

Run 17 BEMC Calibration

Jae D. Nam
Temple Univ.



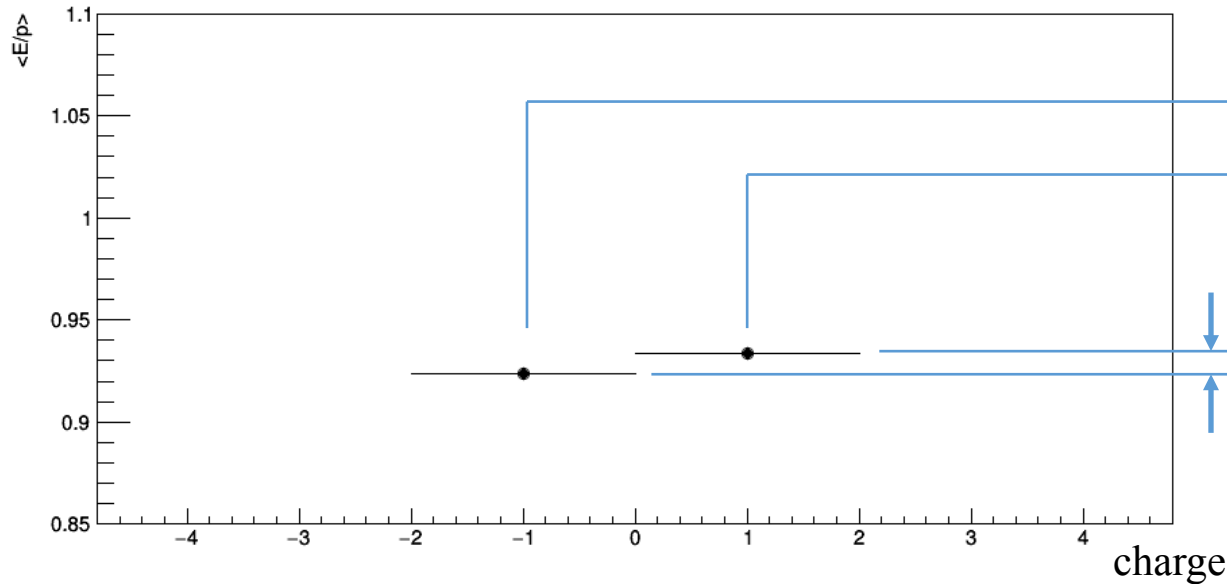
Overview

- Statistical effect to the systematic uncertainty calculation has been estimated.
 - Two major syst. calculation methods employed.
 1. Point-to-point comparison:
 - The difference between two points were taken as the syst.
 - Used in: charge-, momentum-, trigger-, dR-dependences.
 - Statistical effect has been taken from the combined uncertainties in $\langle E/p \rangle$ of the two points.
 2. RMS method:
 - Data points are fed to 1D histogram and the RMS was taken as the syst.
 - Used in: crate-, time-, ZDCx-dependences.
 - Statistical effect has been taken from the average relative uncertainty in $\langle E/p \rangle$ of the points.

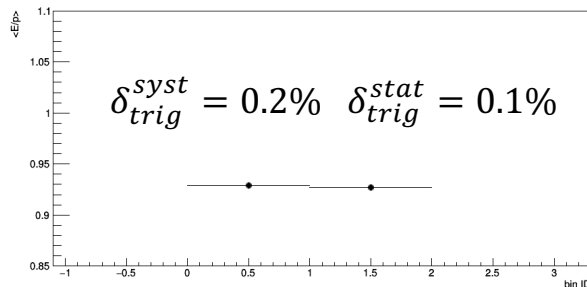
$$\delta_{avg} = \langle \frac{\delta_{E/p}}{E/p} \rangle$$

Statistical effect in point-to-point

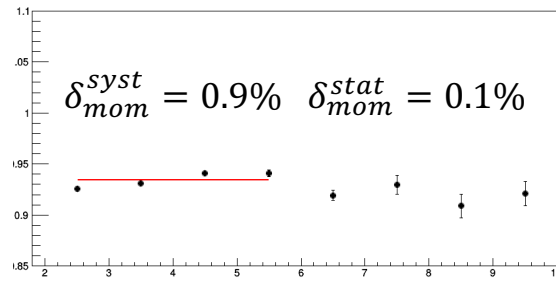
Charge dependence



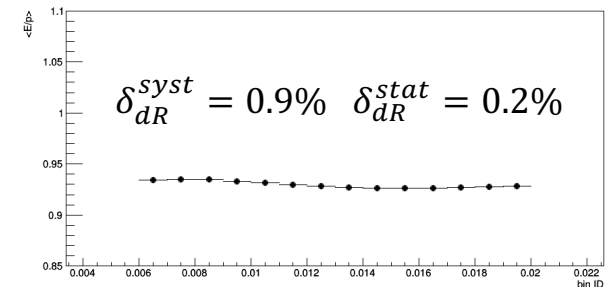
Trigger dependence



Momentum dependence

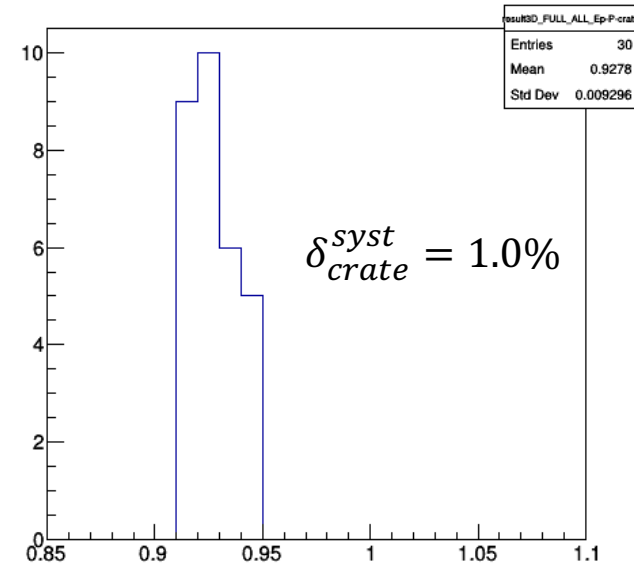
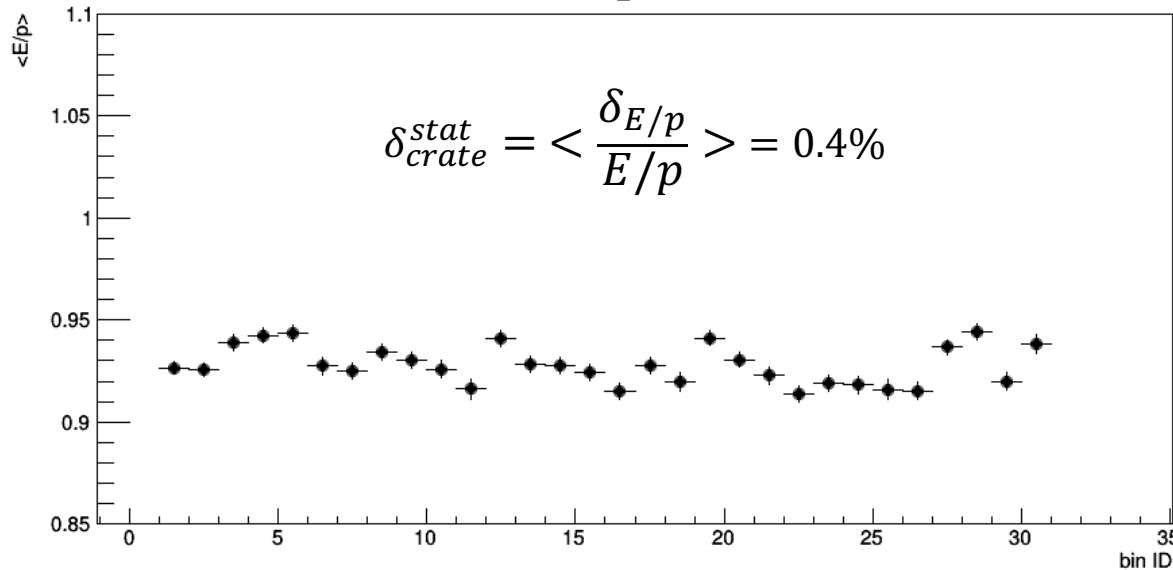


dR dependence

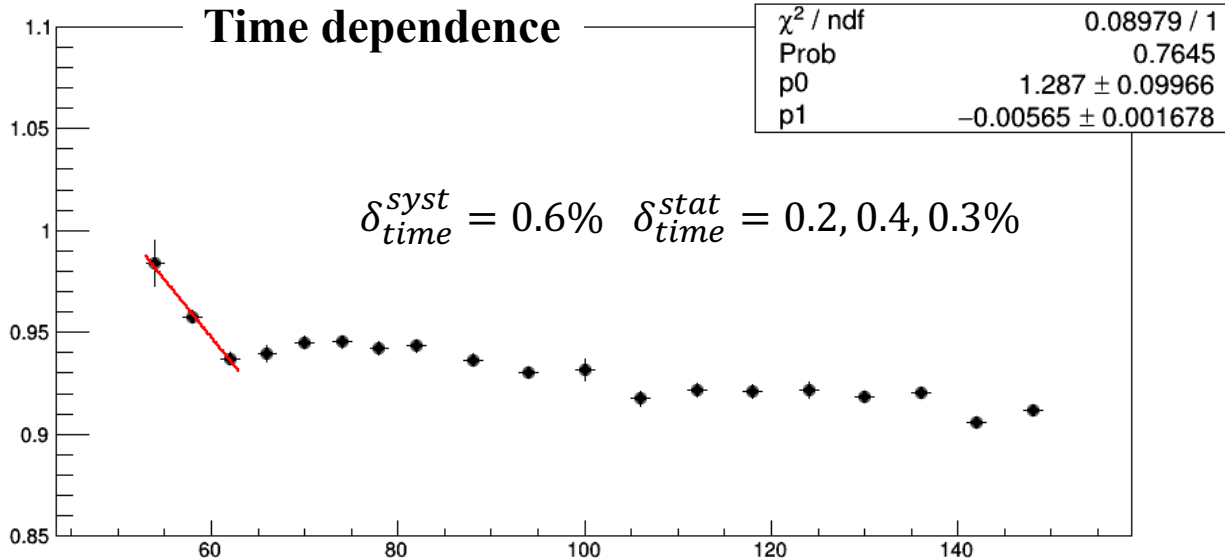


Statistical effect in RMS method

Crate dependence



Time dependence



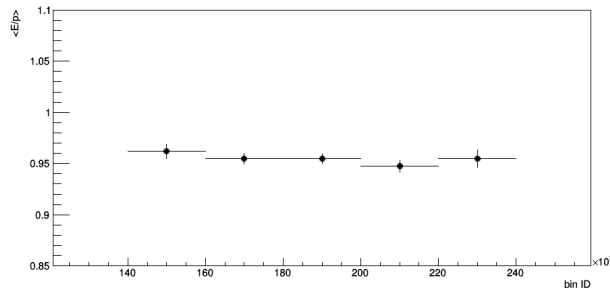
- Statistical effect in P1 is taken from the uncertainty of the slope.
- For P2 and P3, the average relative uncertainty was taken.

$$\delta_{time}^{syst} = 0.6\%$$

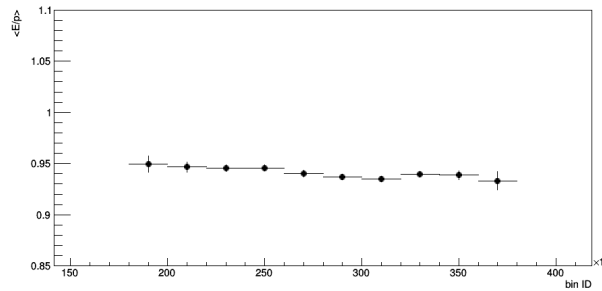
$$\delta_{time}^{stat} = 0.2, 0.4, 0.3\%$$

Statistical effect in ZDCx

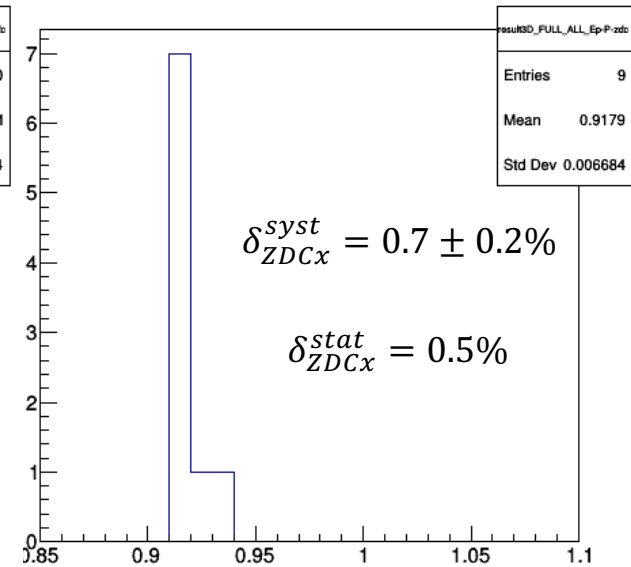
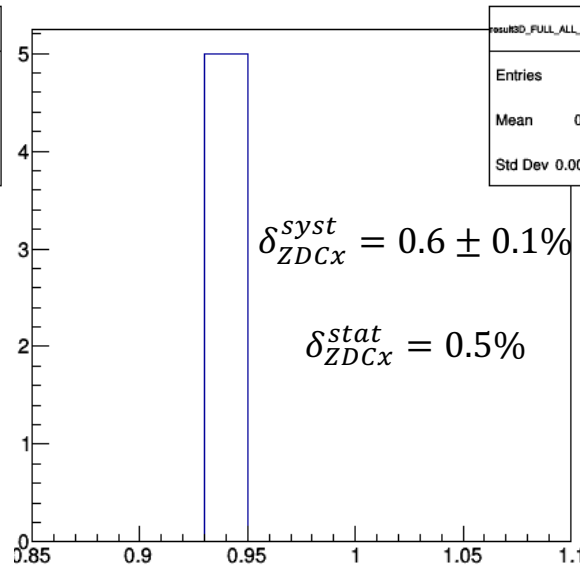
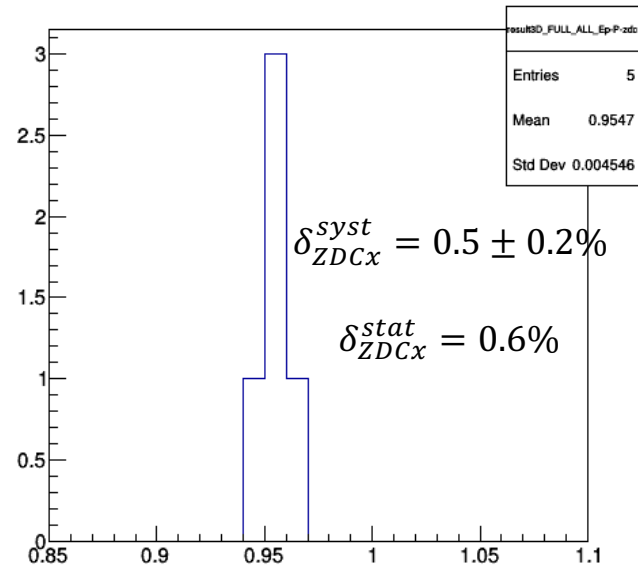
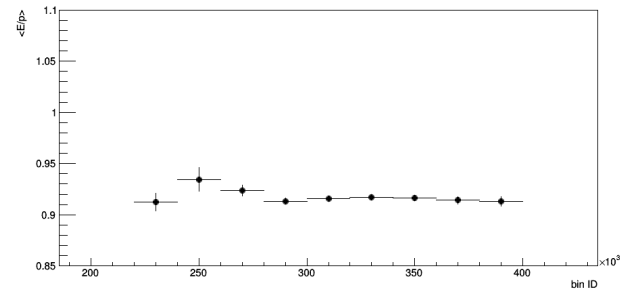
ZDCx (P1)



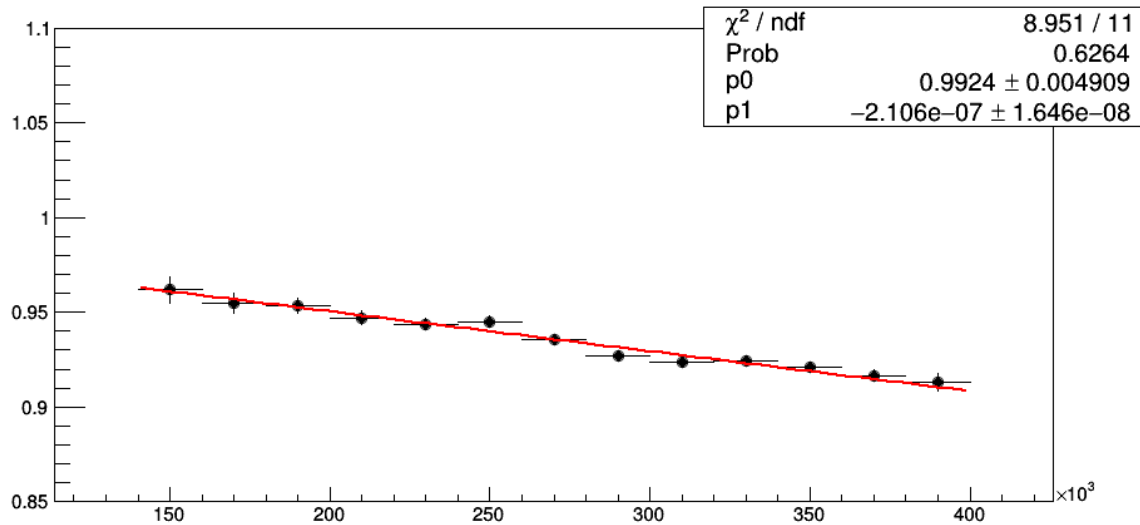
ZDCx (P2)



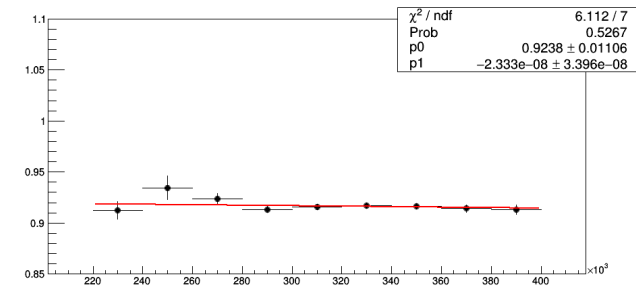
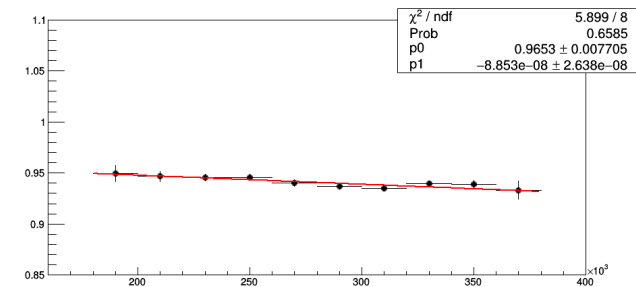
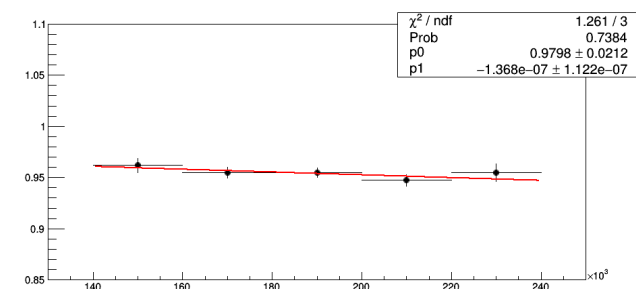
ZDCx (P3)



Additional studies on ZDCx



- The linearity of ZDC rate dependence has been looked into.
 - Most of the remaining linear dependence was found in P1, albeit with a large uncertainty ($p1 \sim \sigma$)
 - In P2, some linear dependence was found with a non-zero, $\sim 3\sigma$ slope.
 - In P3, the linearity seems to have disappeared.
- Period separation seems to suppress the linear ZDC dependence, although may not be as much as the systematic study suggests.



Summary

Systematics	Full (stat)	In (stat)
Trigger	0.2 (0.1)	0.2 (0.1)
Momentum	0.9 (0.1)	0.8 (0.1)
Charge	1.1 (0.2)	1.0 (0.2)
Crate	1.0 (0.4)	1.1 (0.4)
Time	0.6 (0.4)	0.6 (0.4)
ZDC	0.7 (0.5)	0.8 (0.5)
dR	0.9 (0.2)	0.9 (0.2)
Tower Edge	1.8	1.8
Sum	2.8 (0.8)	2.8 (0.8)

- Statistical effect to the systematic uncertainty calculation has been estimated.
 - The estimation suggests a negligible contribution from the statistical effect in most cases.
 - The linear dependence in ZDCx in the global sample seems to be suppressed after the period separation.
 - The non-zero slope in ZDCx and relatively large estimation of statistical effect suggest that ZDCx dependence calculation may underestimate the actual ZDCx dependence
 - Including, the estimated statistical contribution, The systematic uncertainty may vary from 2.7-2.9%.
- BEMC gains have been submitted to the convener and will be uploaded on the database by the end of the week.