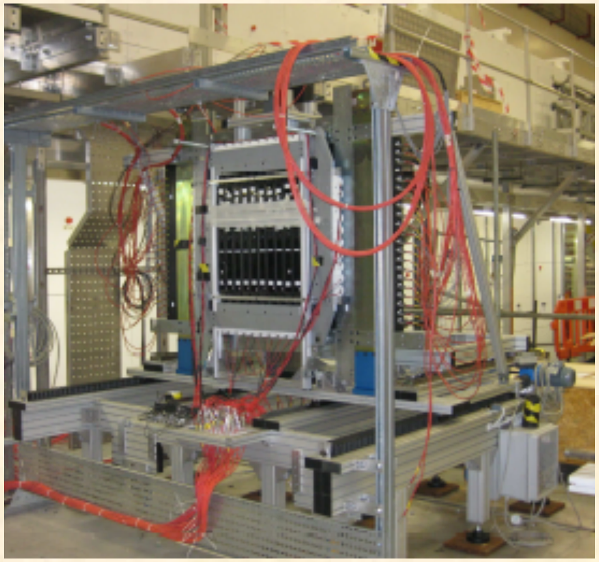
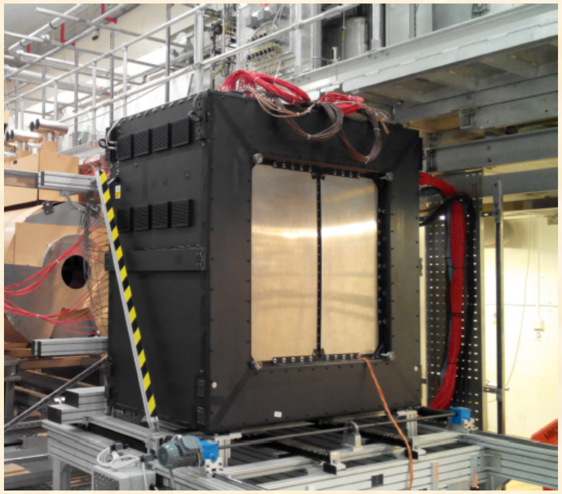
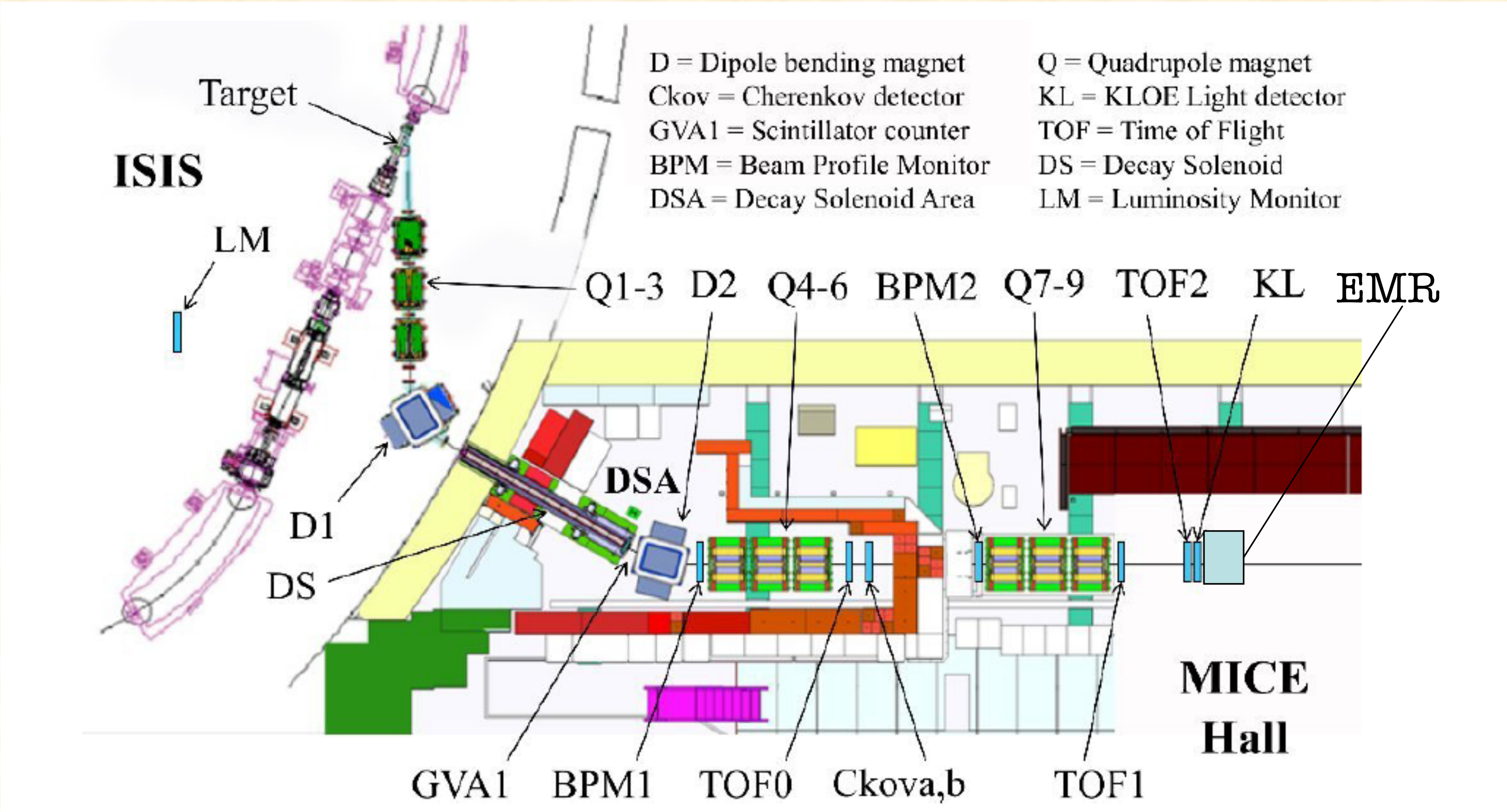
MICE PID: You can tell a muon, but you can't tell it much.

- I'll give a brief discussion of the PID detectors and current efforts.
- Full PID has been in place for MICE this year with the addition of the EMR.
- MICE, the fusion of an accelerator experiment with HEP tracker and PID detectors.





Particle ID at MICE



G4BL' Muon Runs 6-140 and 6-200

John Nugent /MICE NOTE 0416

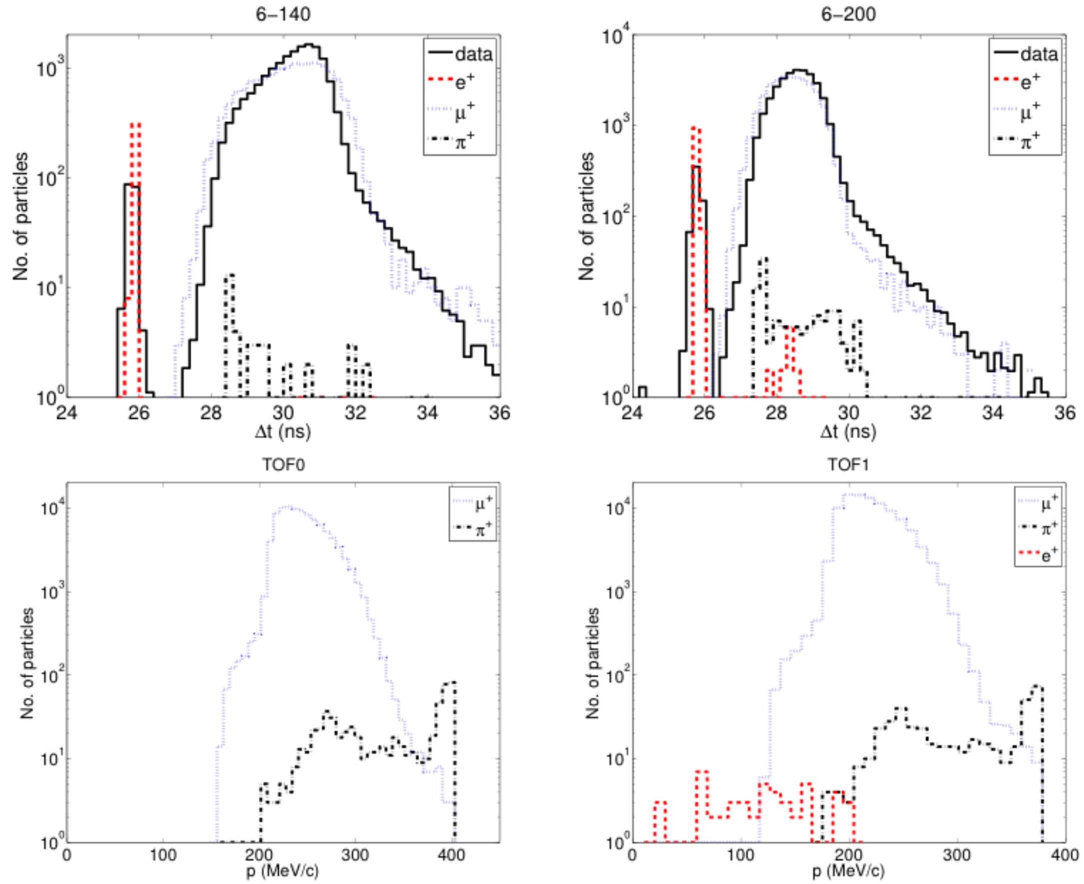
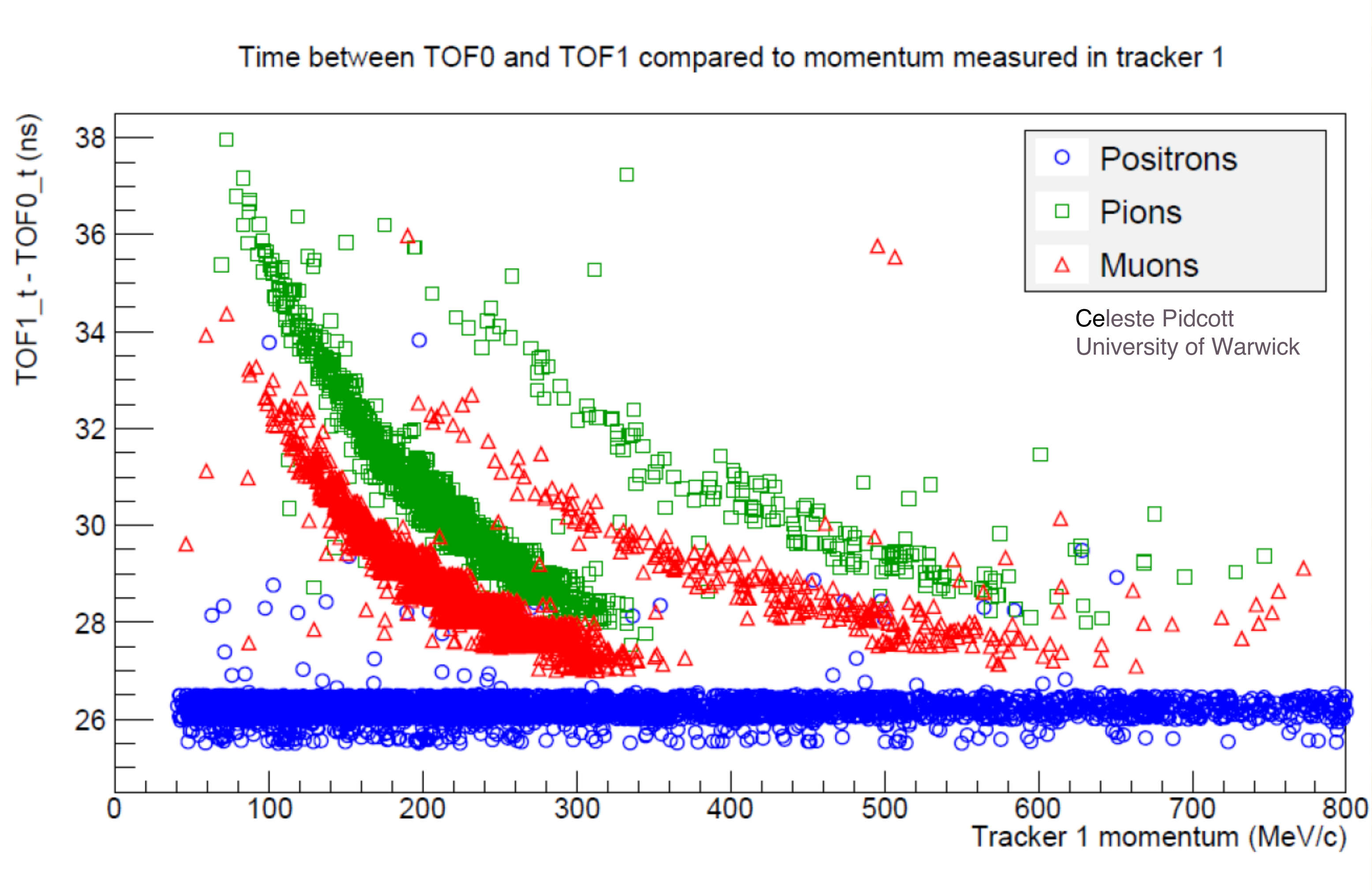


Figure 3. Time-of-flight distributions between TOF0 and TOF1 for data and Monte Carlo simulation: 6π mm · rad positive muon beams with nominal beam momentum $p_\mu = 140$ MeV/c (a) and $p_\mu = 200$ MeV/c (b). The position of the electron peak in the raw data has been renormalised to its nominal value. Momentum distribution for beam particles at TOF0 (c) and TOF1 (d) for a simulated positive 6π mm · rad at 200 MeV/c (a cut between 26.2 and 33 ns on the time–of–flight between TOF0 and TOF1 is applied).

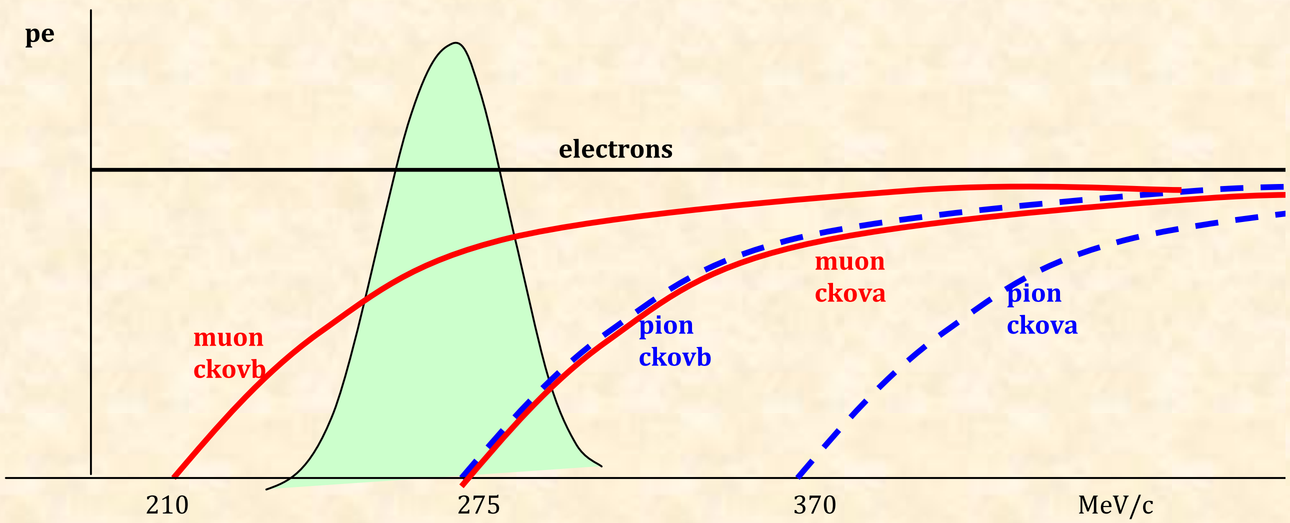
G4 MAUS TOF Spectra vs Tracker Momentum

Celeste Pidcott-Warwick and Global PID



Cartoon of CKOV Photoelectrons vs Momentum

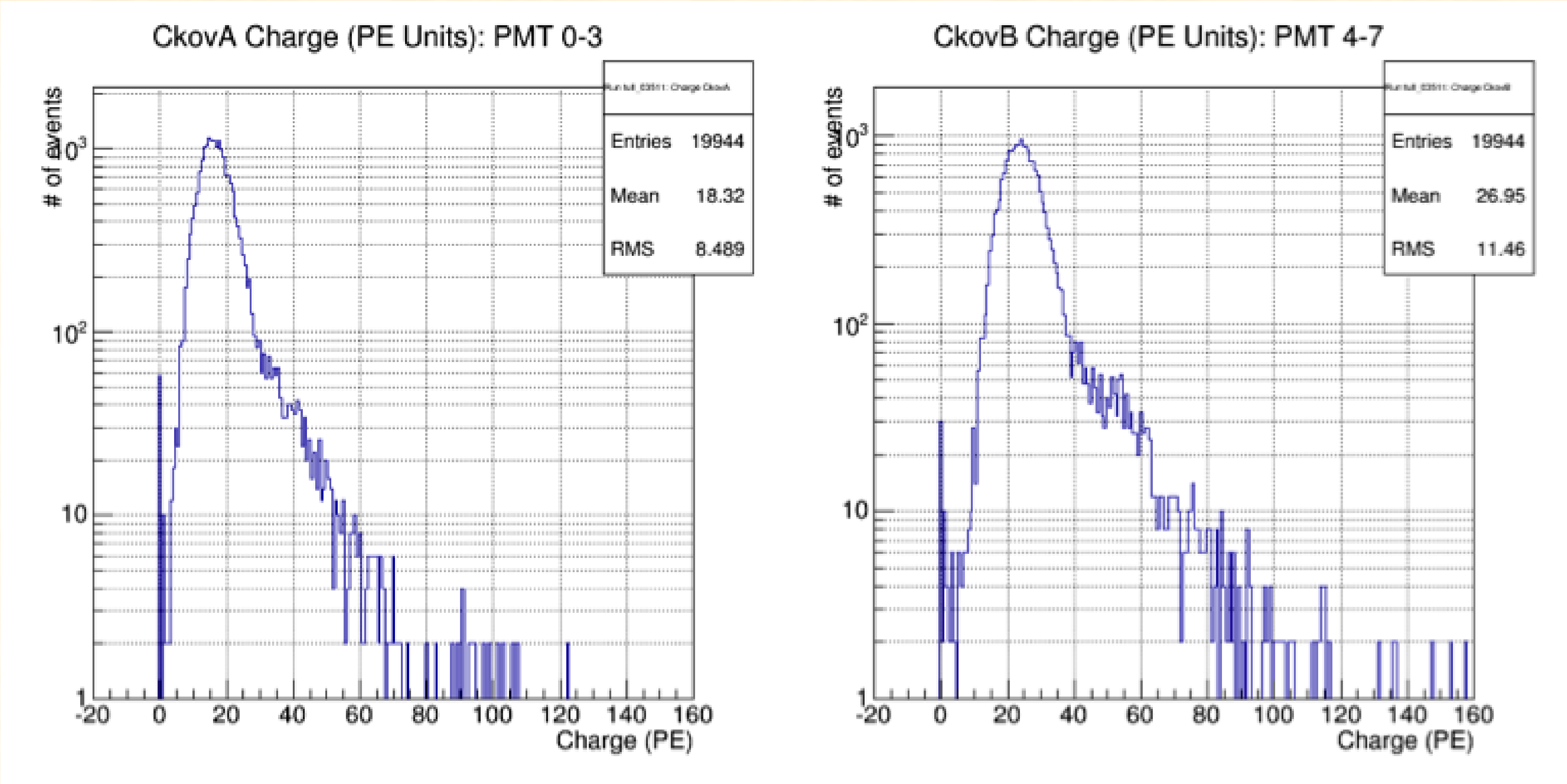
- A standard beamline cherenkov detector with aerogels n=1.07,1.12
- e+/- give beta=1 response.
- electrons, muons and pions can be differentiated by threshold behavior given p from the tracker.



Run 3511- 148 MeV/c Positrons selected

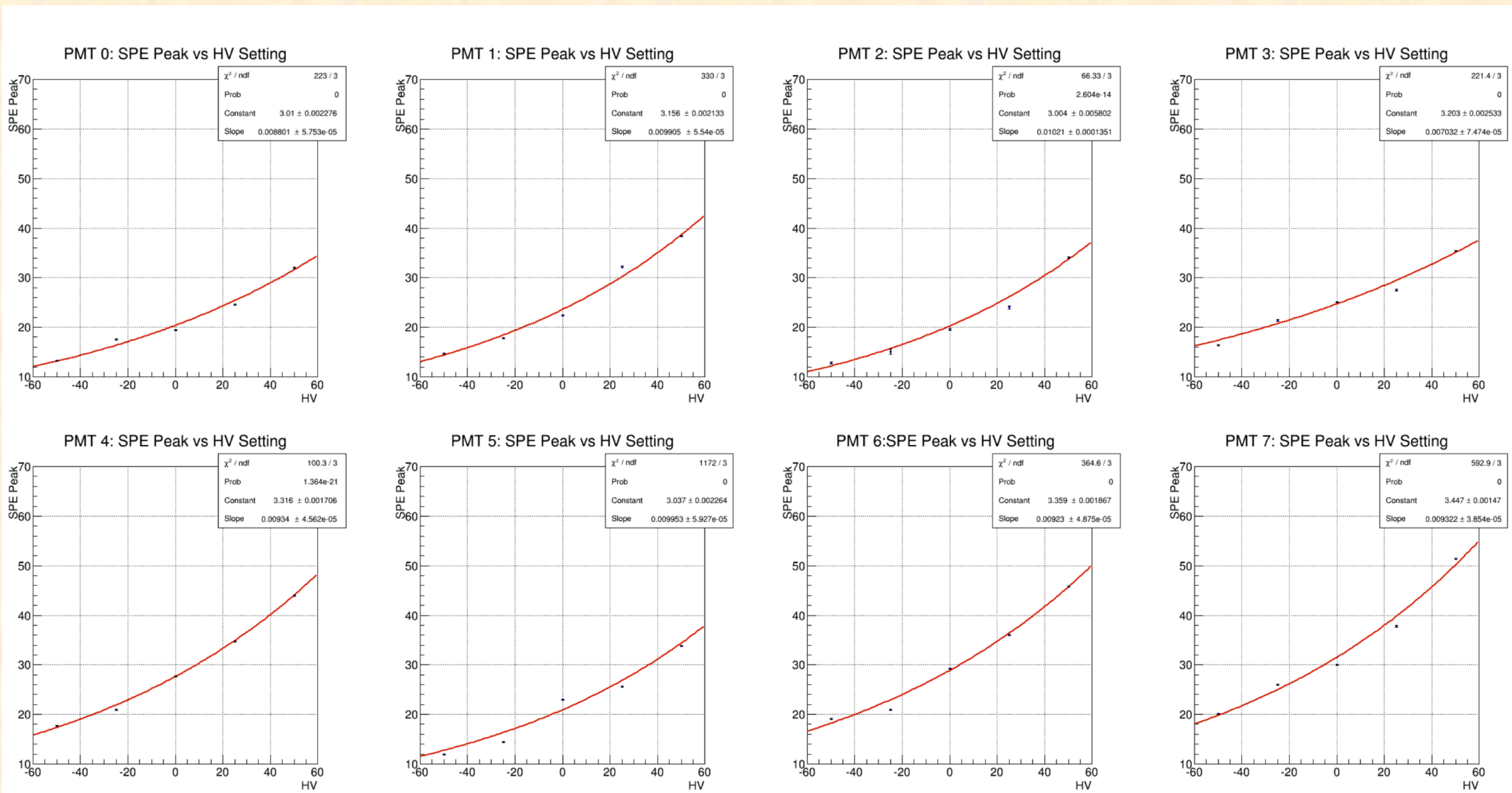
Michael Drews and Miles Winter, IIT

- Michael and Miles have refined the CKOV code, pedestal finder, fadc integrator, etc.
- Inefficiency for positrons at the 0.3% level.



HV Calibration Scan to balance 1pe signals

- HV-scan data from summer activation run.
- CAEN HV needs to be reset to balance outputs at 1pe =25 adc cnts.



KL used to determine beam purity MICE Note 4016

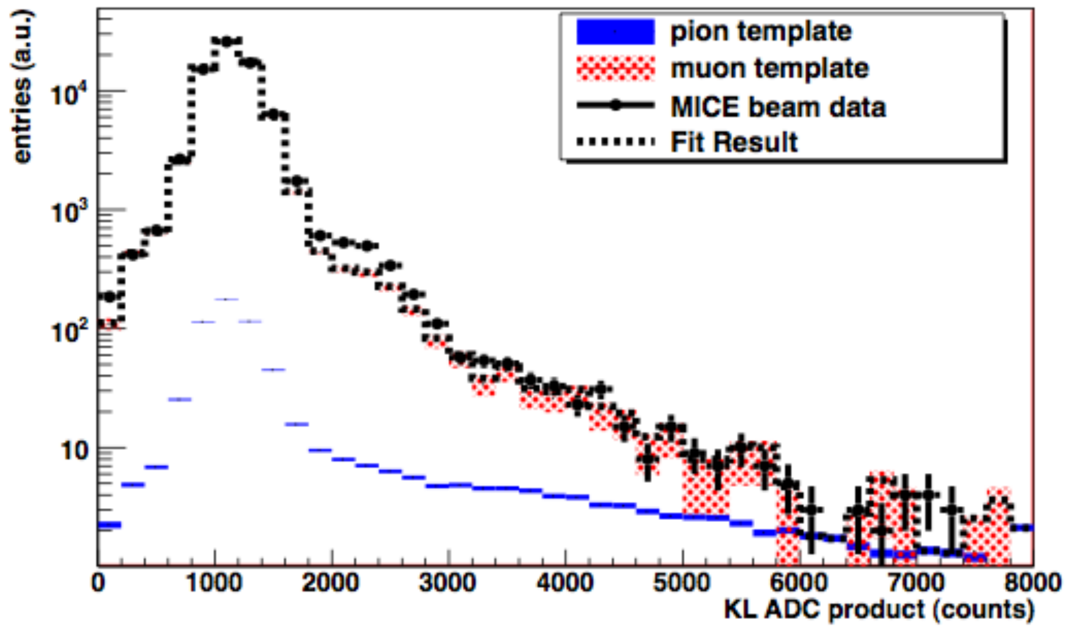


Figure 8. MICE beam data (black dots), muon (red dotted area) and pion (blue solid area) fractions, are normalised to the the template fit (black histogram) performed to the KL product spectrum excluding the window from 1900 to 2700 counts.

Taking into account the number of beam particles in each TOF interval analysed (Point 1–3), the pion contamination averages to

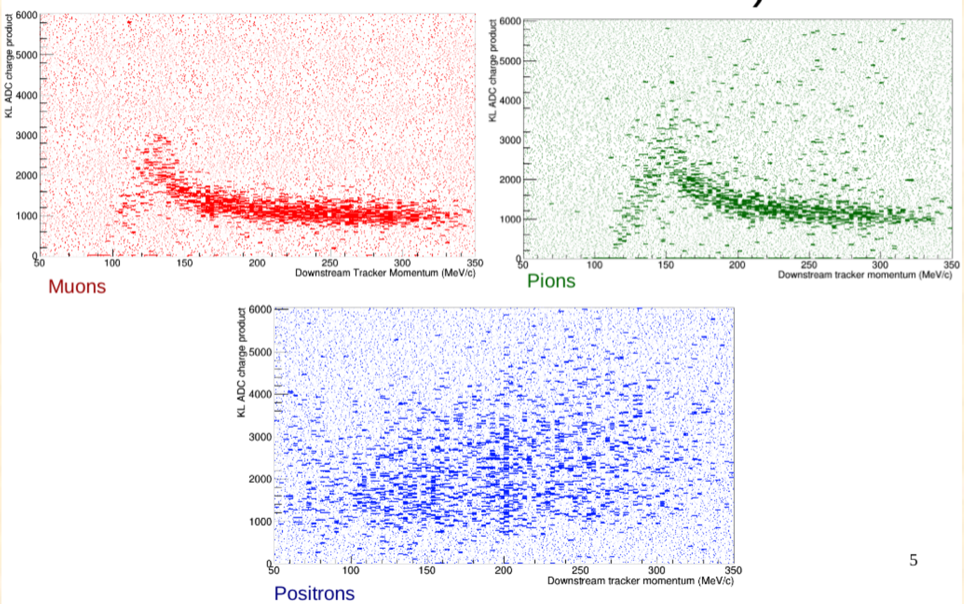
$$(1.11 \pm 0.19 \pm 0.32)\%$$

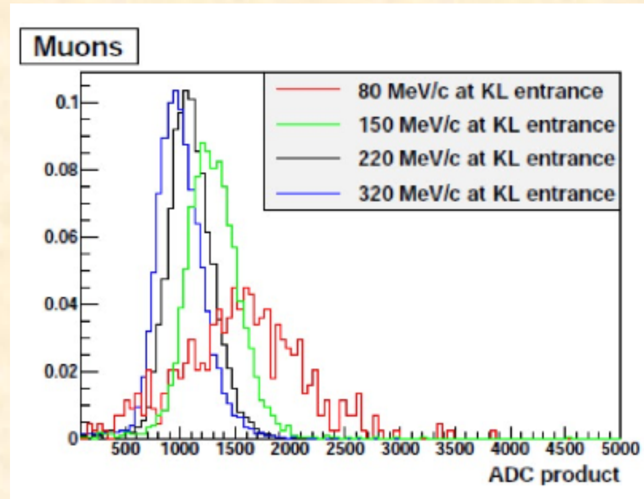
Global PID Project: PIDVar#

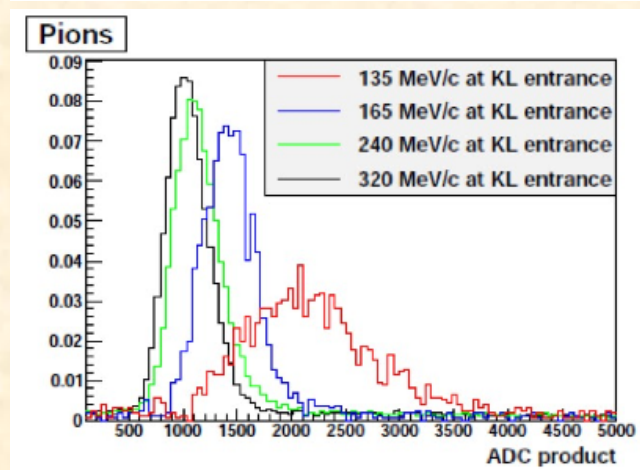
Celeste Pidcott, Warwick

- Each PID variable **TOF**, CKOV, **KL**, EMR will contibute to a Global Particle ID.
- A global particle liklihood will be formed.
- Efficiency and Purity(Mis-id) rates for each PIDVar are being studied.

PIDVarC (KL ADC charge product vs Downstream Tracker Momentum)



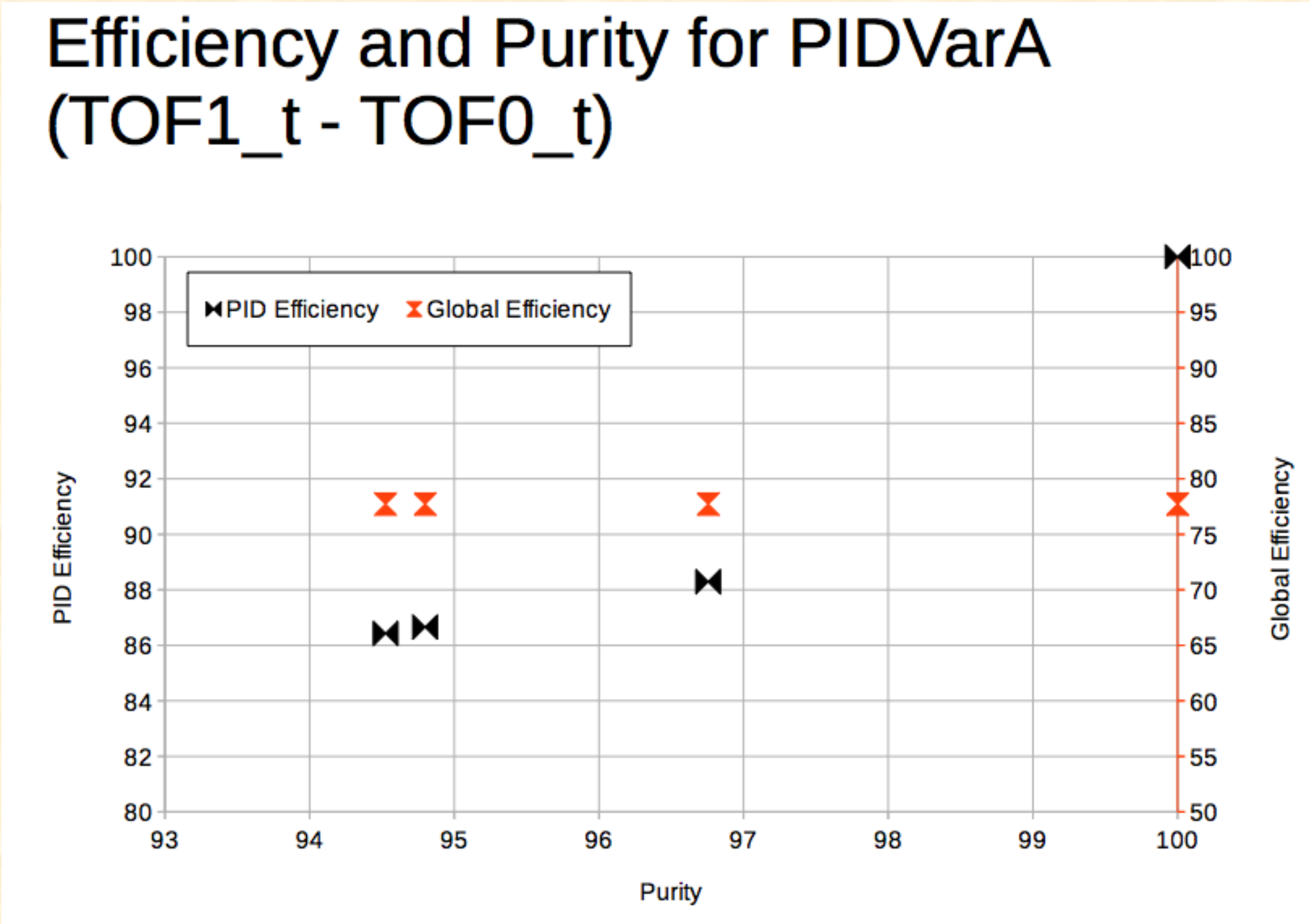




Global PID Project: PIDVarA

Celeste Pidcott, Warwick

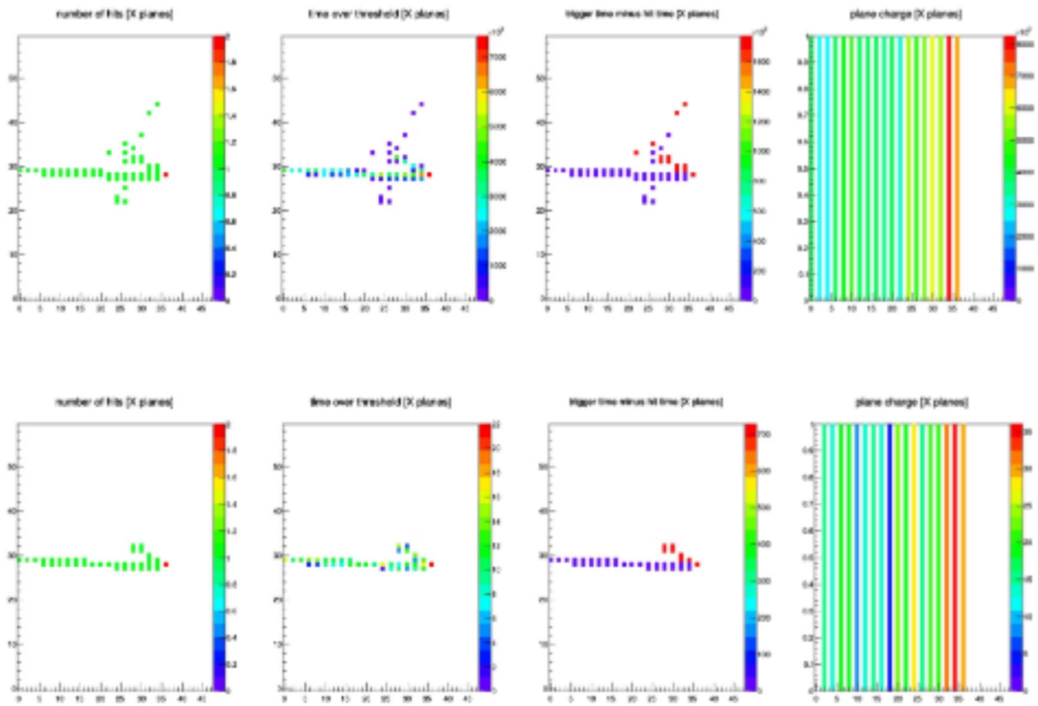
- These are preliminary results for PIDVarA TOF0-TOF1.



EMR Digitizaton and Simulation

Francois Drielsma,Geneva

Digitized Beam Event Display

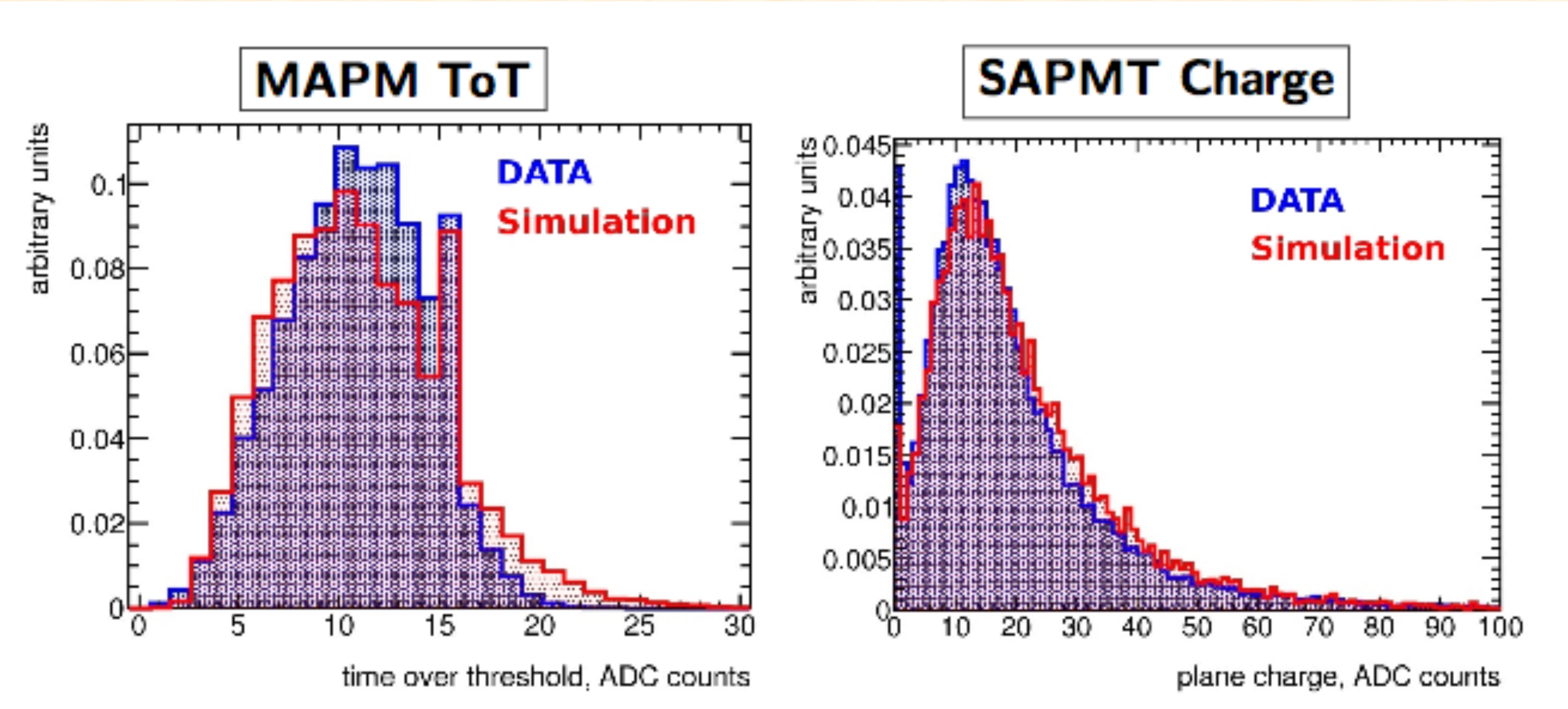


- The smallest energy depositions don't produce a signal
- The signals are converted using the calibration parameters
- Entirely **integrated into MAUS** (version 2.1)

EMR Digitizaton and Simulation

Francois Drielsma,Geneva

- Cosmic events Data vs Simularion with very good match.



Summary

- PID detectors operating well and awaiting next beam period.
- Still some work to do on CKOV, EMR in to Global PID Project.
- Next milestone would be a magnet off run with the tracker, maybe soon!