Status Report

March 8th, 2023

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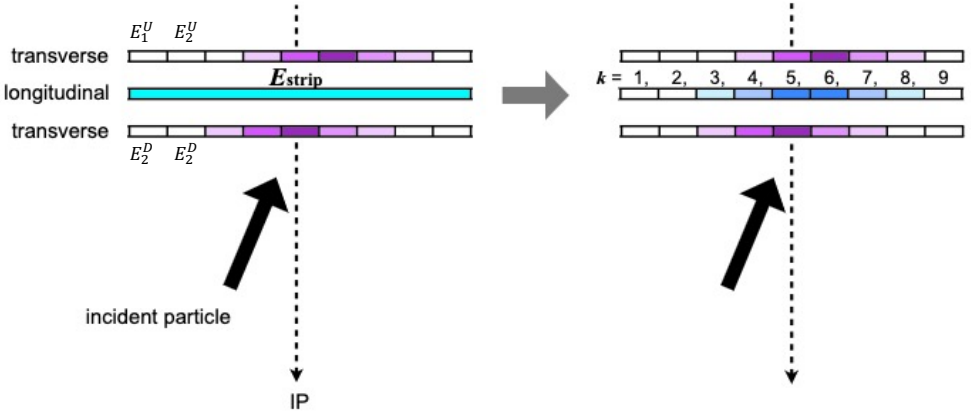
Content

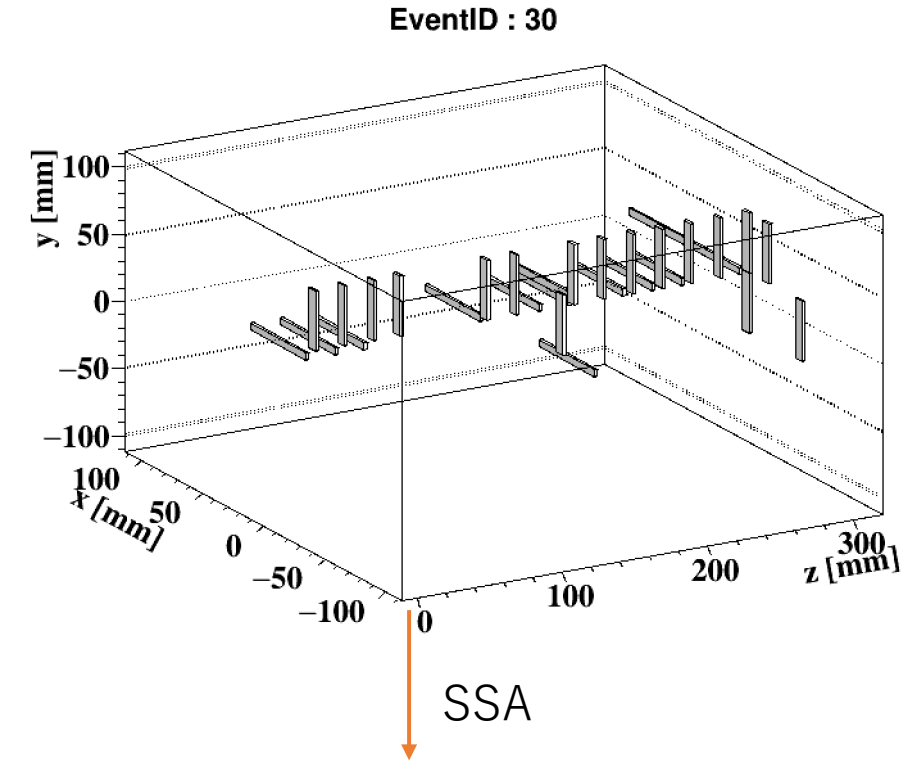
- SSA and track fitting
- Preliminary result of triggerID mismatch

Strip splitting algorithm

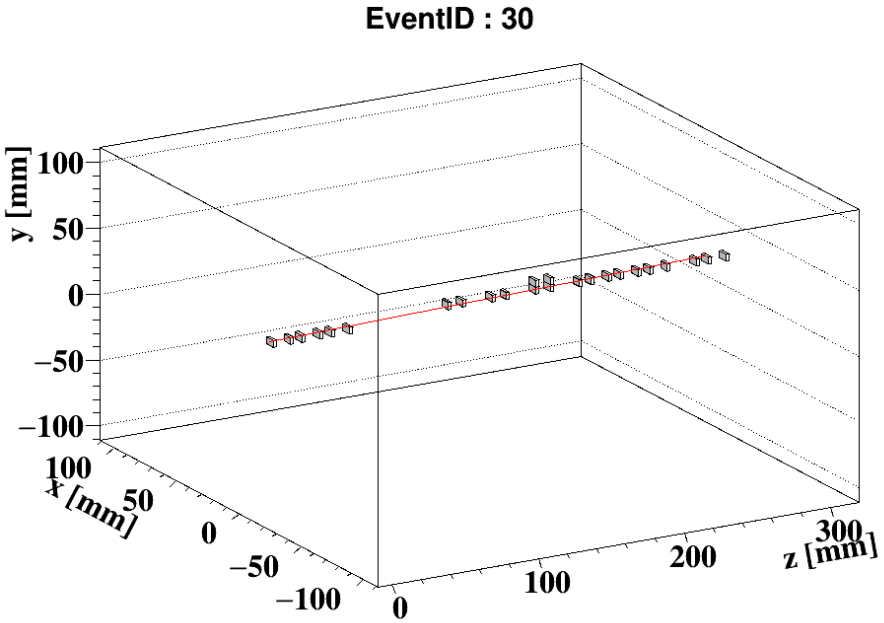
- Hit strip is divided into 5 mm*5 mm virtual cells by SSA
- Fitted muon track by a linear function using the virtual cells



$$E_k = E_{strip}\frac{w_k}{\sum_j w_j}, w_k = E_k^U + E_k^D$$



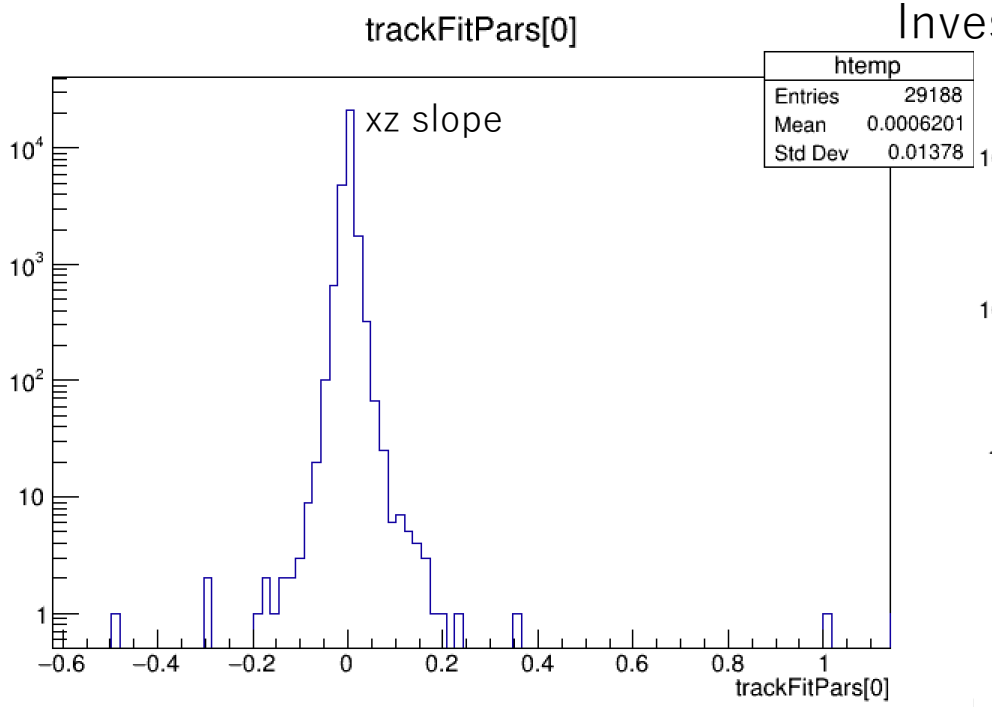
SSA



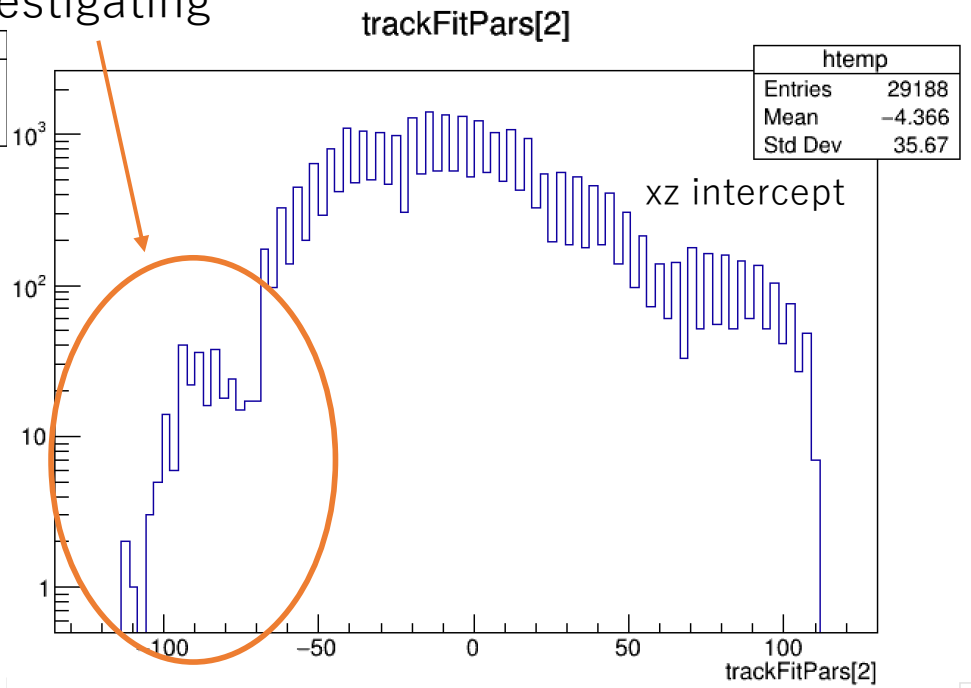
Fitting parameters (run 316 muon)

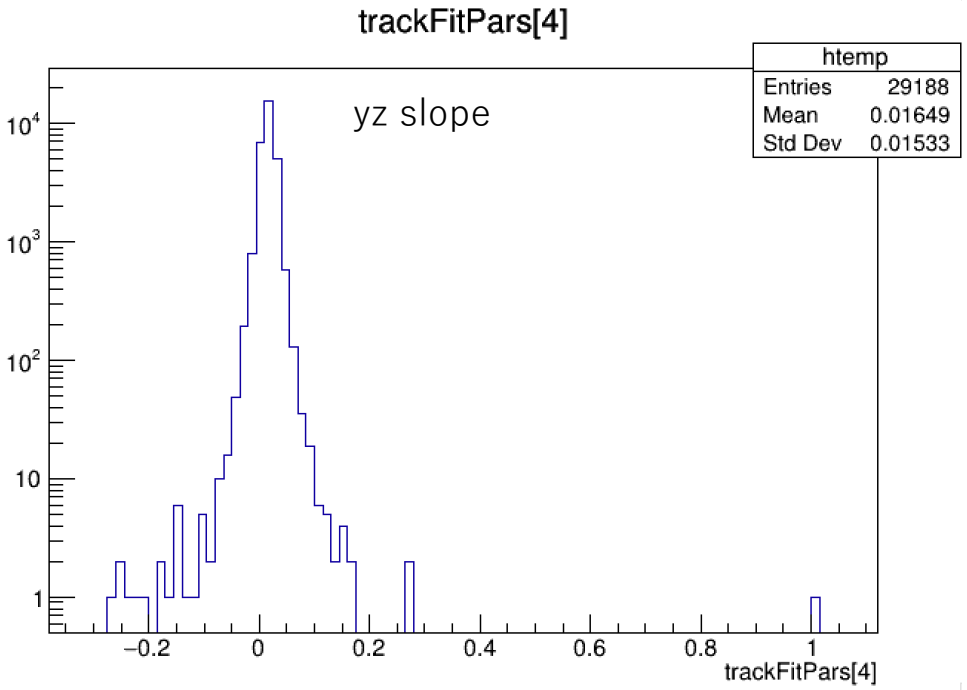
$x = [2] + [0] * z$
$y = [6] + [4] * z$

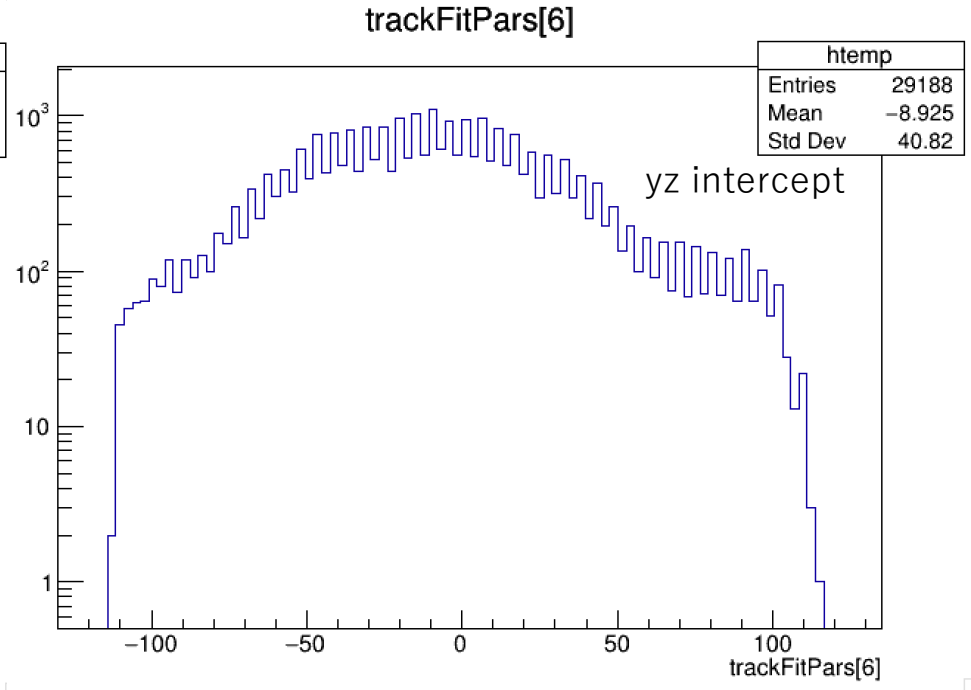
Unit [mm]



Investigating





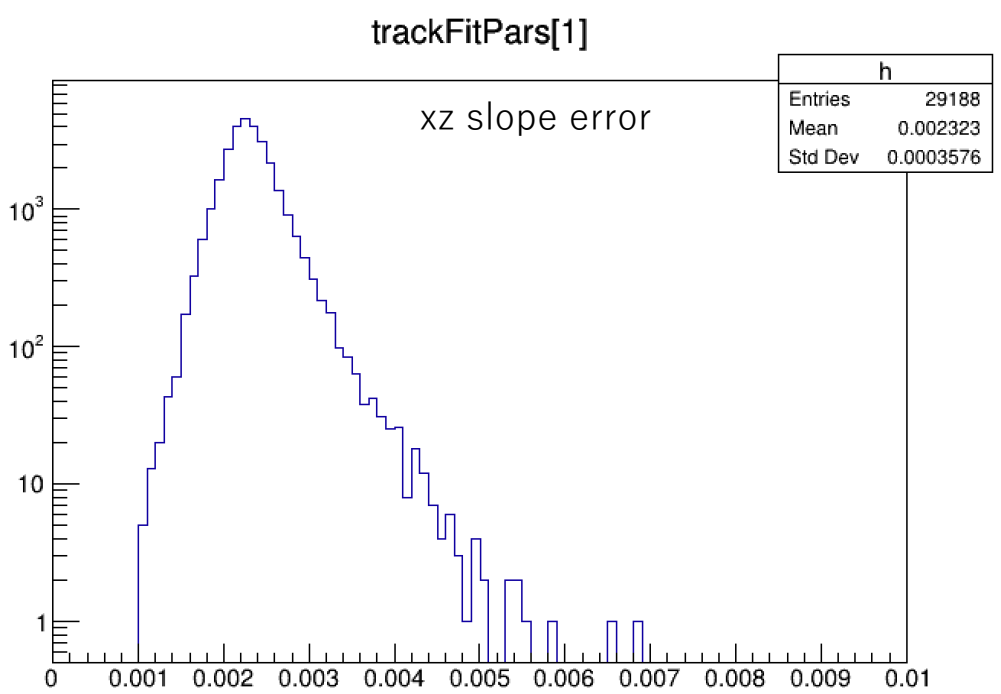


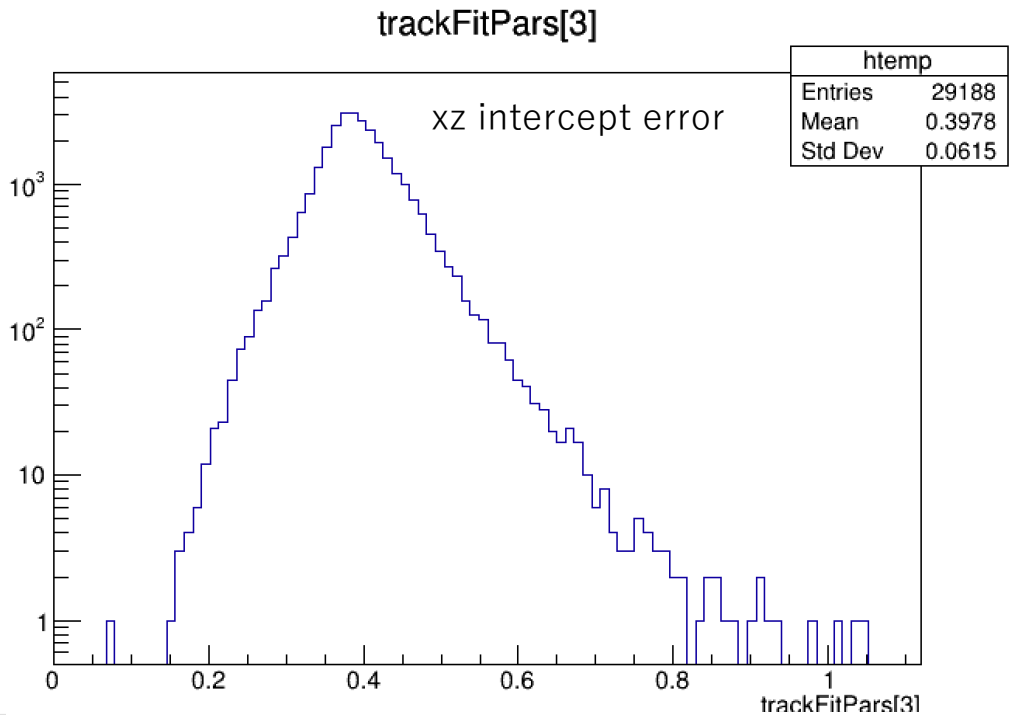
Fitting parameter errors (run 316 muon)

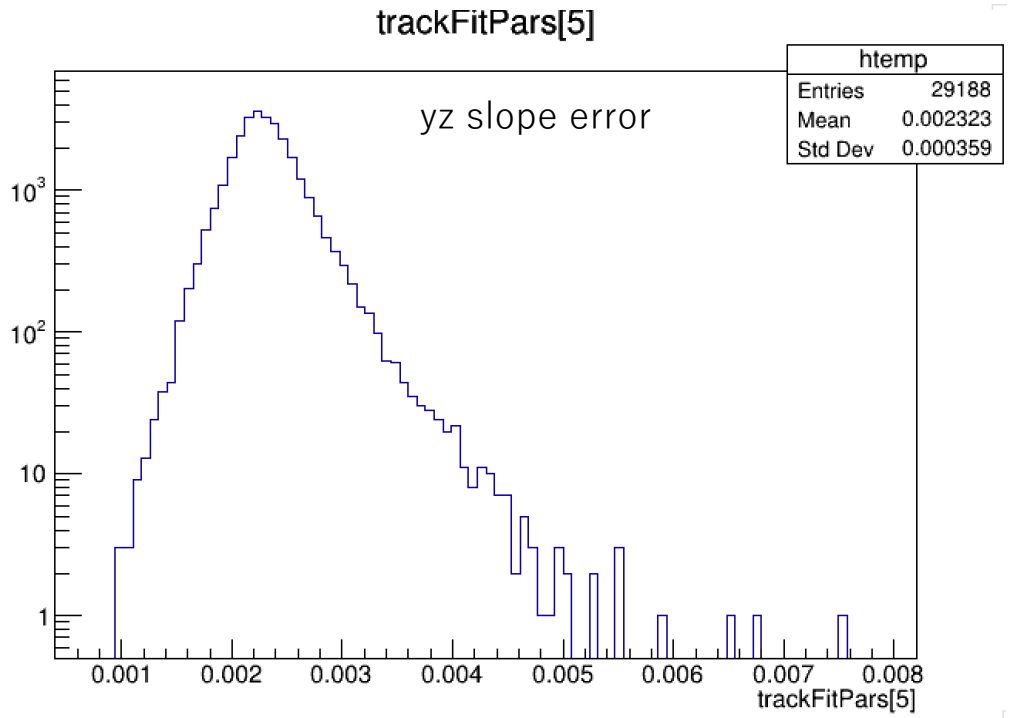
$x = [2] + [0] * z$
$y = [6] + [4] * z$

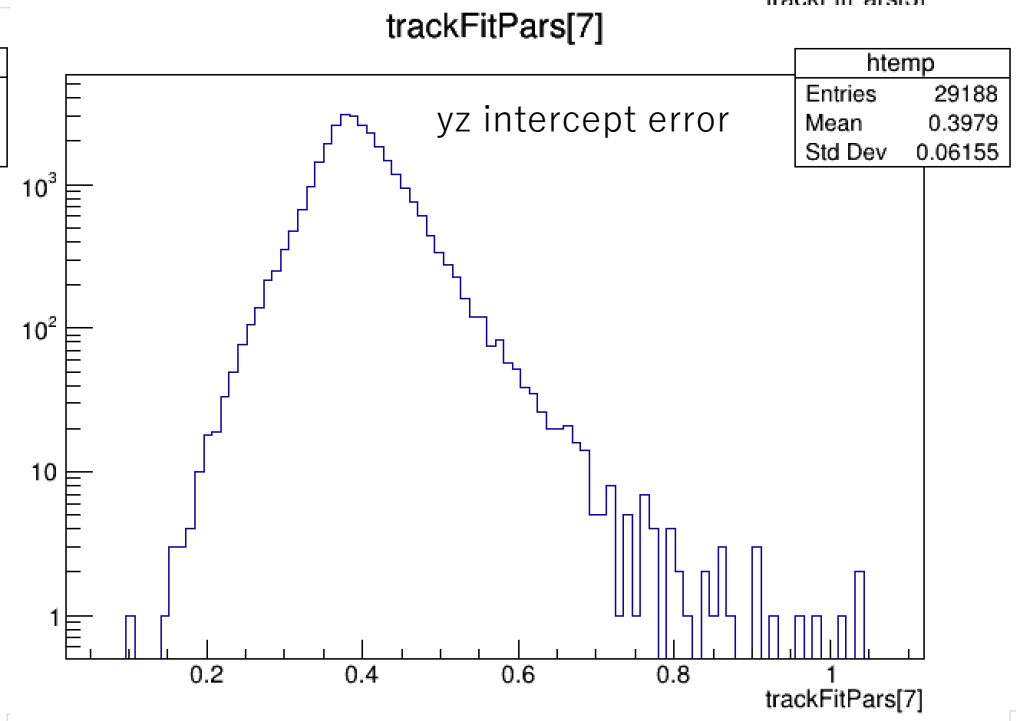
[1]: $error\ of$ [0]
[3]: $error\ of$ [2]
[5]: $error\ of$ [4]
[7]: $error\ of$ [6]

Unit [mm]



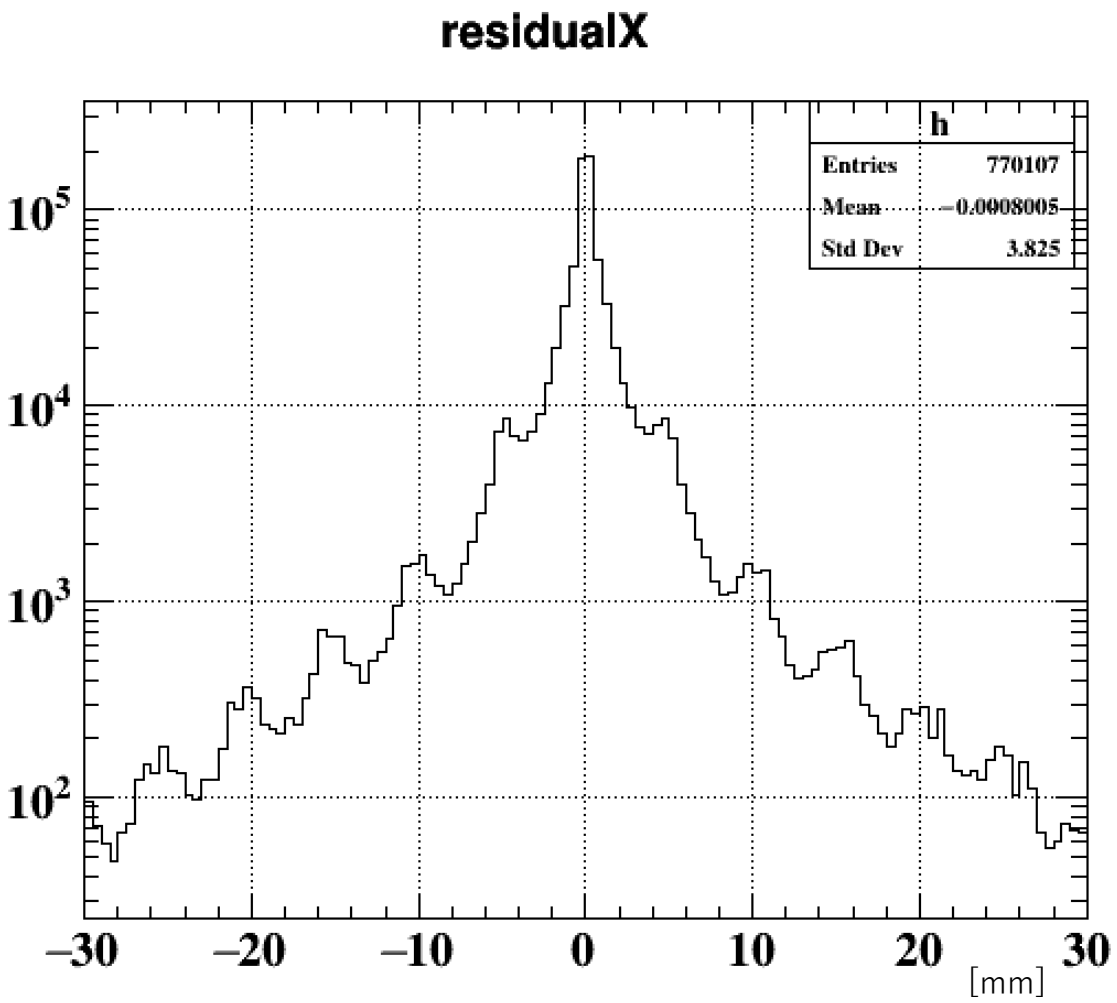


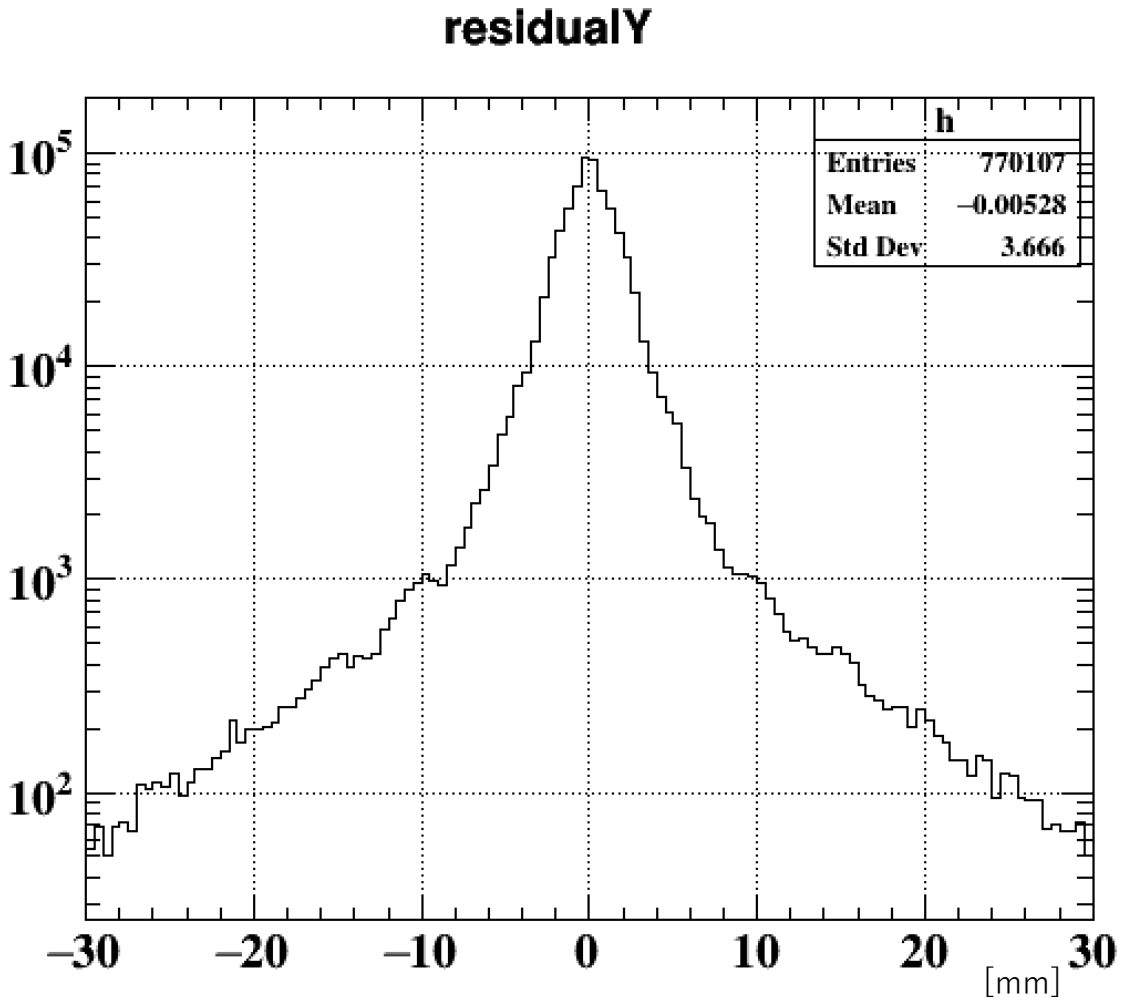




Residuals

- Residual is calculated from the distance of channel position and fitted line
  - Misalignment of layer is not fixed





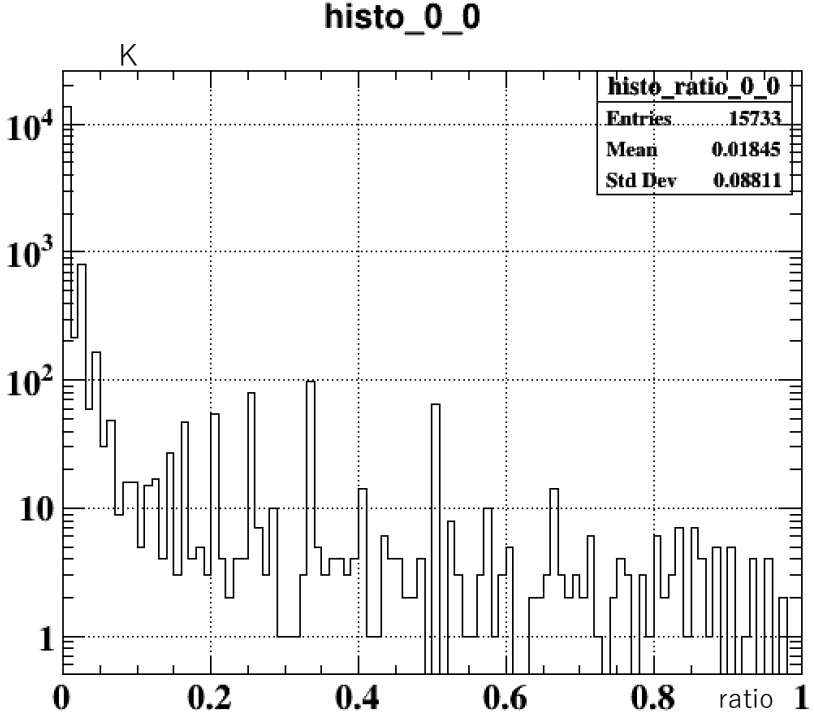
Trigger ID mismatch

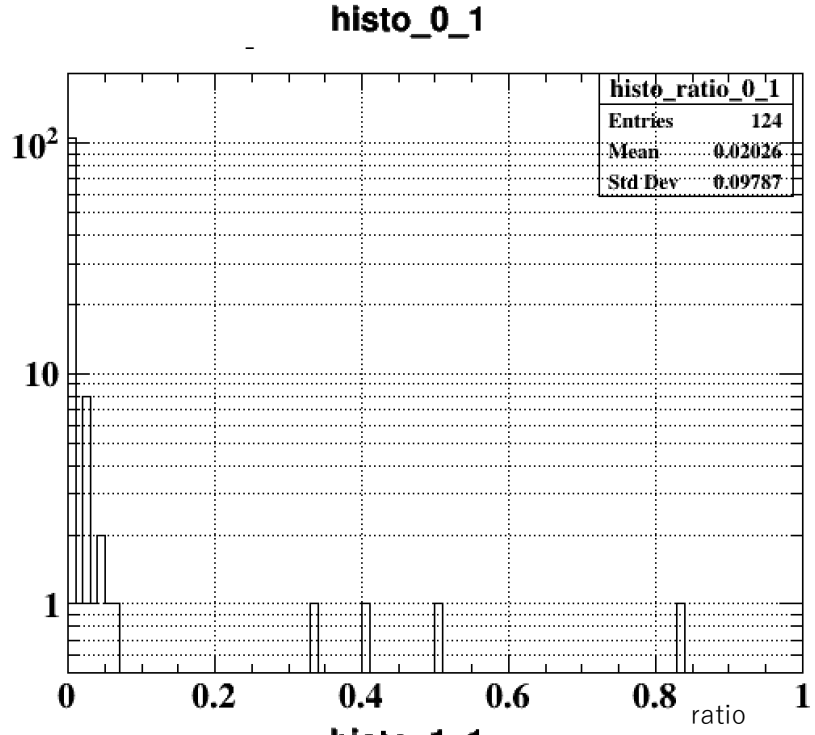
- Checked trigger IDs of ECAL and HCAL
  - Use ratio as a simple indicator
    - Ratio = (number of hit channel in HCAL which is on the fitted line in an event) / (number of hits in HCAL in an event)
  - Histograms are drawn separately for the Cherenkov signals

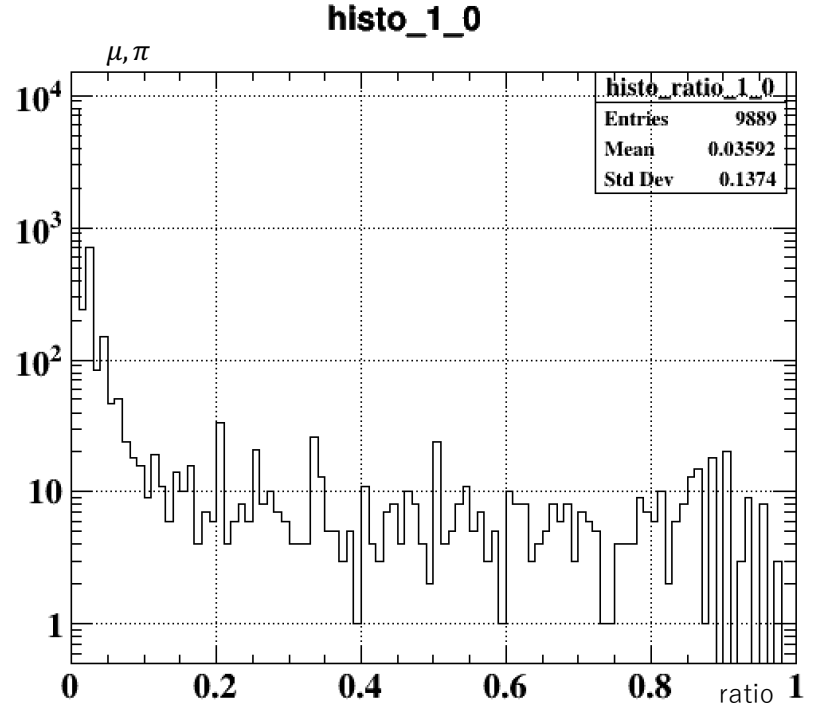
- Geometry of calorimeters is not optimized yet
  - ECAL and HCAL distance : 40.0 mm

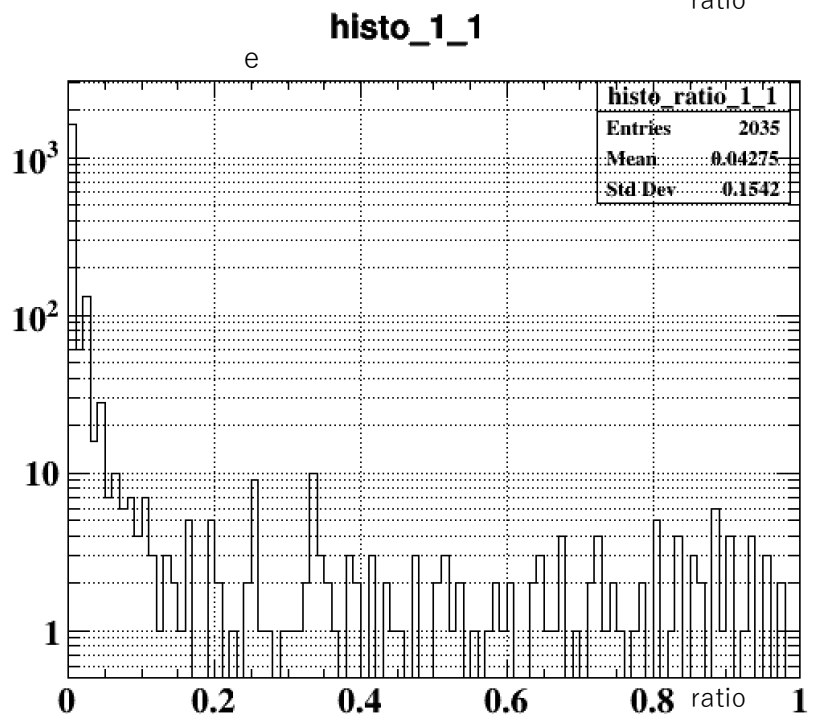
ECAL =
HCAL
run 316

Ratio =
(number of
hit channel in
HCAL which
is on the
fitted line) /
(number of
hits in HCAL)



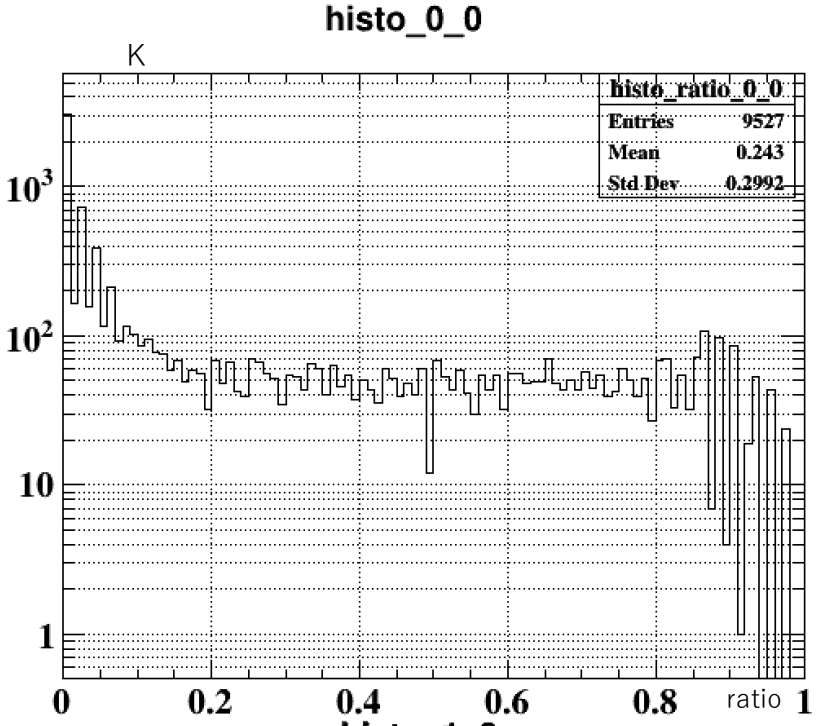


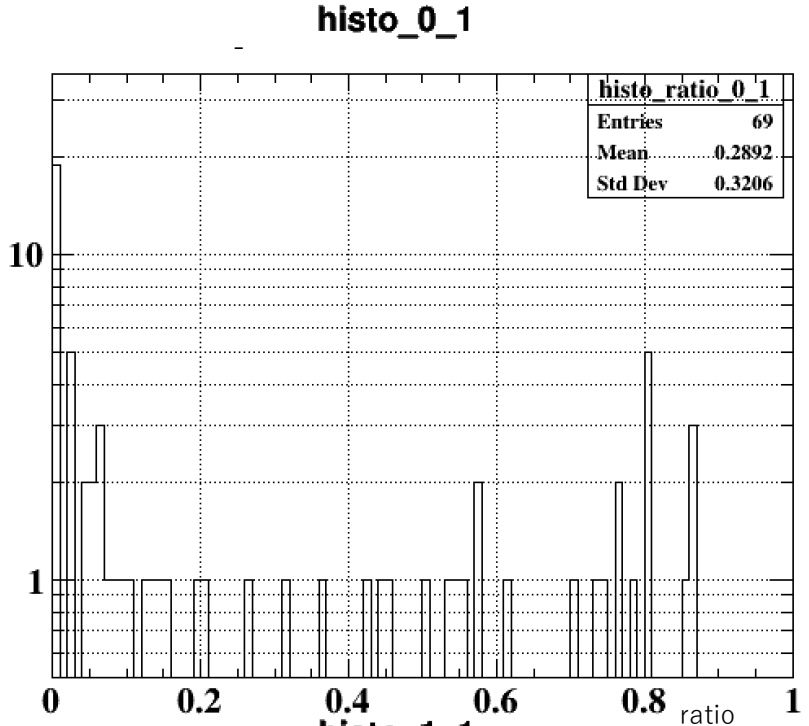


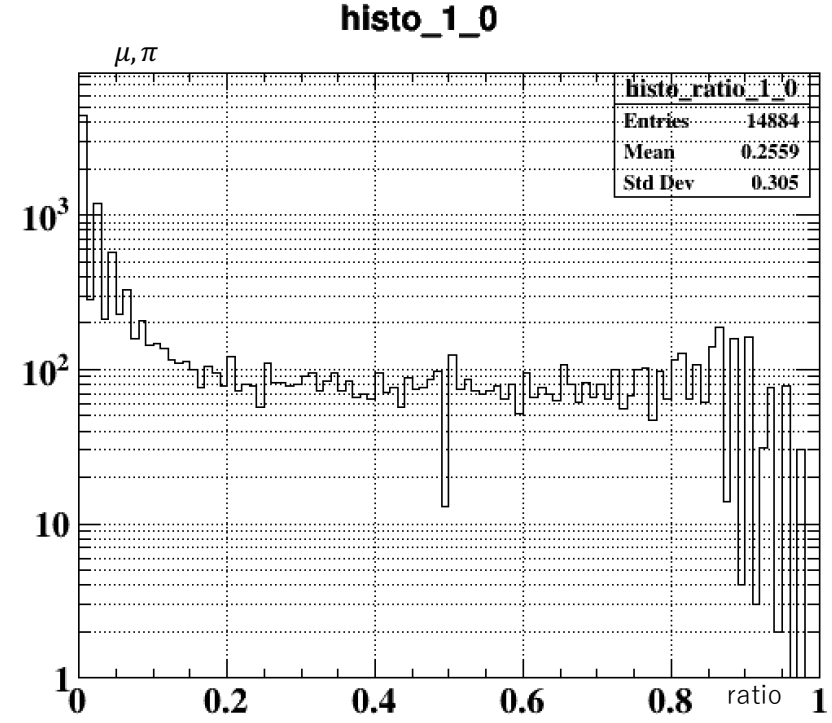


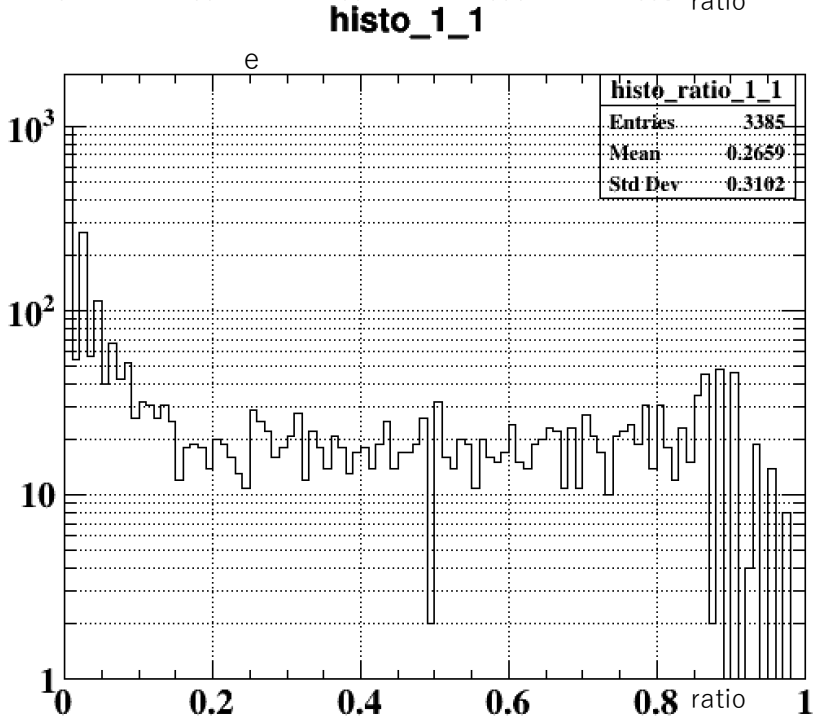
ECAL = HCAL+1 run 316

Ratio = (number of hit channel in HCAL which is on the fitted line) / (number of hits in HCAL)



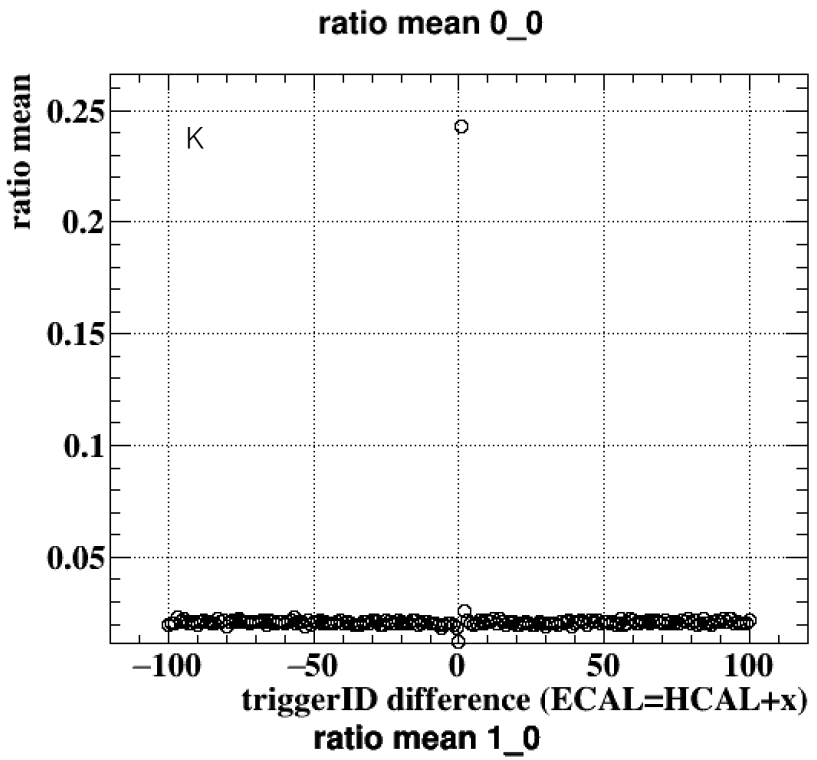


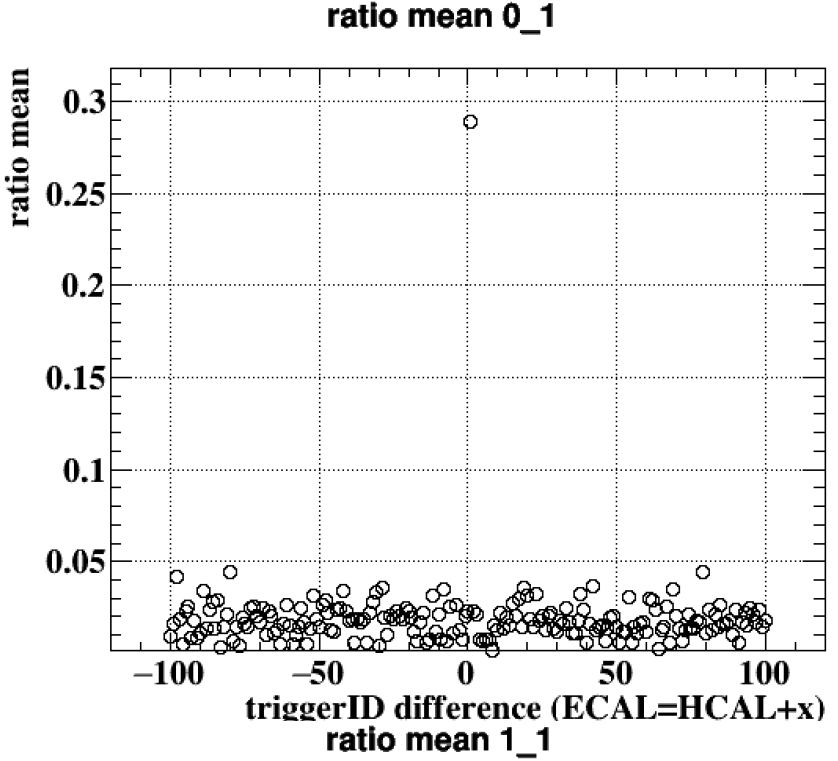


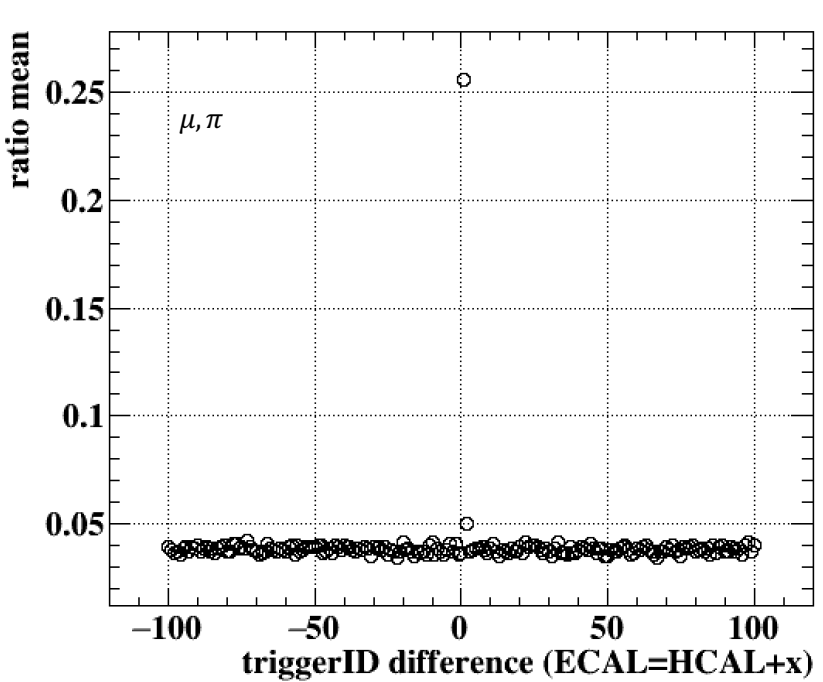


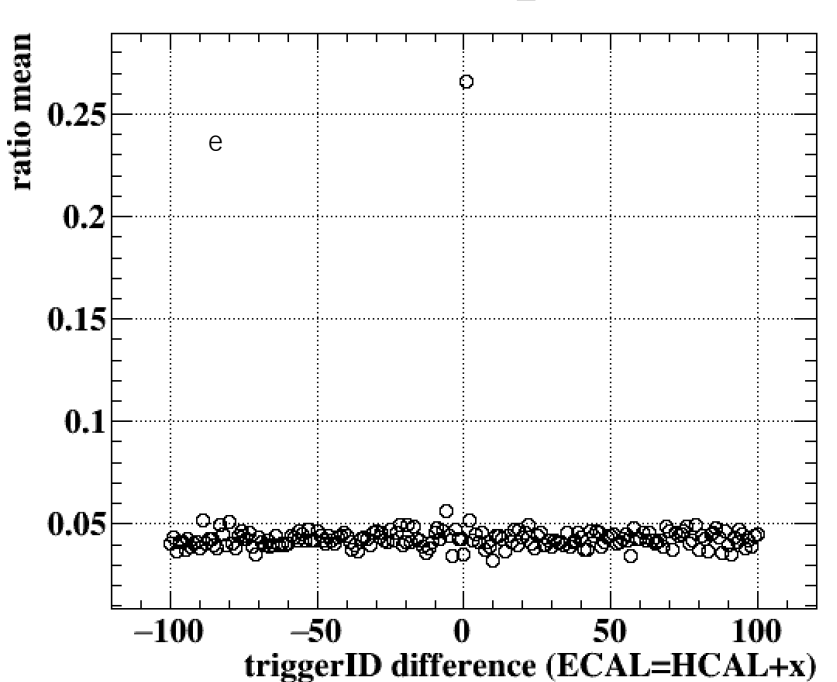
Trigger ID difference

- Graphs show mean values of ratio histograms with different triggerID difference between ECAL and HCAL









Summary and prospects

- Implemented track fitting and residual calculations
- Checked ECAL and HCAL trigger ID mismatch

- Prospect
  - Make algorithm to calibrate temperature
  - Upgrade accuracy of track fit
    - Angular calibration of MIP
    - Correction of misalignment of ECAL layers
  - Check ECAL and HCAL trigger ID with muon-like event in positron and pion runs more in detail