HMS Calorimeter Calibration

- DIS Runs 3196-3199 (Mid Momentum) and 3408, 3411, 3418 and 3419 (High Momentum). Runs with the same kinematics were chained together.

- Time Window Cuts: (/PARAM/HMS/CAL/hcal_cuts.param)
  - hcal_pos = hcal_neg = (-100,0)

Input File

CALIBRATION/hms_cal_calib/input.dat

```
                                                    cameron@cameron-Inspiron-7391: ~

  GNU nano 2.3.1                                 File: input.dat


-10 10   Delta range, %
0.5 1.5 Beta range
1.5      Gas Cherenkov, threshold on signals in p.e.
10       Minimum number of hits per channel required to be calibrated
0.05 2. Range of uncalibrated energy deposition histogram
500      Binning of uncalibrated energy deposition histogram
-0.1 0.1        Gaussian fit range around mean e- peak in the uncalibrated Edep histogram
2.       Sigma width to select events to use in calibration (green fill)

; Calibration constants for file hms_ecal.root (HMS 2489-2494), 164827 events processed

hcal_pos_gain_cor= 12.99,  7.13,  9.22, 10.26, 10.82, 12.49, 11.93, 12.39, 10.28, 15.14, 14.59, 12.85,  6.40,
                   10.87, 12.23,  9.46, 13.51,  8.71,  6.30,  7.73,  7.41,  8.94, 11.40, 11.51, 12.40, 14.86,
                   24.29, 14.78, 18.17, 21.53, 16.96, 18.97, 23.00, 19.51, 21.92, 25.86, 18.37, 22.29, 19.84,
                   32.17, 16.75, 20.16, 18.54, 17.89, 19.25, 22.14, 17.51, 19.67, 20.51, 18.37, 18.86, 26.46,
hcal_neg_gain_cor= 15.11, 14.11, 14.42, 10.92, 11.88, 13.32, 14.58, 18.16, 12.63, 11.47, 10.60, 11.41, 19.57,
                   14.71, 13.20, 14.22, 14.34, 16.11, 16.93, 19.64, 17.34, 18.06, 11.49, 14.83, 13.72,  8.86,
                    0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,
                    0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,  0.00,
```
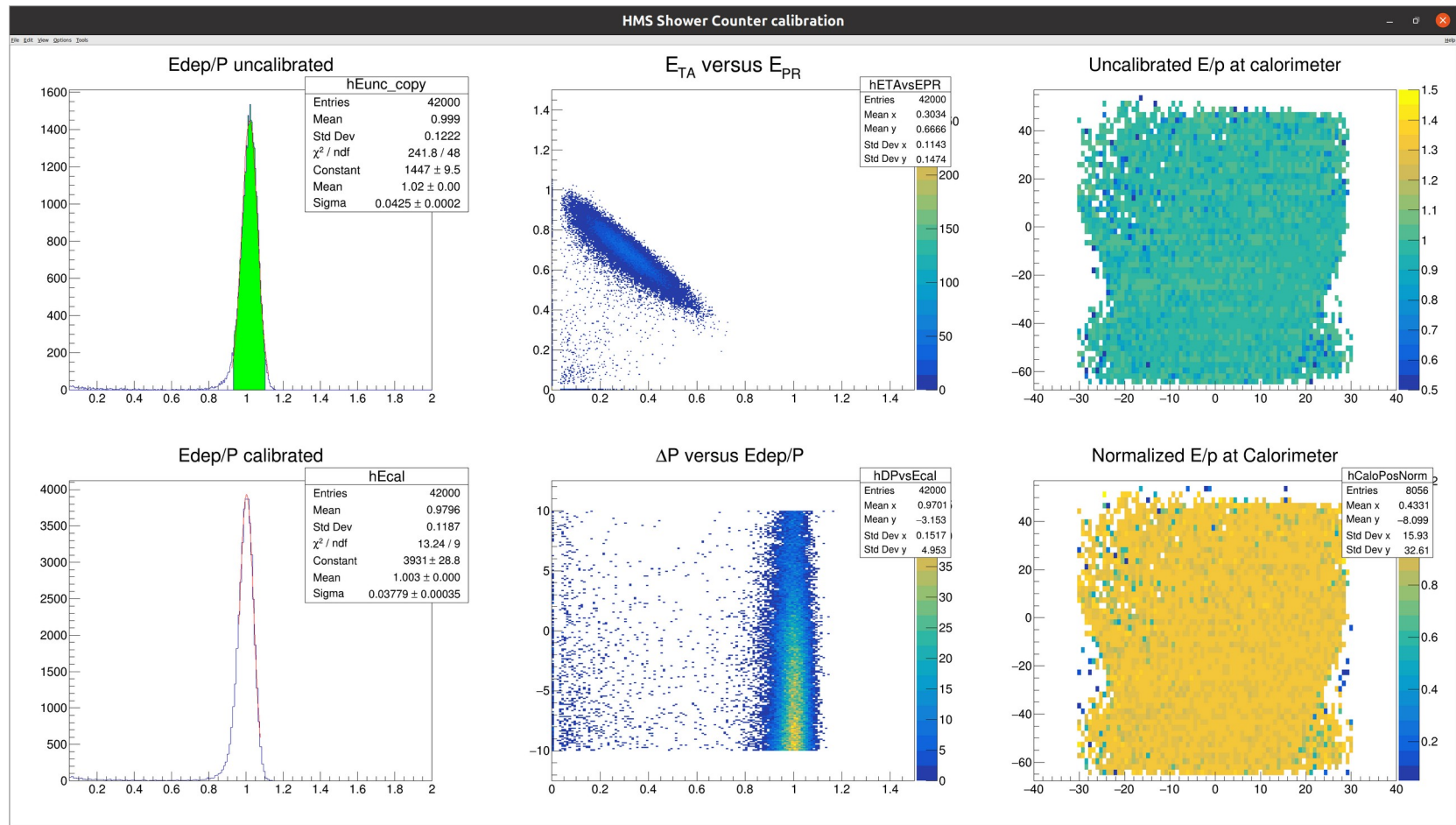
DIS Mid Momentum Runs
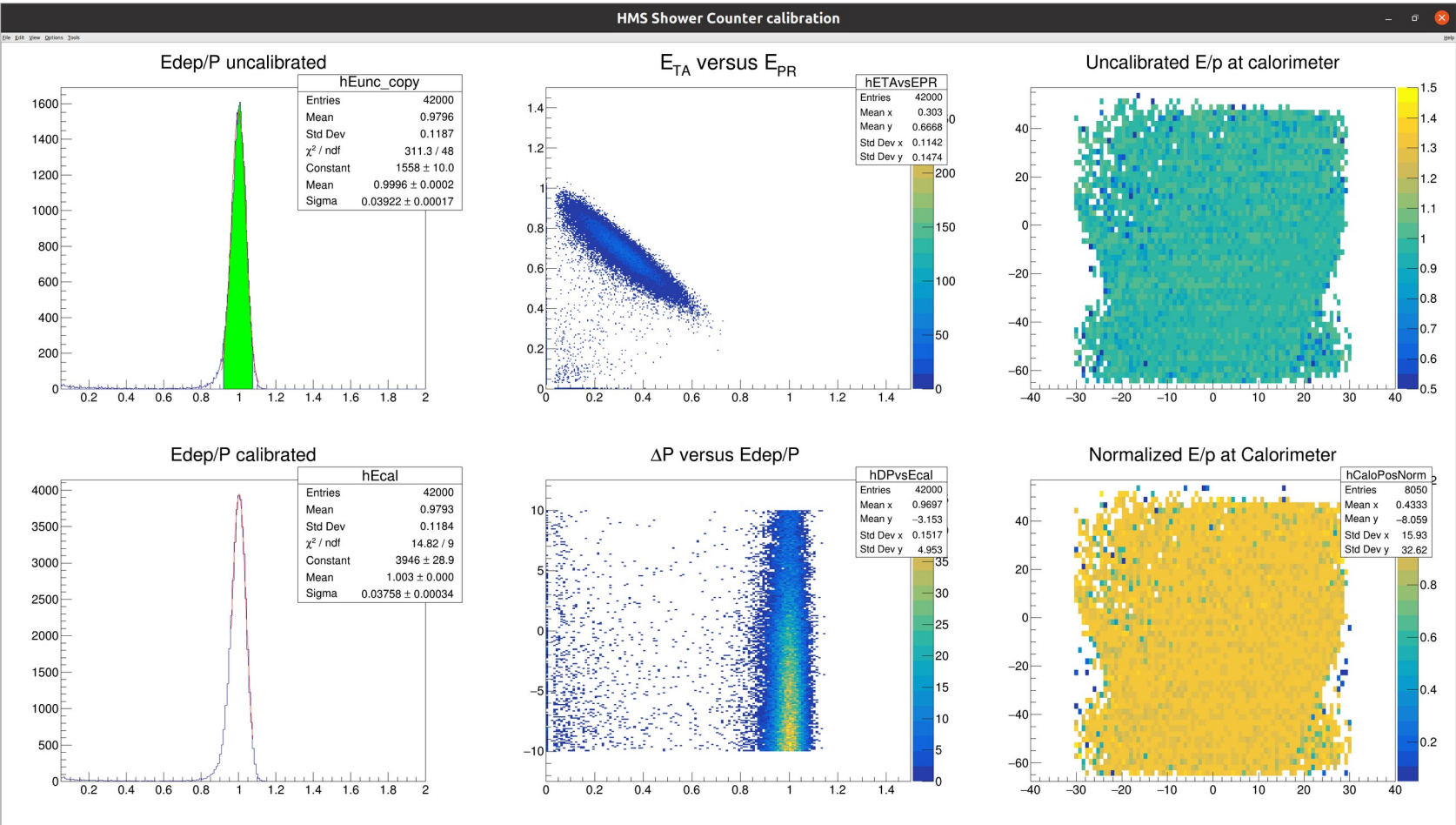## 180º, Ep=-2.9 GeV, 30º

1st Iteration Using Input File From Last Slide

Resolution = σ/μ = 0.0378

DIS Mid Momentum Runs 180º, Ep=-2.9 GeV, 30º

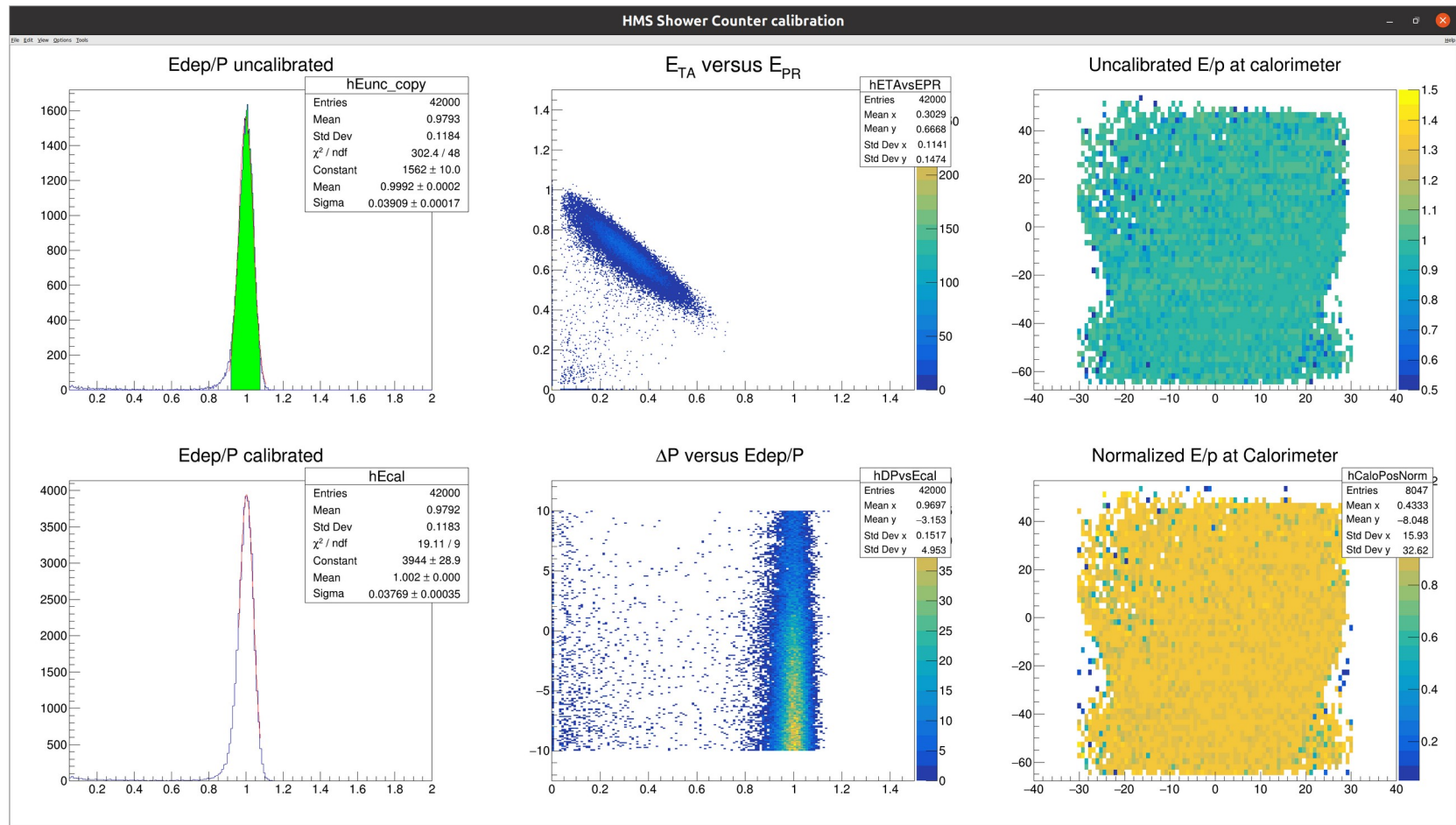## 2nd Iteration Using Output From Previous Calibration

Resolution = σ/μ = 0.0376

DIS Mid Momentum Runs
180º, Ep=-2.9 GeV, 30º
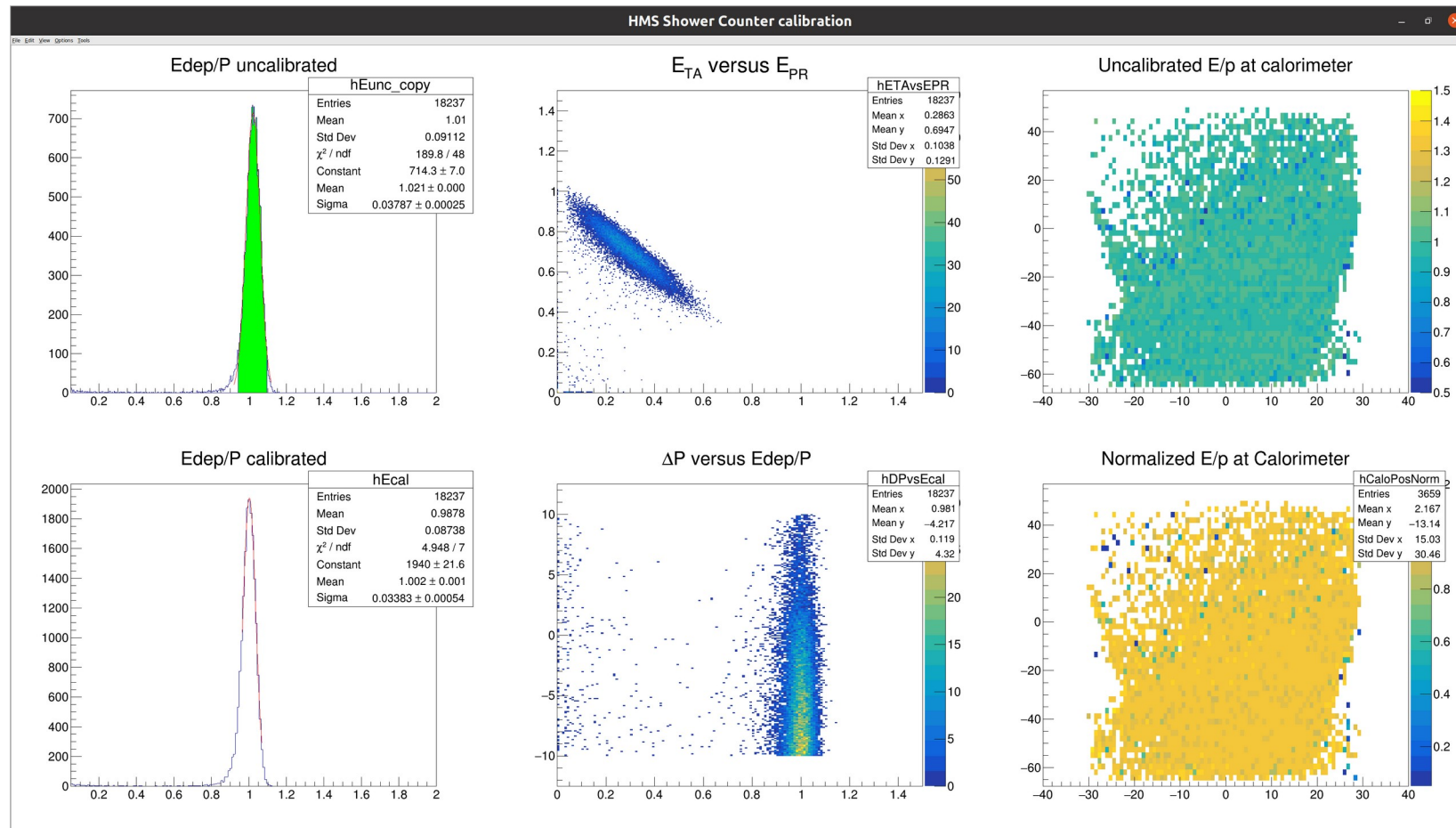
3rd Iteration Using Output
From Previous Calibration

Resolution = σ/μ = 0.0377

DIS High Momentum Runs 90º/180º, Ep=-3.5 GeV, 30º
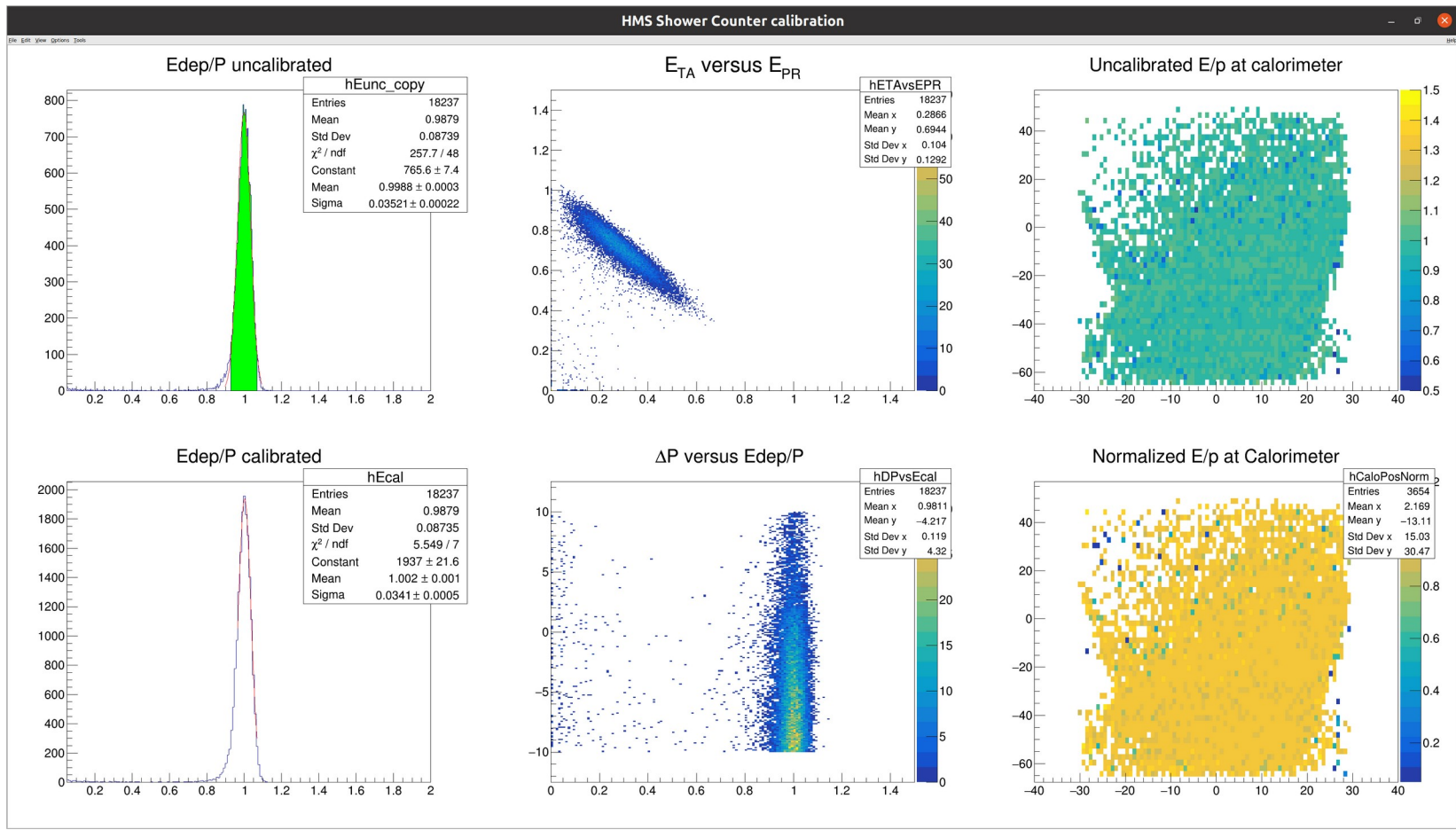
1st Iteration Using Input File From 2nd Slide

Resolution = σ/μ = 0.0338

DIS High Momentum Runs
90º/180º, Ep=-3.5 GeV, 30º
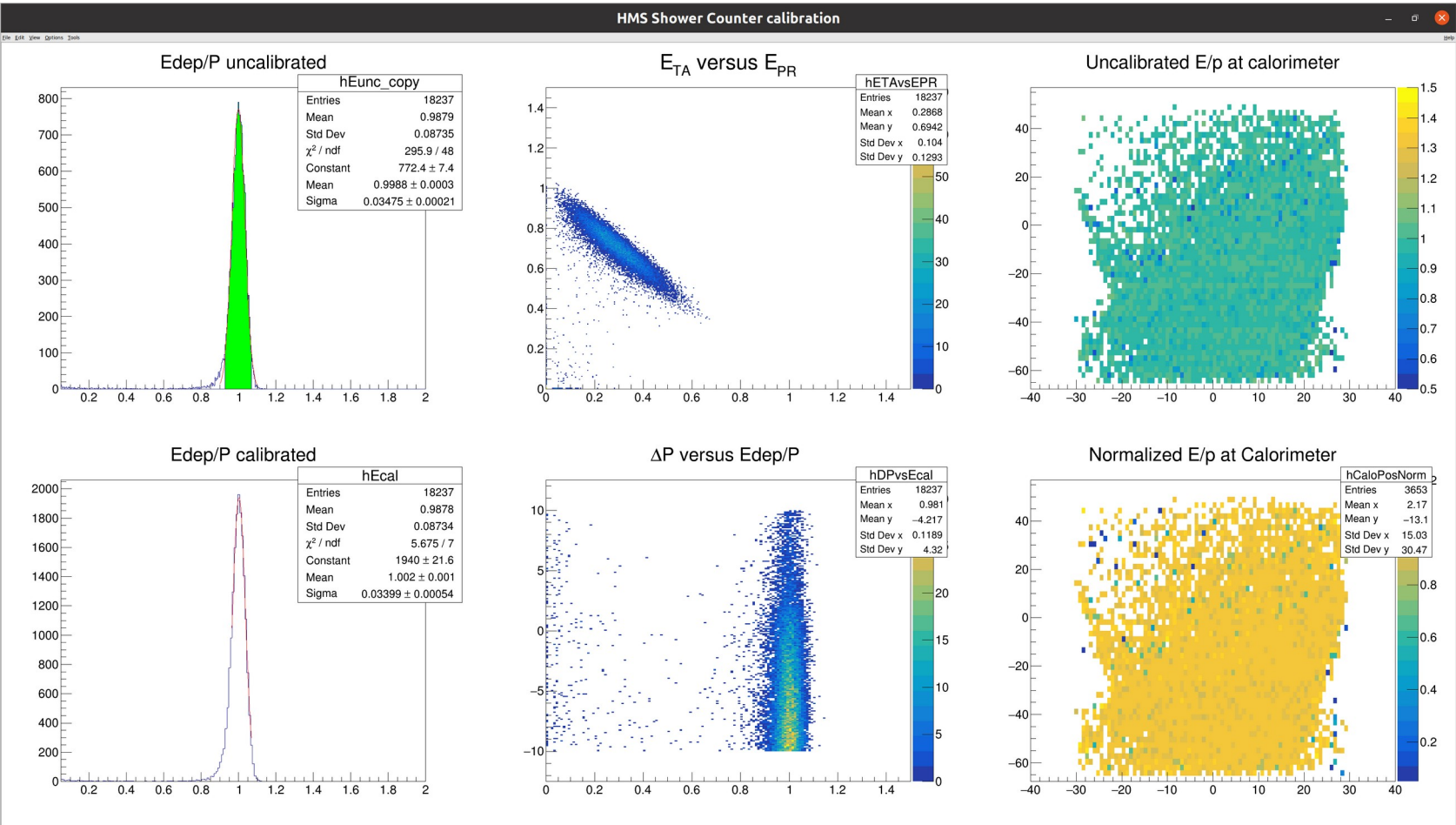
2nd Iteration Using Output From Previous Calibration

Resolution = σ/μ = 0.0341

DIS High Momentum Runs
90º/180º, Ep=-3.5 GeV, 30º

3ʳᵈ Iteration Using Output From Previous Calibration

Resolution = σ/μ = 0.0340

Resolution Summary Table

	Iteration 1	Iteration 2	Iteration 3
Mid Momentum	3.78%	3.76%	3.77%
High Momentum	3.38%	3.41%	3.40%

HM = High Momentum
MM = Mid Momentum

In conclusion, it appears that doing more iterations does not improve the resolution. Also, the resolution appears to increase with increasing momentum.