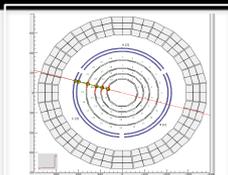


# CLAS12 Software Release

**Veronique Ziegler**

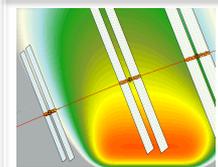
**First Experiment Workshop**

# Coatjava-2.4 Available Services



**Central Tracking:** : new reconstruction package for combined system 4 double-layers SVT + 1 double-layer BMT.

- CVT → helical tracks reconstruction
- CVTCosmics → straight tracks (cosmics) reconstruction



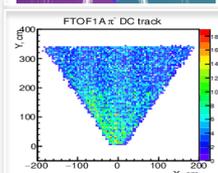
**Forward Tracking:** : improved noise rejection and segment finding algorithms.

- DCHB → hit-based tracking
- DCTB → time-based tracking → track parameters used for matching to FTOF & EB



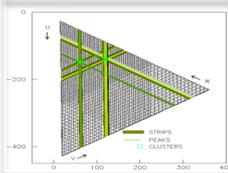
**PID:** HTCC reconstruction included in full reconstruction chain (e- ID). Clustering and timing validated on MC. Improved GEMC simulation of HTCC mirror reflectance.

- HTCC → runs HTCC reconstruction



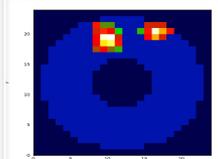
**PID:** TOFs: new reconstruction package for combined system CTOF+FTOF. Calibration constants from database.

- FTOFRec → FTOF reconstruction (hits & clusters [only hit info used in EB])
- CTOFRec → CTOF reconstruction



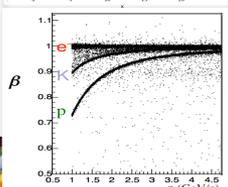
**PID:** EC/PCAL: implementation of attenuation correction. MC parameters tuned to match calibration data. Calibration constants from database.

- ECREC → runs EC and PCAL reconstruction



**PID:** FT: FT-Calorimeter & FT-Hodoscope services available for low angle  $\gamma$  & e- reconstruction. Improved clustering algorithms.

- FTCAL → Forward Tagger calorimeter reconstruction
- FTHODO → Forward Tagger hodoscope reconstruction
- FTMATCH → Forward Tagger matching between CAL and HODO



**Event Builder:** links services together, uses detector responses and tracking information to assign PID

- EB → runs the event builder (added at the end of the service chain by default)

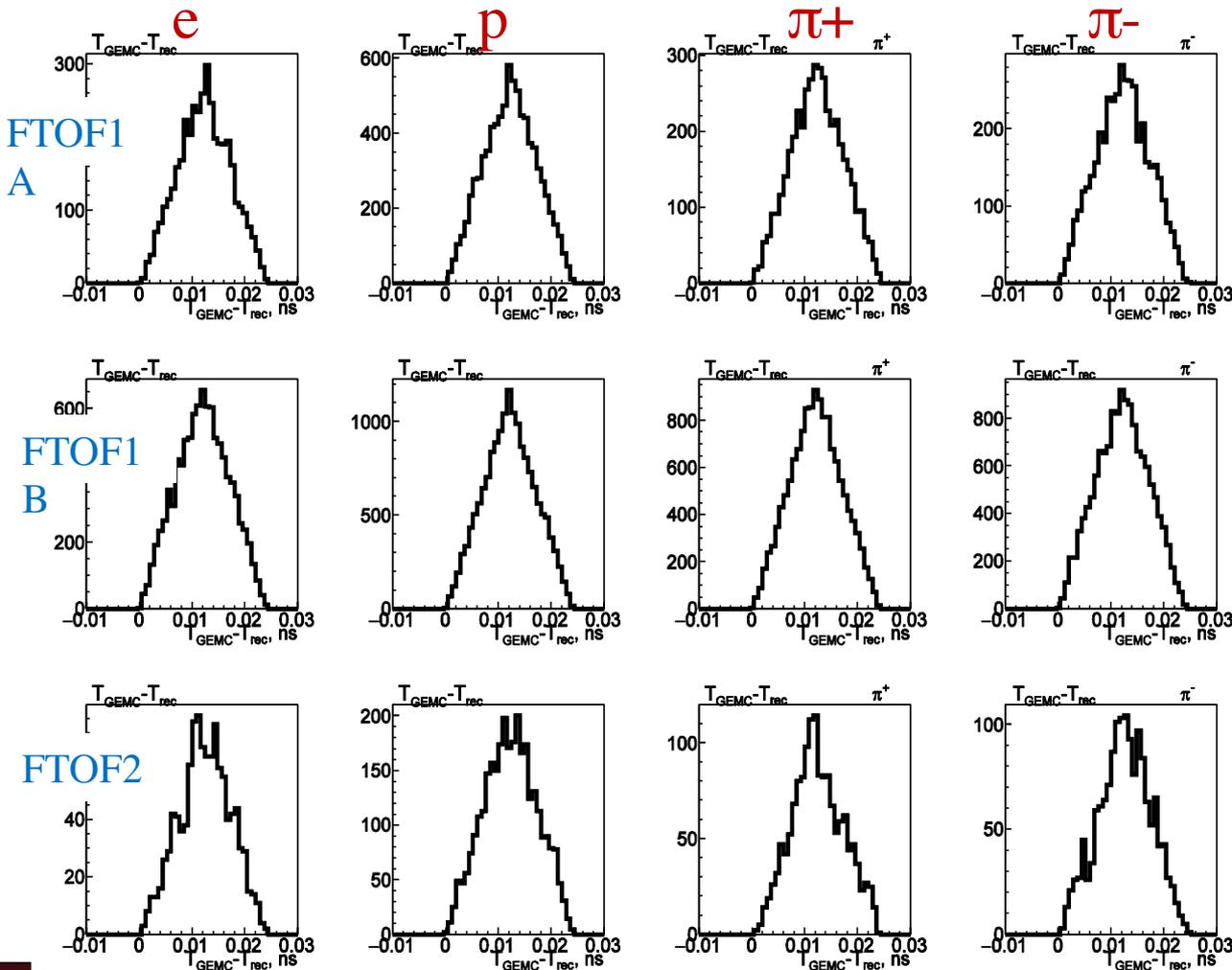
# TOF Software Update

- Reconstruction code (Java) written for combined system CTOF+FTOF
- Algorithms based on status word describing hit TDC and ADC values [1: OK, 0: not OK, i.e. FTOF word = ADCL\_stat TDCL\_stat ADCR\_stat TDCR\_stat ]
  - Done on a case by case basis → order of steps matters
    - missing ADCL,R - missing TDCL,R, missing one ADC & one TDC → requires tracking info
- Clustering and panel 1a,1b matching
  - corrected time using combined panel information (better than 1b alone)
- Ongoing development
  - Code being validated on GEMC (recon & simulation reads the same constants from ccdb)
  - Hit reconstruction validation ongoing for FTOF; just started for CTOF
    - Use of cluster information for timing resolution improvement being studied and validated
  - MC parameters tuned to match calibration data
- Timeline for project completion: end of August 2016

# FTOF Reconstruction Validation

E. Golovach (Moskow U)

FTOF hit time ( $T$ ), hit position along the scintillator paddle ( $X$ ) and deposited energy ( $E$ ) are reconstructed within the accuracy determined by the truncation of the digitized ADC and TDC, if no smearing in GEMC is applied.



- Good agreement between simulation and reconstructed data
- Energy correspondingly good
- Algorithm for clusterization being developed and validated
  - combine timing from panel 1a and 1b to give better hit time resolution

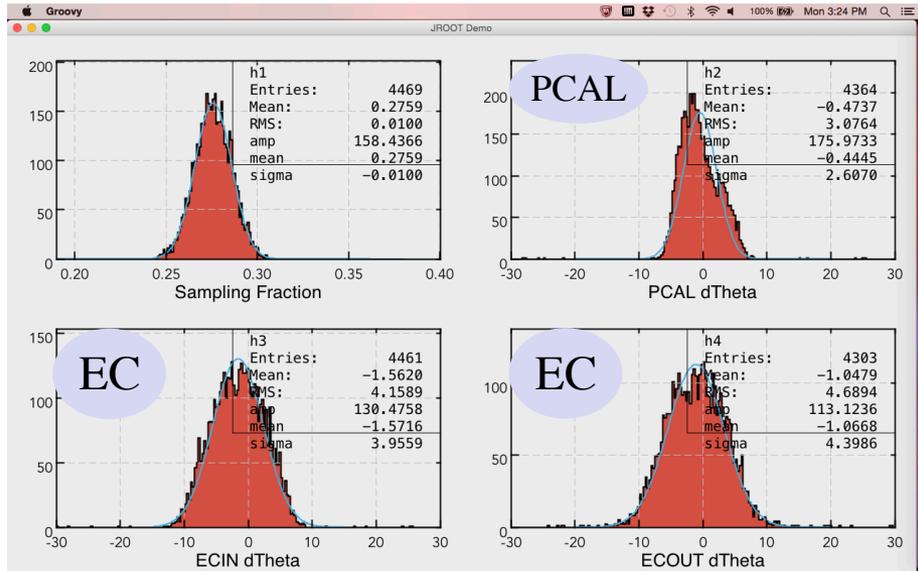
\* systematic shift due to digitization

# EC+ PCAL Reconstruction Validation

6 GeV photon simulated with GEMC

J. Newton (ODU)

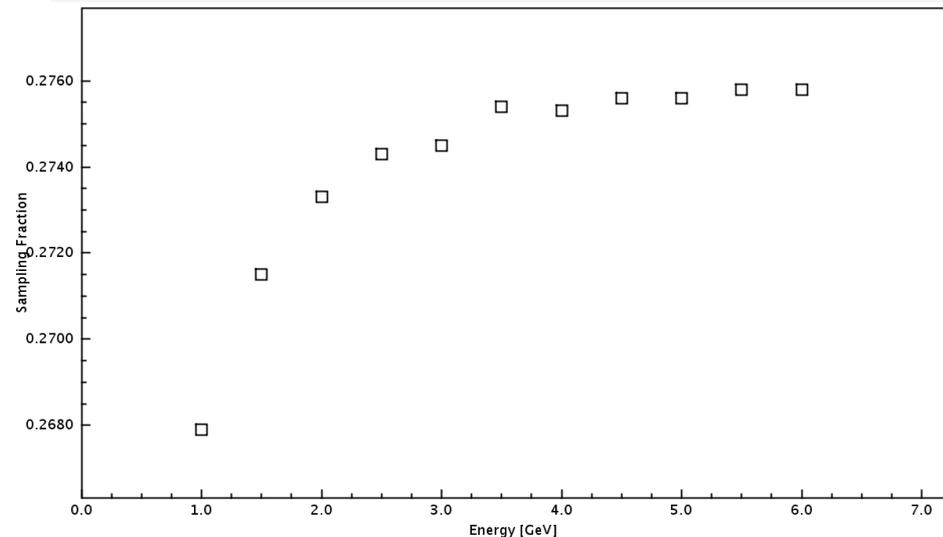
- Good agreement between simulation and reconstructed data for EC & PCAL
  - geometry agreement between GEMC and reconstructed validated for EC



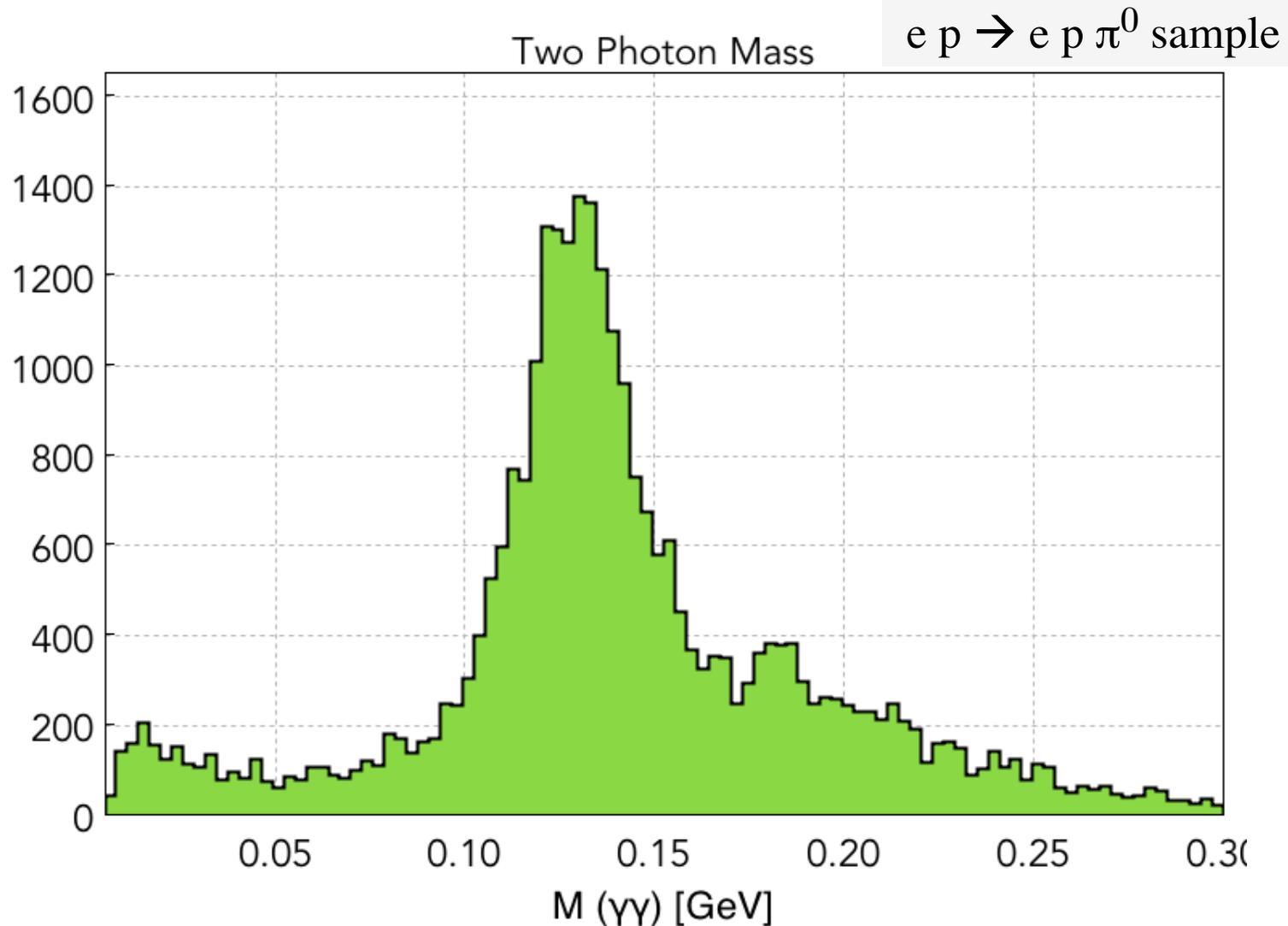
(units = mrad)

~90% efficiency from 1 to 6 GeV

Sampling fraction as a function of energy



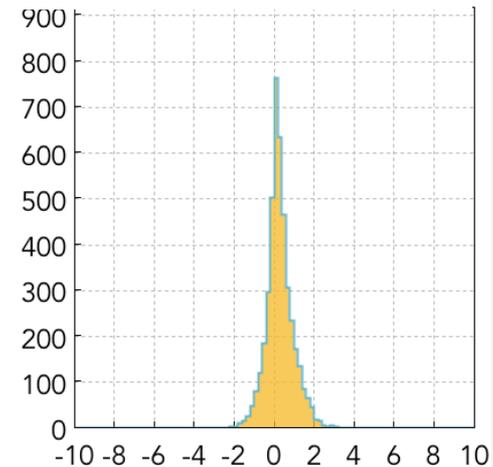
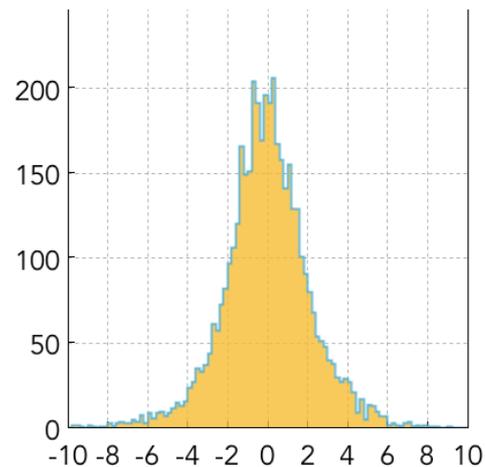
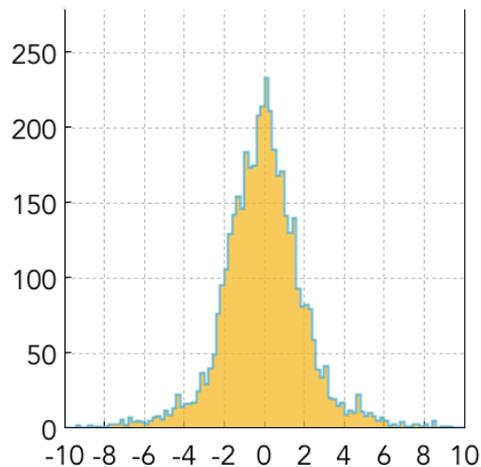
# Event Builder: Neutrals Reconstruction



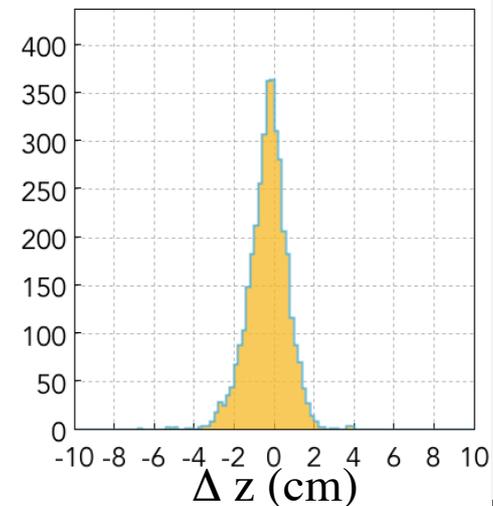
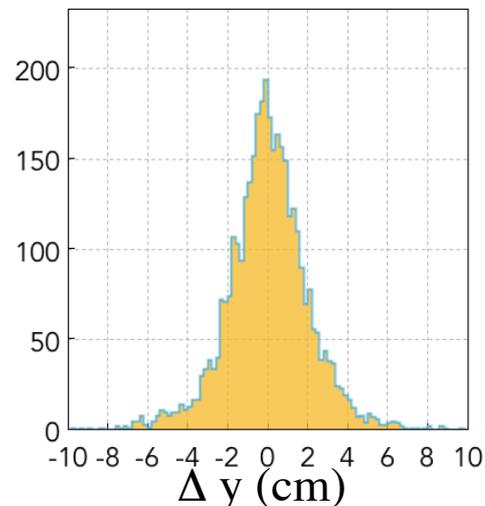
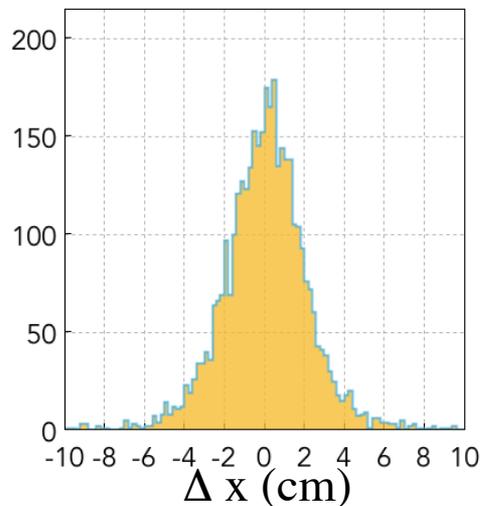
# Event Builder: FTOF Matching

$e^- p K^+ \pi^-$  sample

negative  
tracks

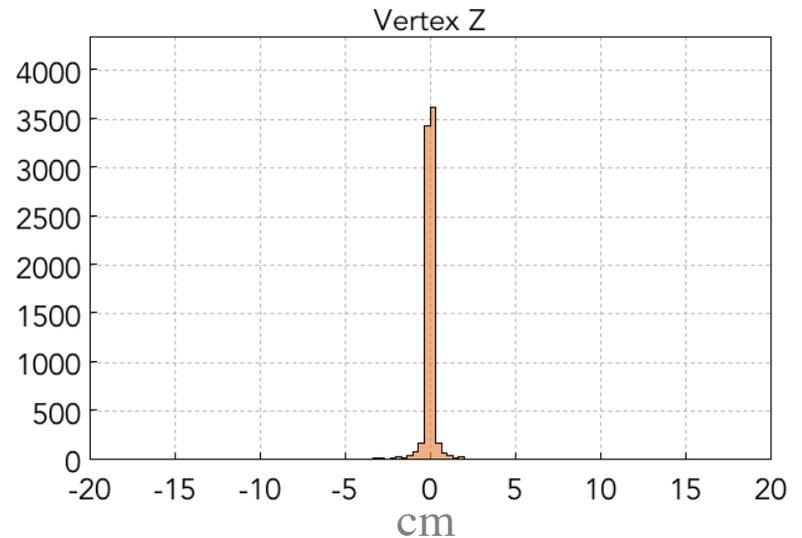
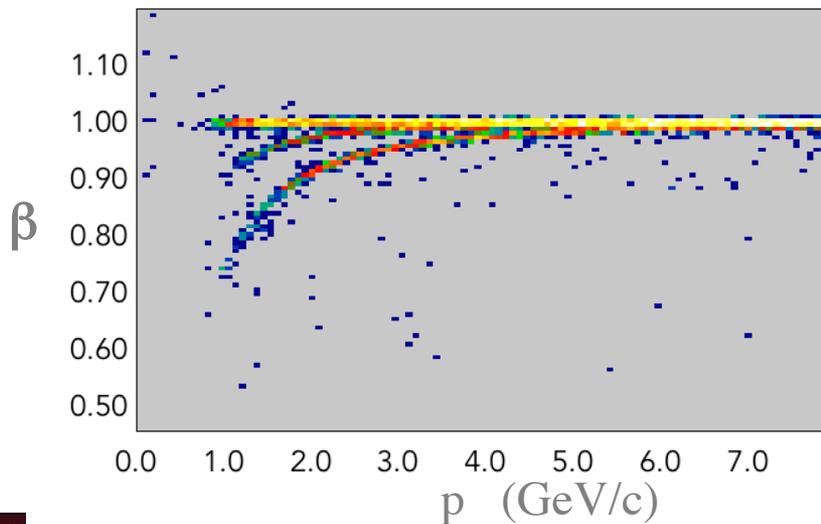
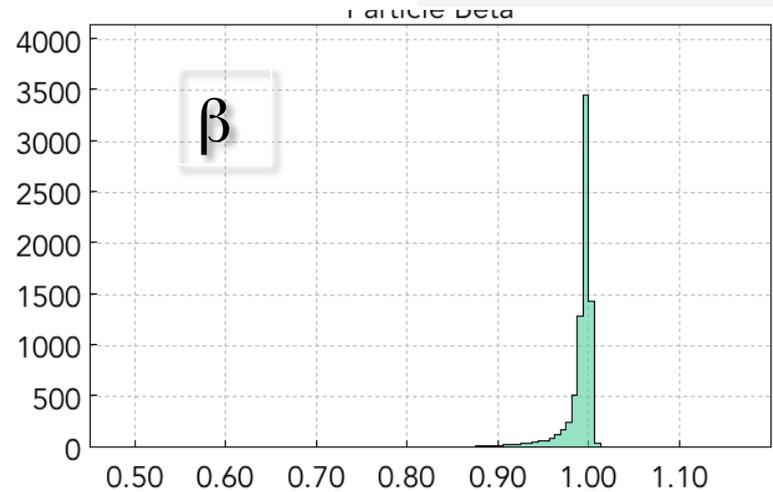
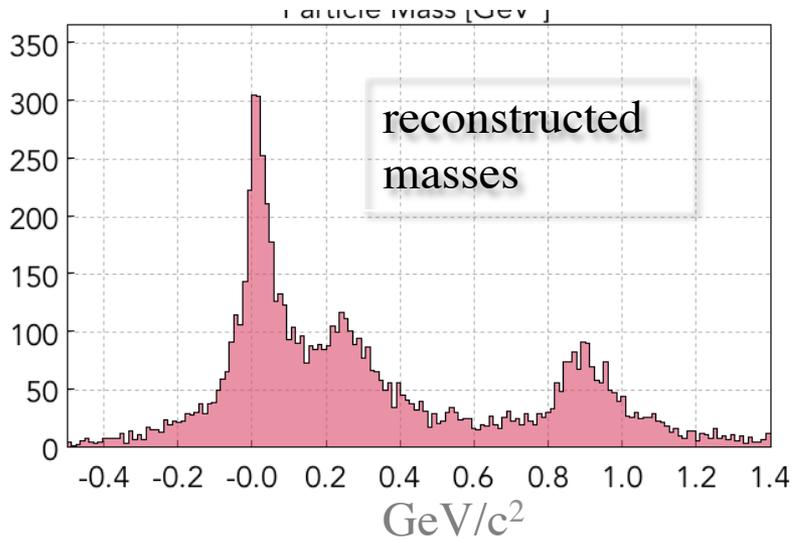


positive  
tracks



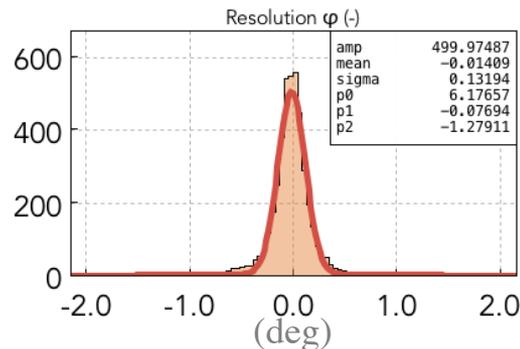
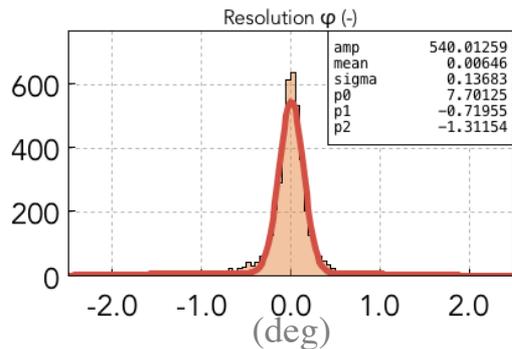
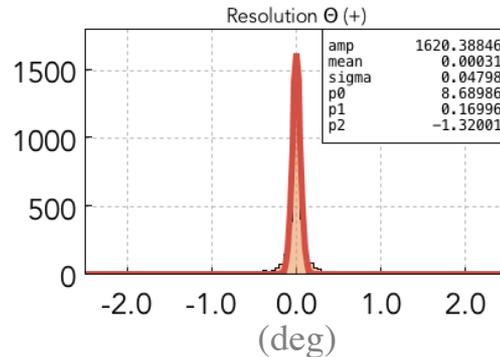
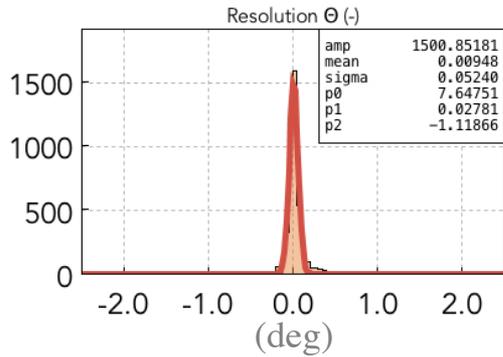
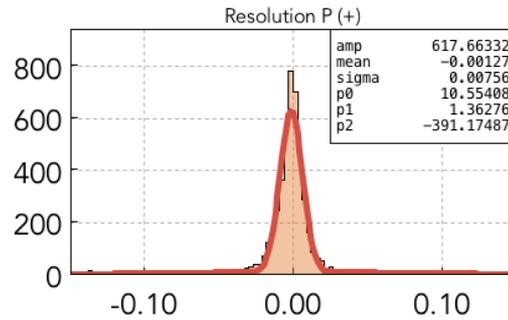
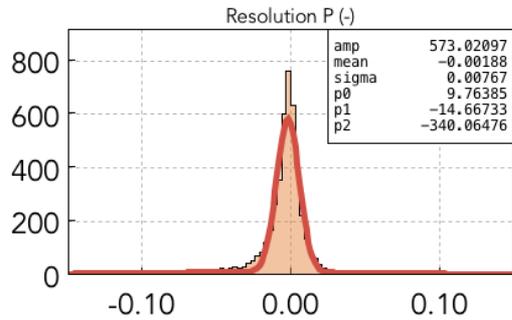
# Event Builder: PID

$e p K^+ \pi^-$  sample



# Event Monitoring: Tracking Resolutions

$e p K^+ \pi^-$  sample



negative tracks

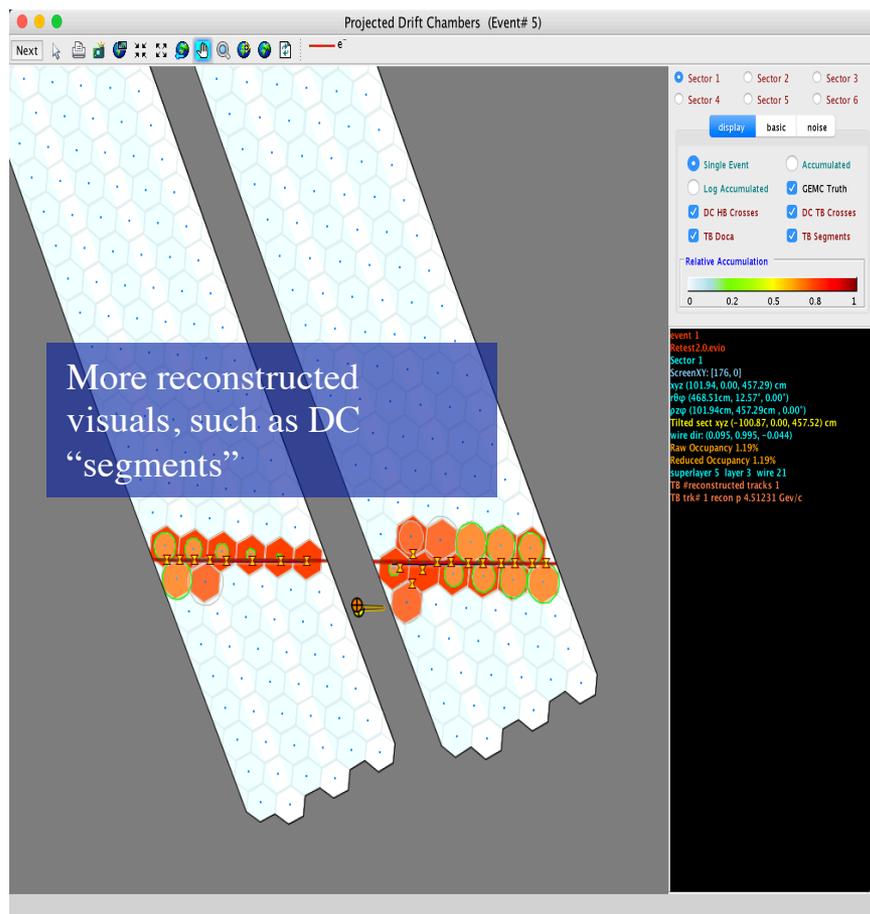
positive tracks

# ced new features

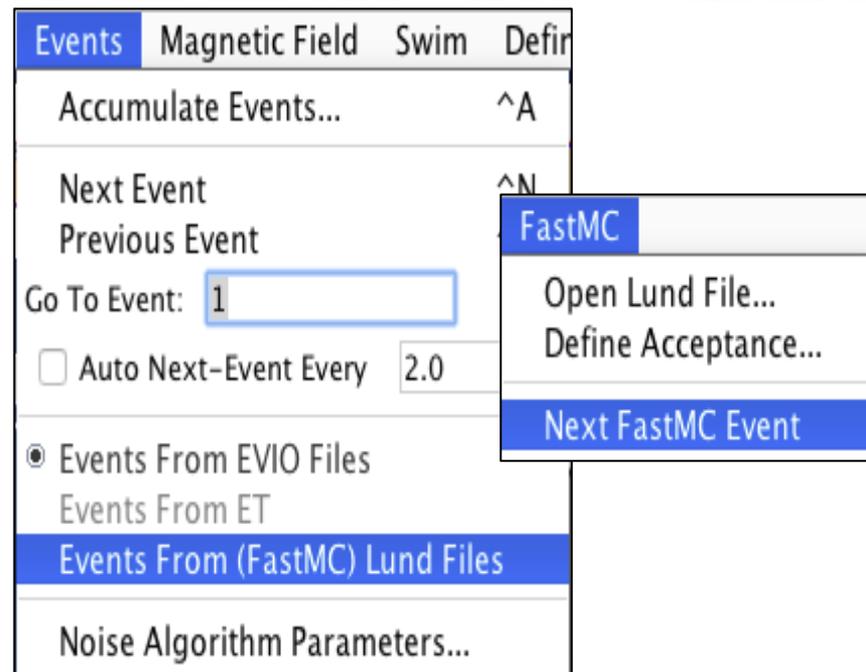
D. Heddle (CNU)

Coming soon, full integration with FASTMC, dictionary building, machine learning

Every view now has a next (event) button for convenience



New “Projected Drift Chambers” view. Instead of the entire detector projected onto a constant  $\phi$  plane, each superlayer is projected onto a plane perpendicular to its wires. This reduces distortion and makes visualization of tracks and segments wrt DOCAs more accurate and, consequently, more useful.



You can now choose “Lund Files” as the source of events. *ced* will read the file and swim the particles. It will then ask *coatjava* libraries to determine what was hit, and then it will display the hits.

Over the next month, we will use the DC hits to build a dictionary and (independently) to train a neural net. We will then test the resolution and speed of using these machine-learning products as 0<sup>th</sup> pass track fitters.

# Features, fixes and improvements

- use drupal forum to report issues
  - works like hypernews: searchable
  - <https://clasweb.jlab.org/drupal/forum>

The screenshot displays the Drupal forum interface. On the left, there are sections for 'Active forum topics', 'New forum topics', 'Navigation', and 'User login'. The main content area is titled 'Forums' and includes a 'Recent content' section with a list of posts. Below this is a table with the following data:

	Forum	Topics	Posts	Last post
	Calibration & Commissioning Calibration and Commissioning Software	4	6	analyze... by gavalian 07/28/2015 - 12:34
	General discussion	1	1	Plotting... by gavalian 07/06/2015 - 11:18
	Reconstruction	1	1	Electrons... by whit 07/21/2015 - 12:00
	Analysis Discussion on analysis tools	0	0	n/a

On the right side, there are sections for 'Who's new' (listing users: adhikari, lclark, lukas, lcsmith, fatiha) and 'Who's online' (stating 'There are currently 0 users online.'). At the bottom of the forum section, there are two bell icons for notifications.