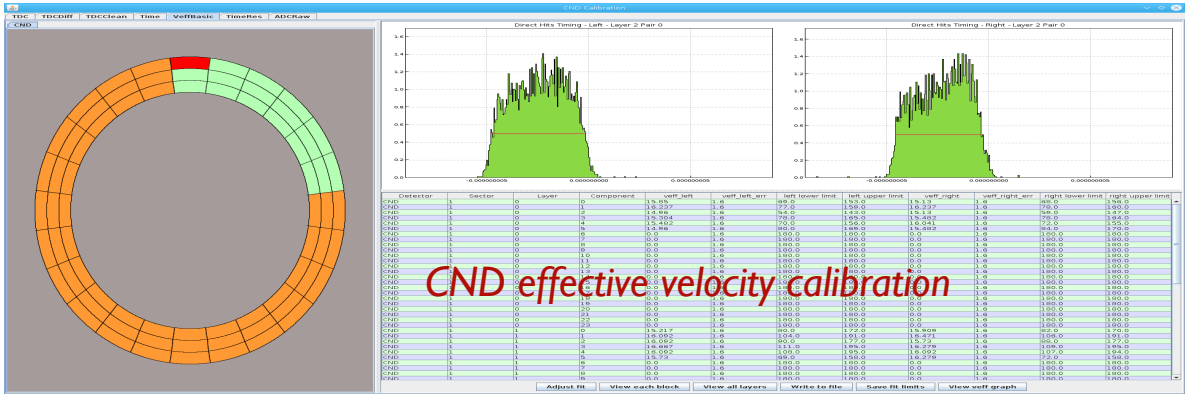


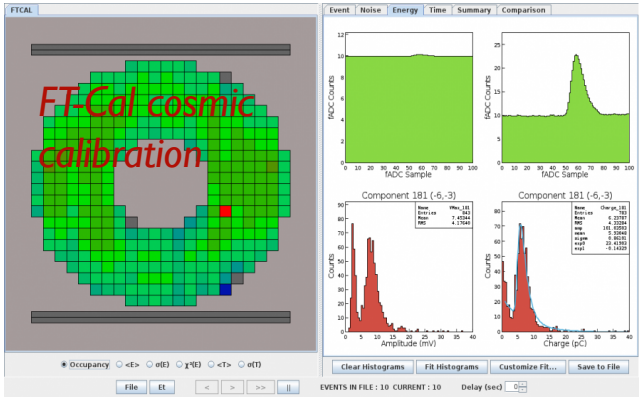
The Others…

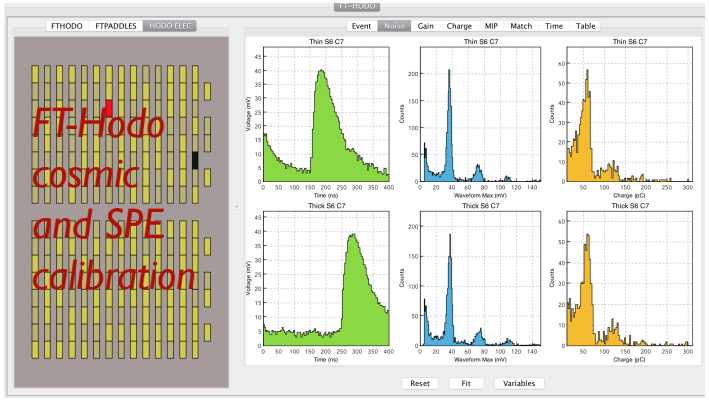

SVT KPP event


IntensityTest Run:[335]
Q0 and σ0
Q1, ~Gain
SPE Peak
HTCC SPE calibration
Events / 1 ADC Channel
ADC Channel
Entries 436932
Mean 2476.637
RMS 476.266
ChiSq 3523.038
ndf 3016
ChiSq/ndf 1.168
mu 0.996
omega 0.423
Q0 2020.313
Q1 264.066
alpha 0.003
sigma0 9.443
sigma1 275.328
scale 0.878
height 452707.096


Pedestal Substraction
MM pedestal subtraction
ADC
Sample


CND effective velocity calibration


FT-Cal cosmic calibration


FT-Hodo cosmic and SPE calibration

Summary and Plans

- A lot has happened since last Collaboration meeting:
  - KPP preparation (run plan, bg studies, simulations, …)
  - Calibration Challenge
  - KPP run!!
  - Continued calibration development and actual detector calibration
- Pre-beam calibration crucial for the success of KPP
- Present focus on KPP data calibration for forward detectors
- Parallel effort on calibration development for central detectors and ancillary system using non-beam data
- Still need significant development on Calibration Constants Database tool
- Goal of delivering full calibration suites by early summer:
  - Time for improvements and fine tuning before engineering run
  - Develop documentation and tutorials
  - Train "calibrators"
  - …