Understanding TRT Endcaps

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EVENT DISPLAY
OF ENDCAP TRACKS HERE.

Introduction

Undertaken systematic study of **Endcap** alignment.

Begins with understanding **L1**

Started with one run **92057** (Boff) 200K events

Track Selection:

5 SCT Hits (TRT Only endcap tracks atrocious see backup, understood?)

10 TRT Endcap Hits (saw this might limit L2 stats, but ok here)

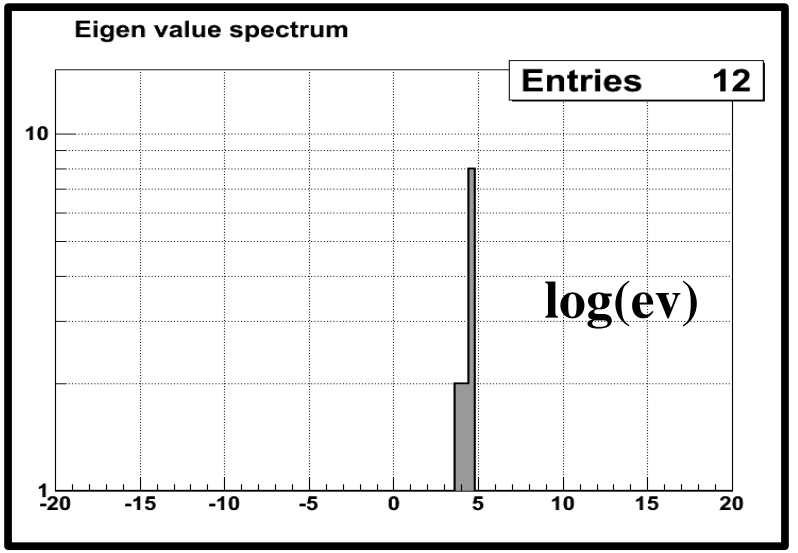
4097 Tracks Selected corisponding to **30K** EndcapA hits

35K EndcapC hits

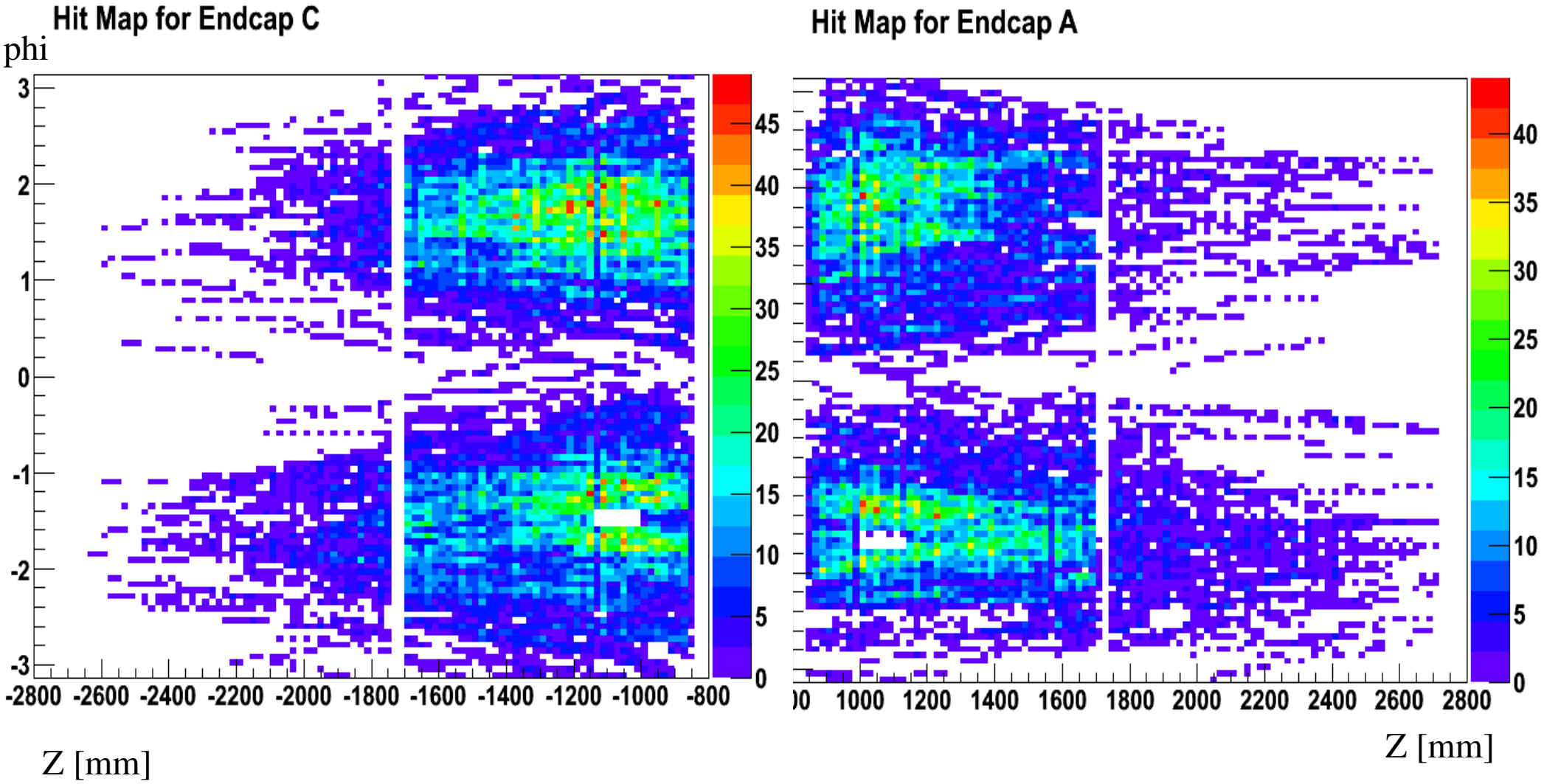
Aligning the Endcaps in 6 DoF

Translations in global x,y,z

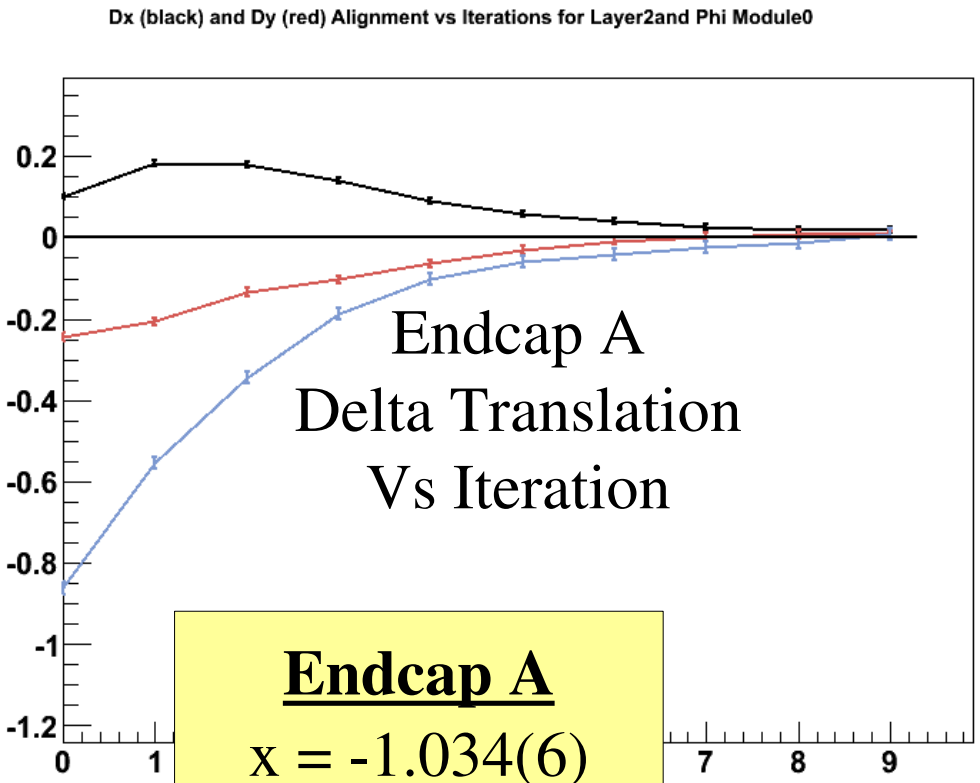
Rotations around global x, y, z

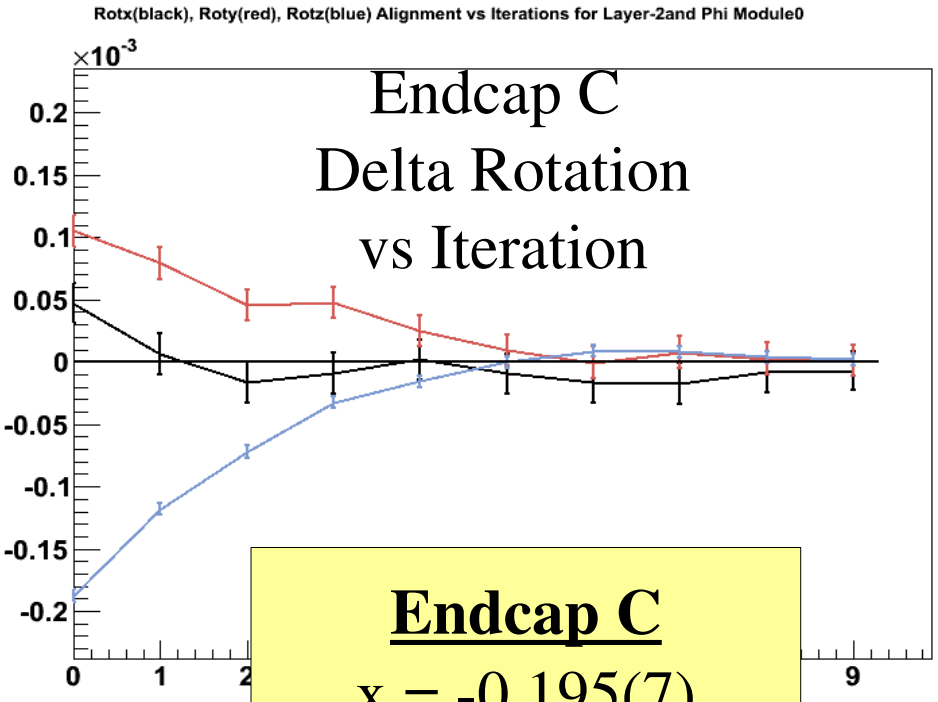


L1 Alignment



L1 Alignment





Endcap A

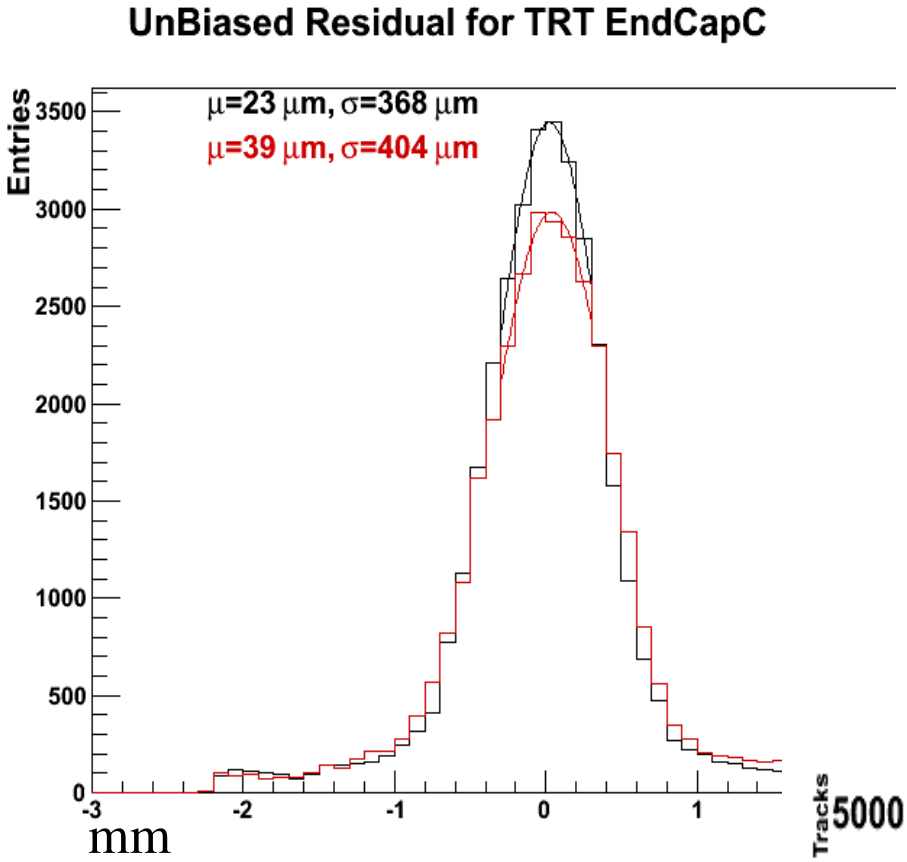
x = -1.034(6)
y = -0.221(9)
z = -3.189(8)
rotx = 0.14(1)
roty = 0.87(1)
rotz = -7.495(5)

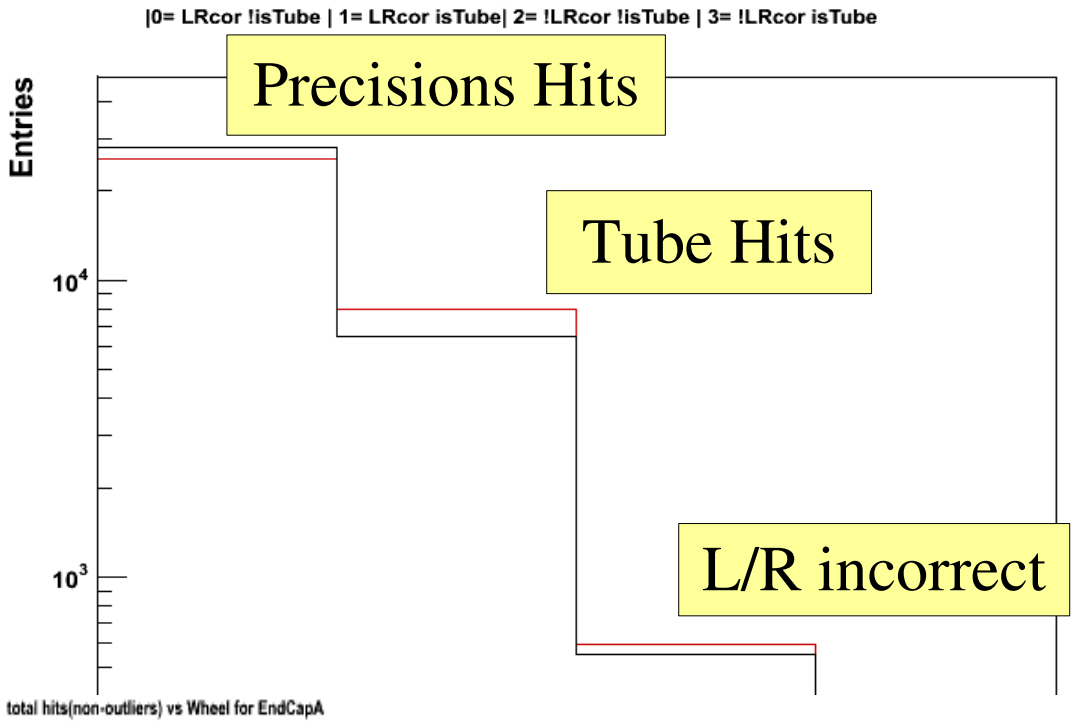
Endcap C

x = -0.195(7)
y = 1.494(9)
z = 1.82(1)
rotx = -0.330(7)
roty = 0.508(1)
rotz = 5.744(2)

Misalignments are in **mm** and **mrad**. Uncertainties purely **statistical.**

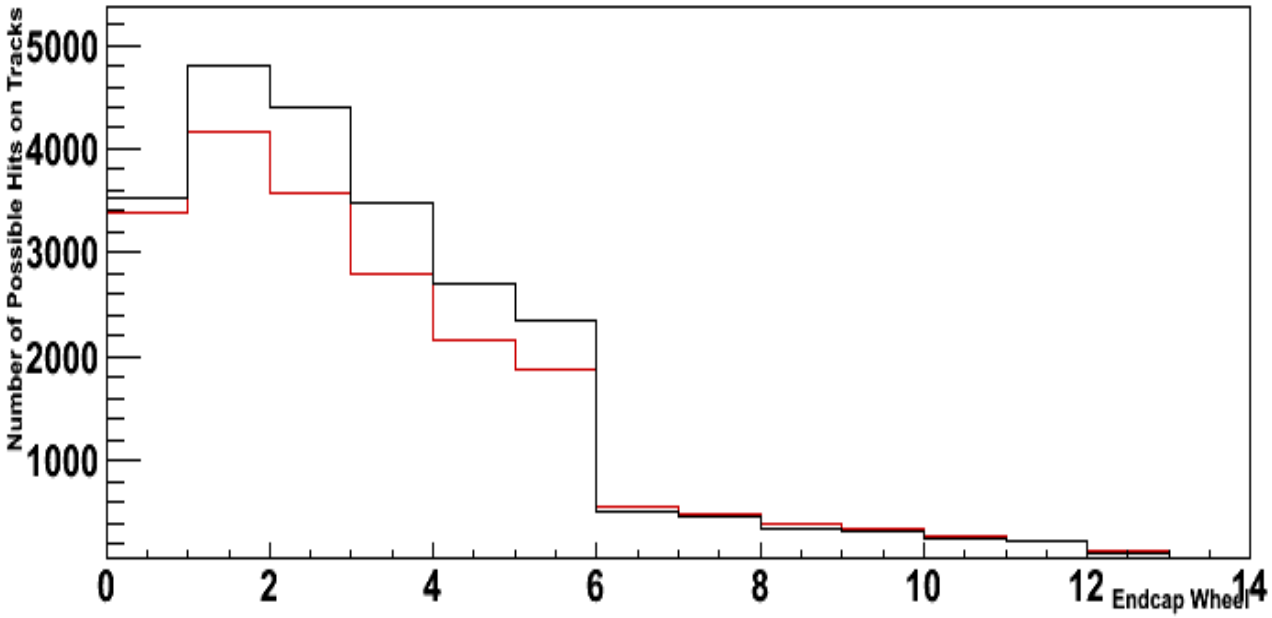
L1 Alignment Validation





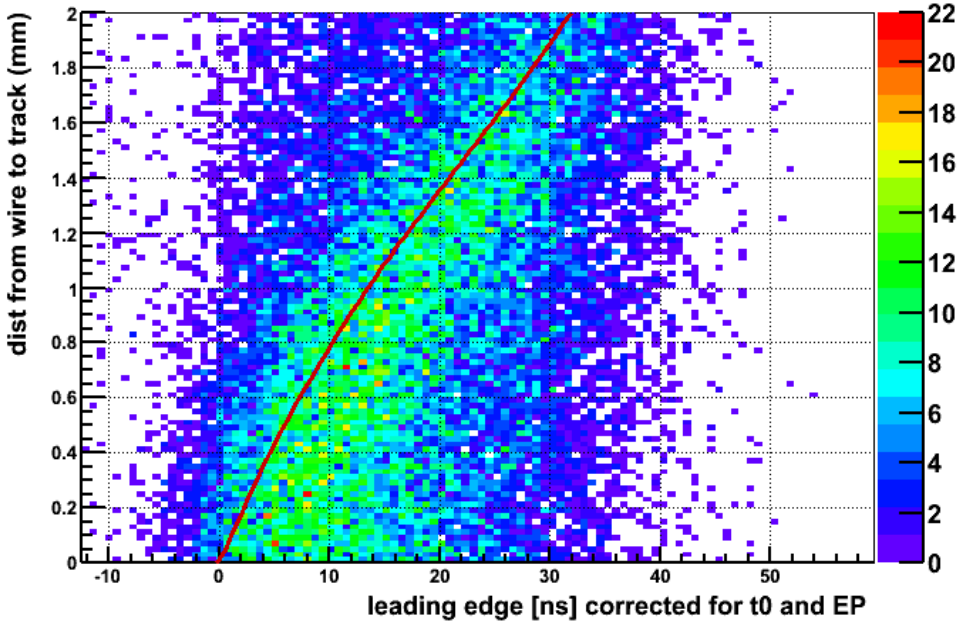
Before Alignment

After Alignment

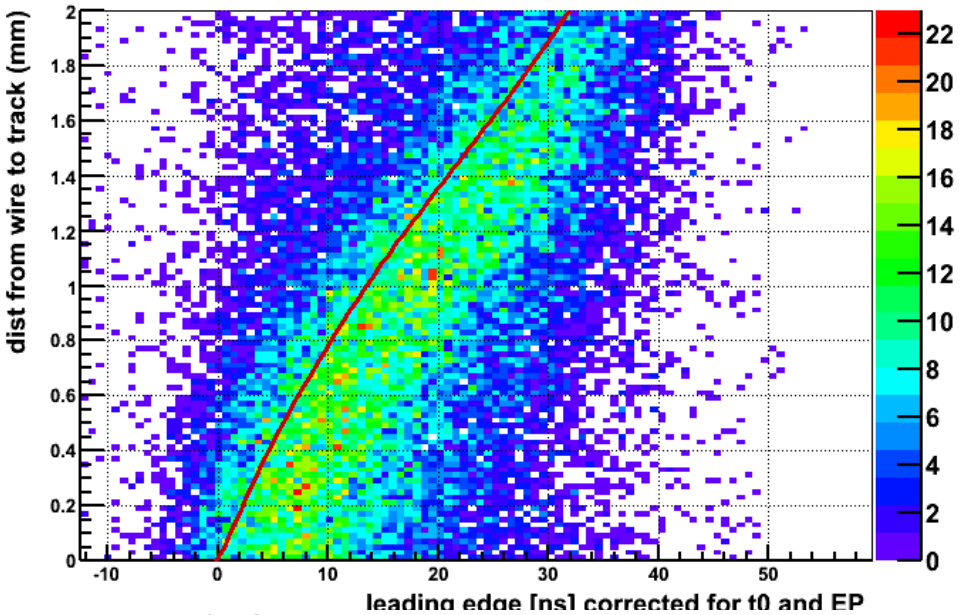


r(t) relation

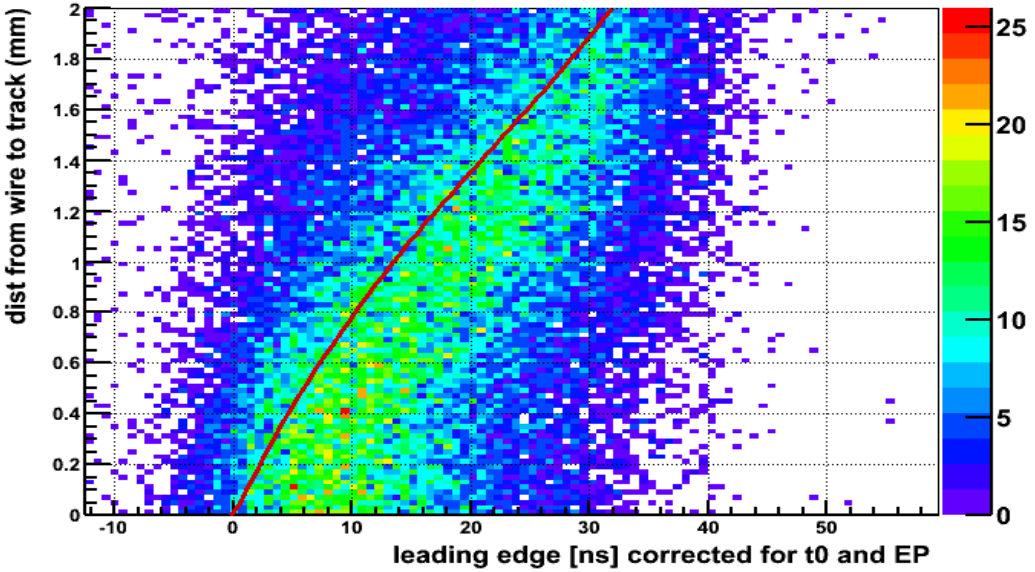
Endcap A Before Alignment



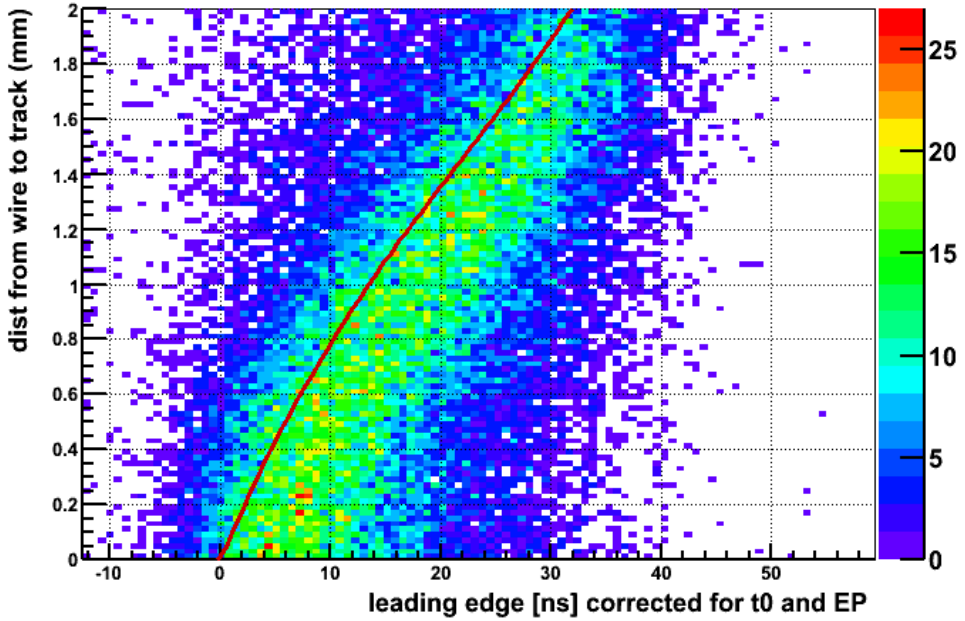
Endcap A After Alignment



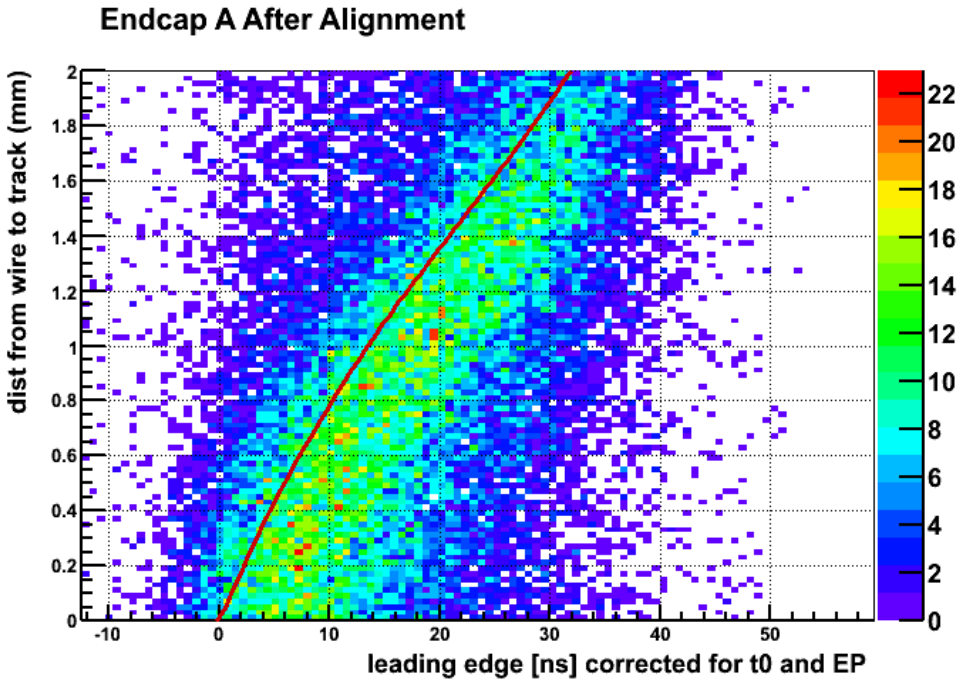
Encap C Before Alignment

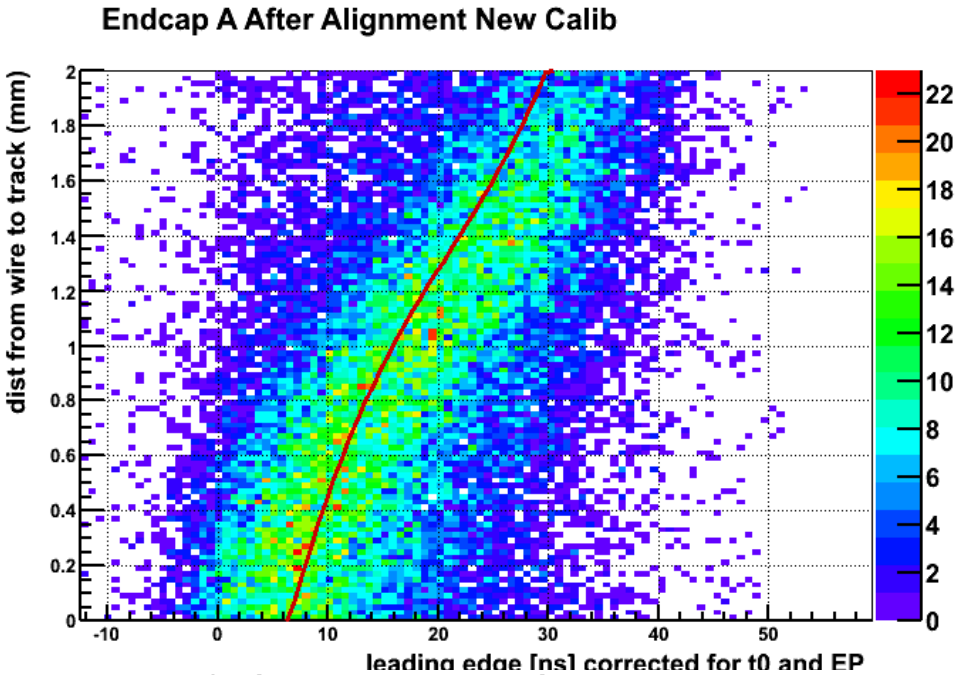


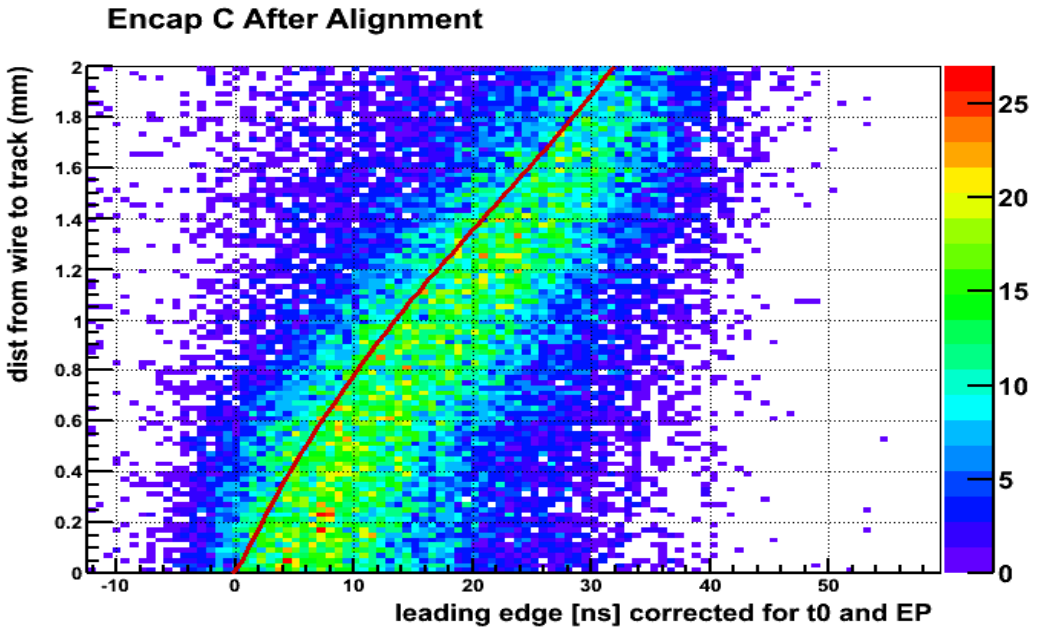
Encap C After Alignment

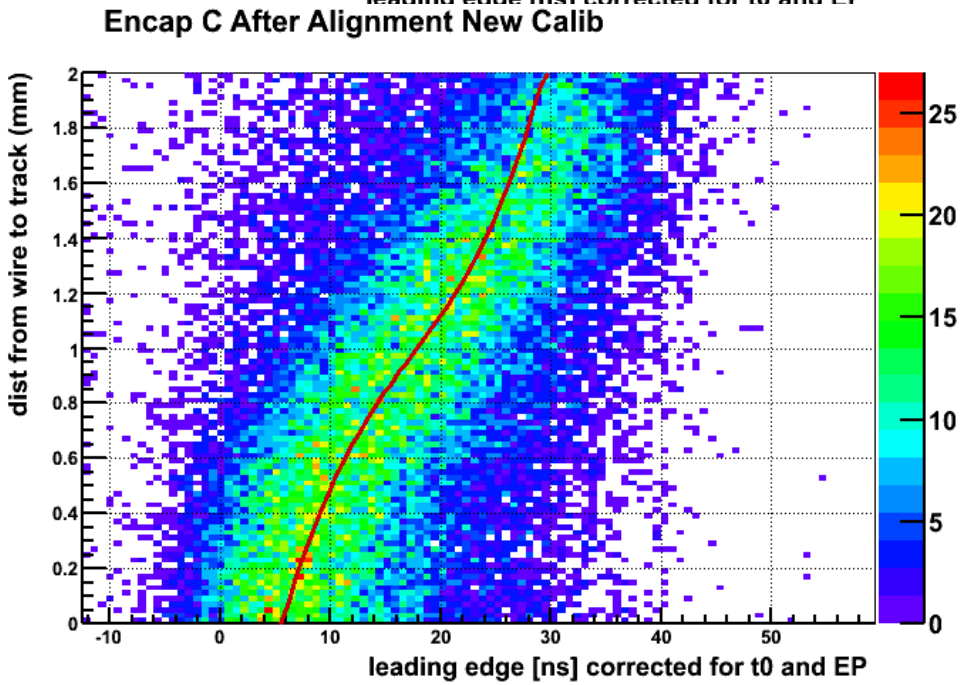


Calibrate r(t) relation



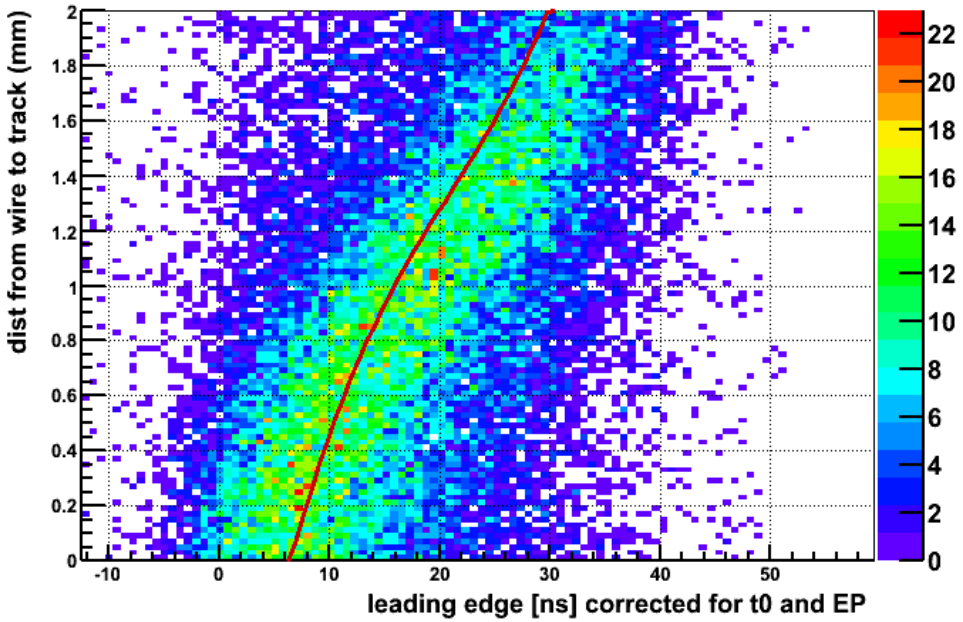




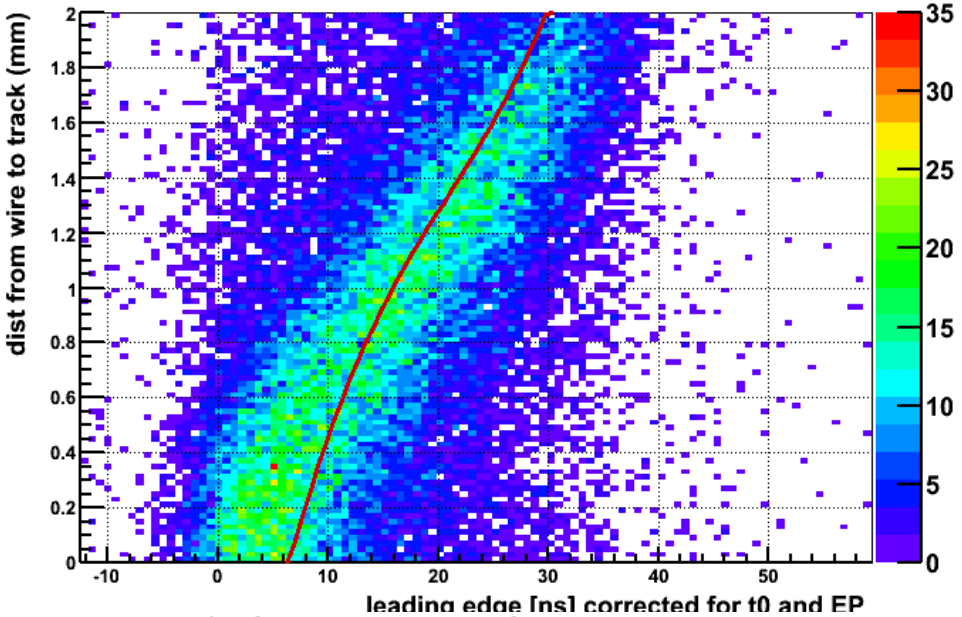


Calibrate r(t) relation

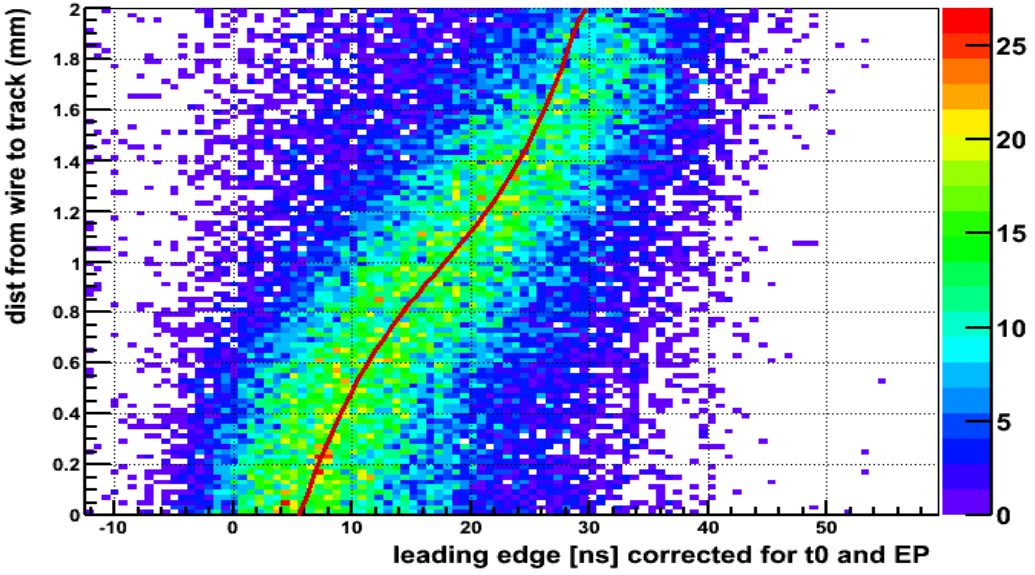
Endcap A After Alignment New Calib



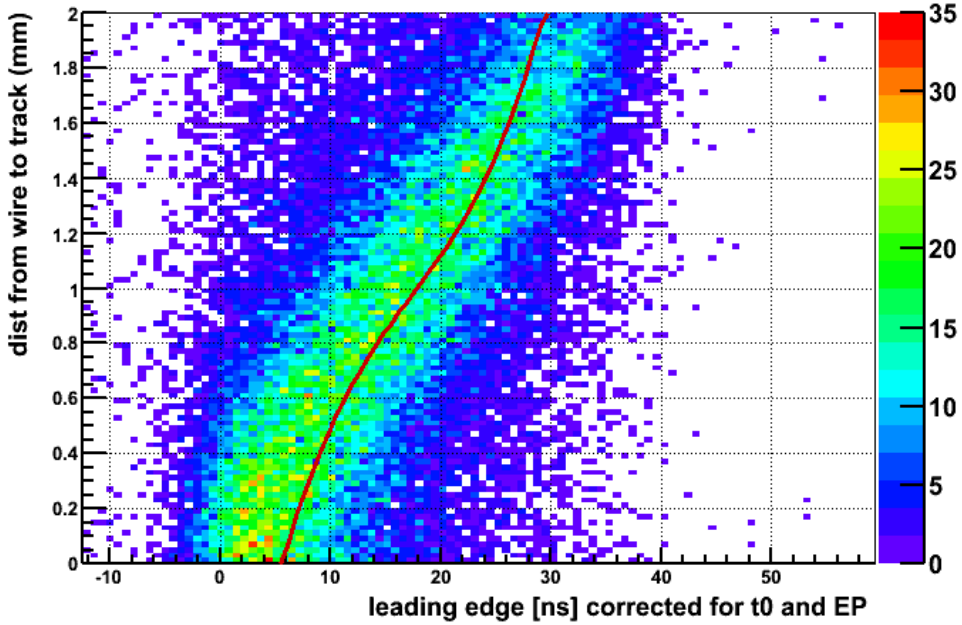
Endcap A After Iteration with New Calib



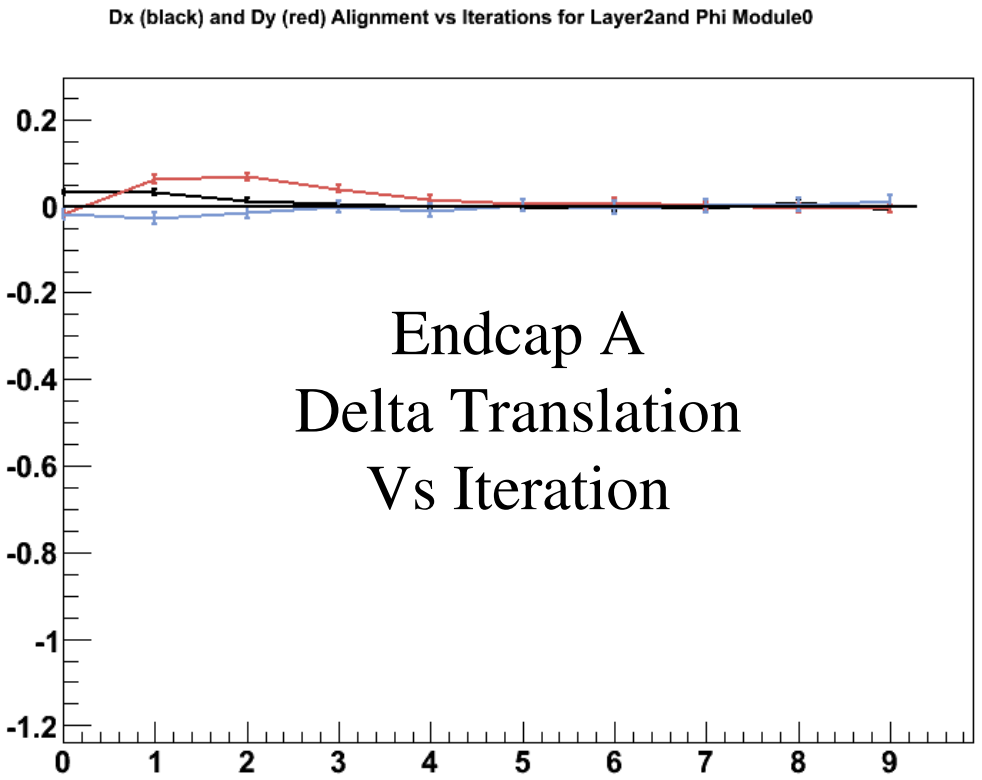
Encap C After Alignment New Calib

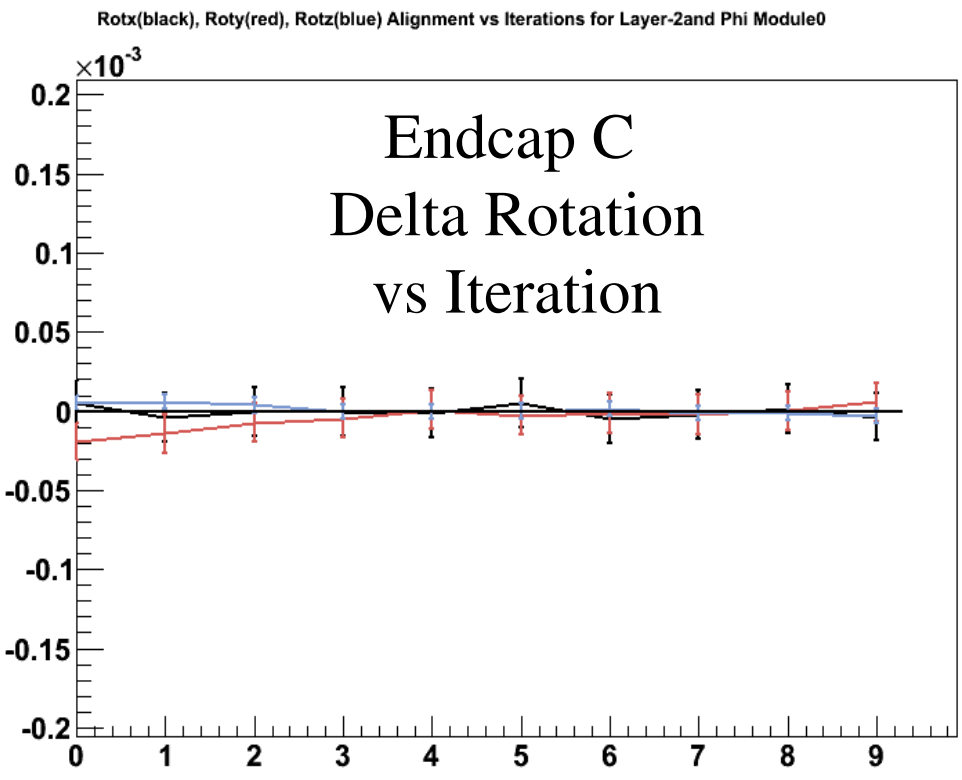


Encap C After Iteration New Calib



Re Align L1 w/ new calibration

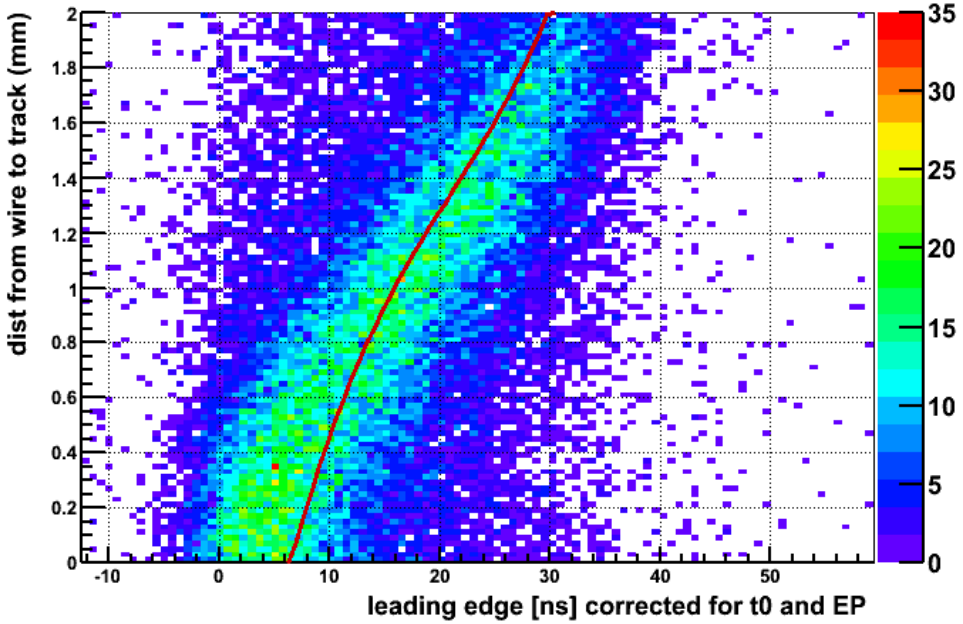




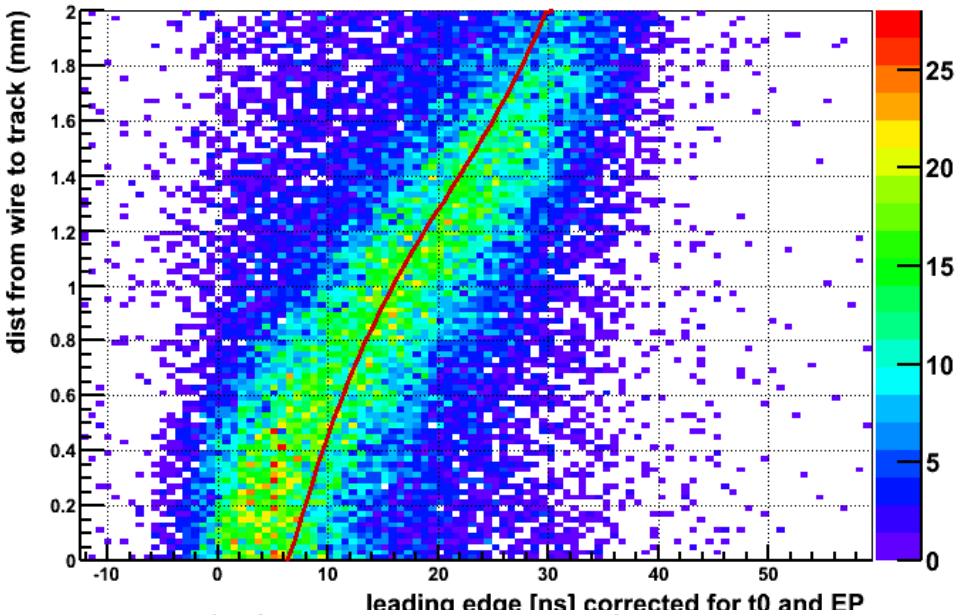
Only small changes in terms of alignment parameters

Calibrate r(t) relation

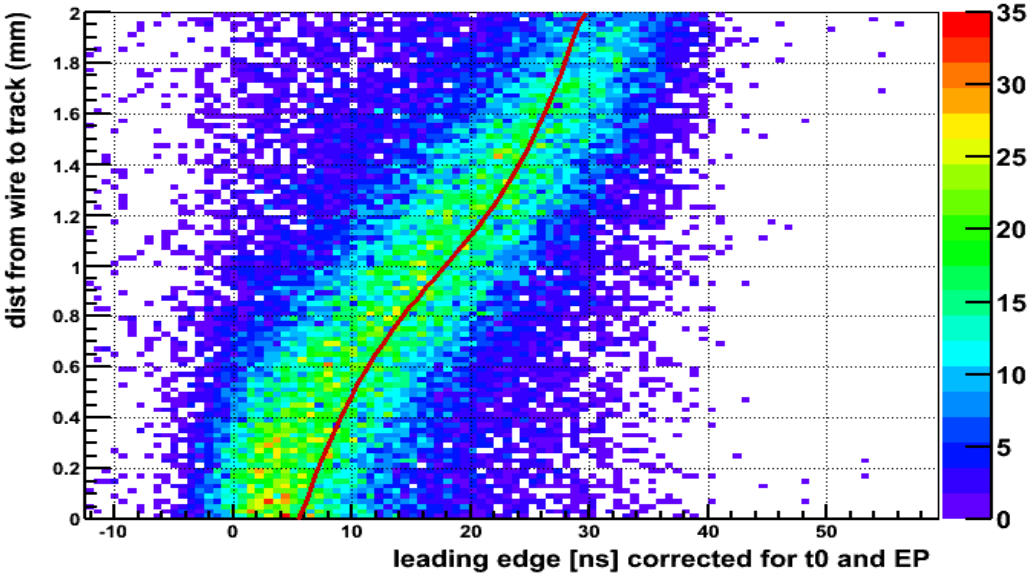
Endcap A After Iteration with New Calib



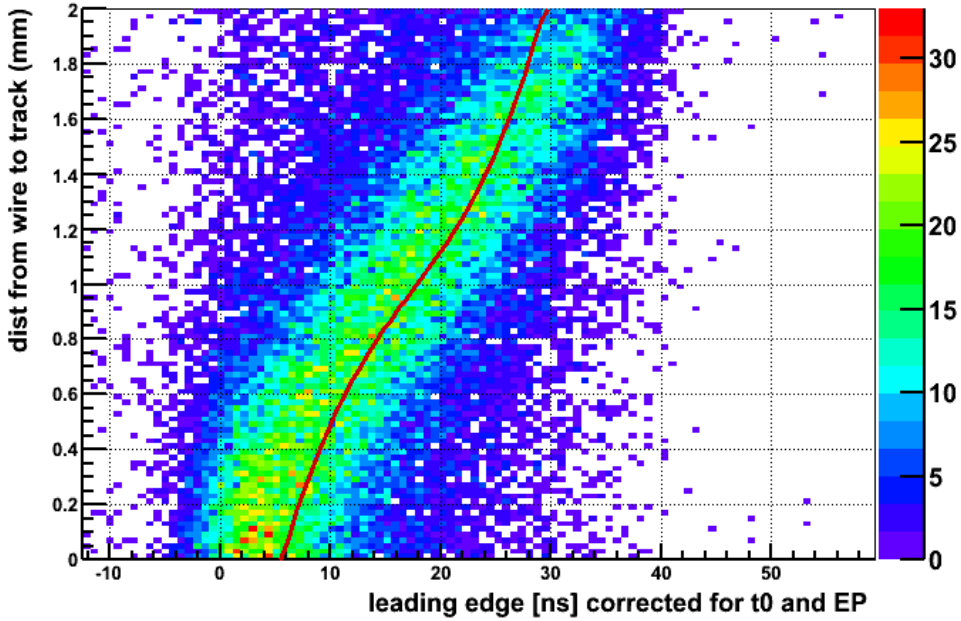
Endcap A After Alignment With New Calib



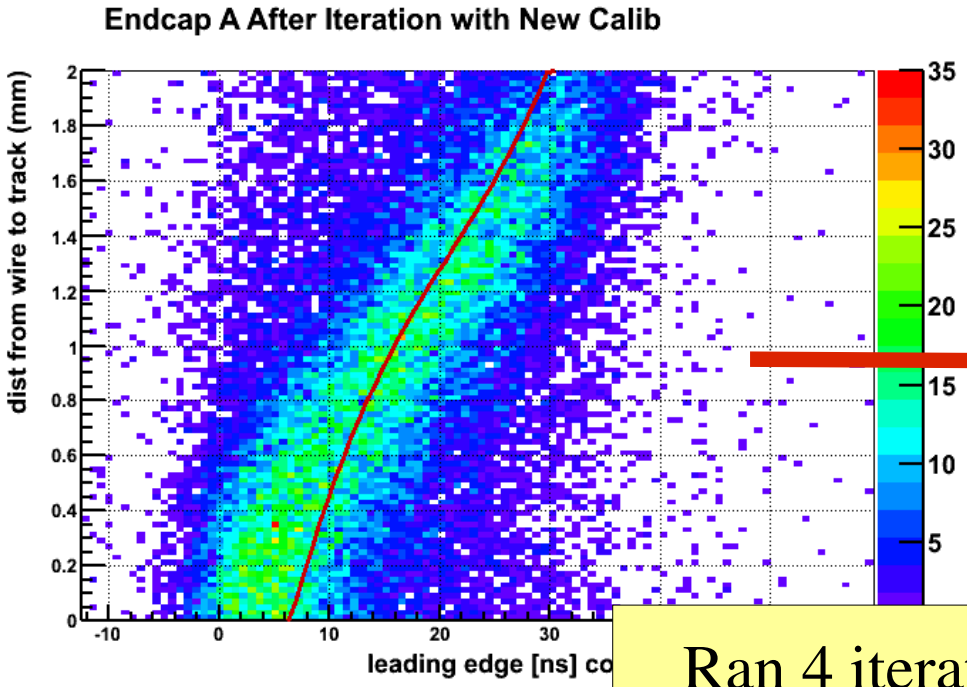
Encap C After Iteration New Calib

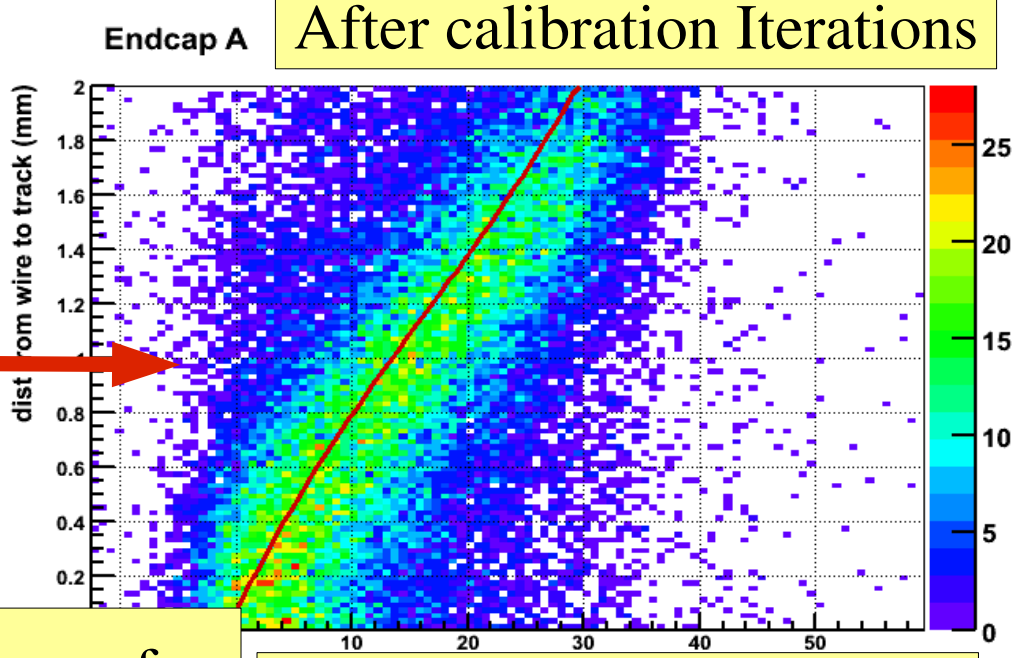


Encap C After Alignment With New Calib

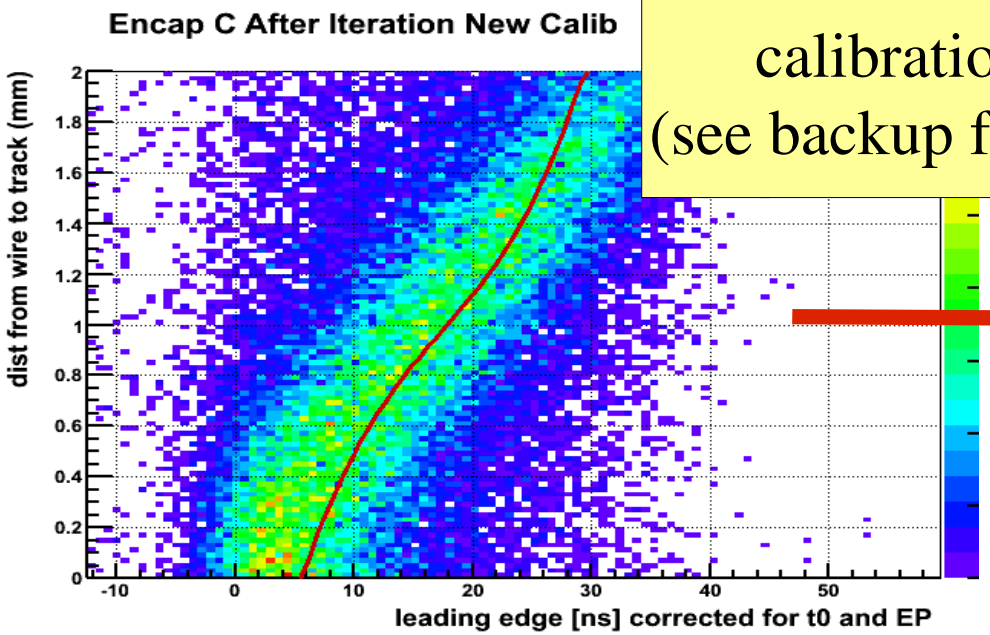


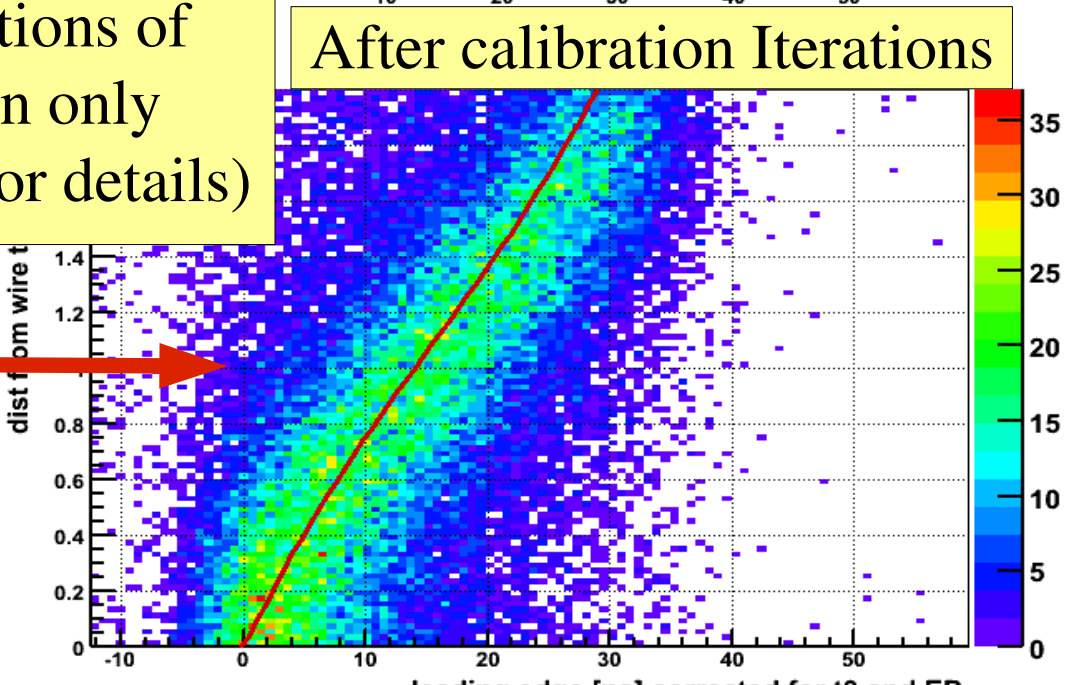
Calibration Iterations



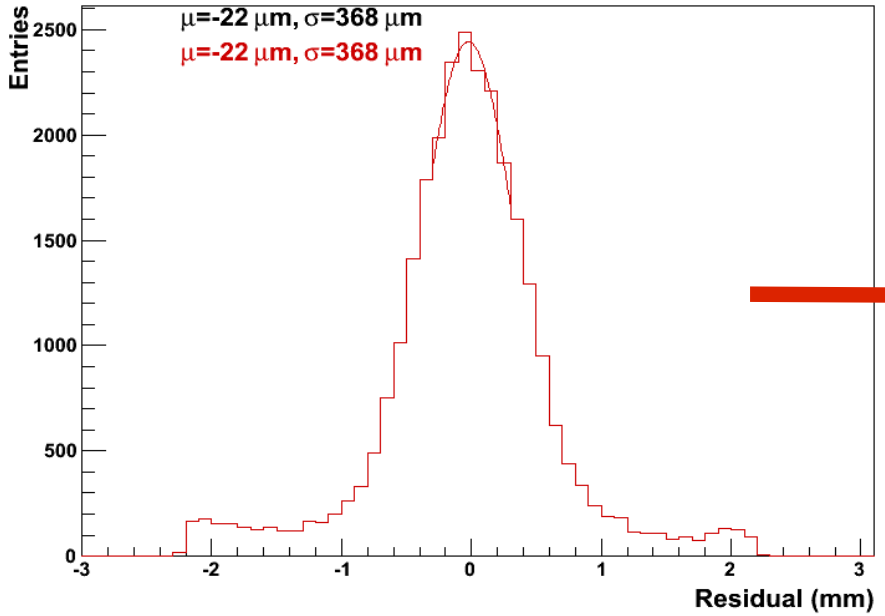


Ran 4 iterations of calibration only (see backup for details)

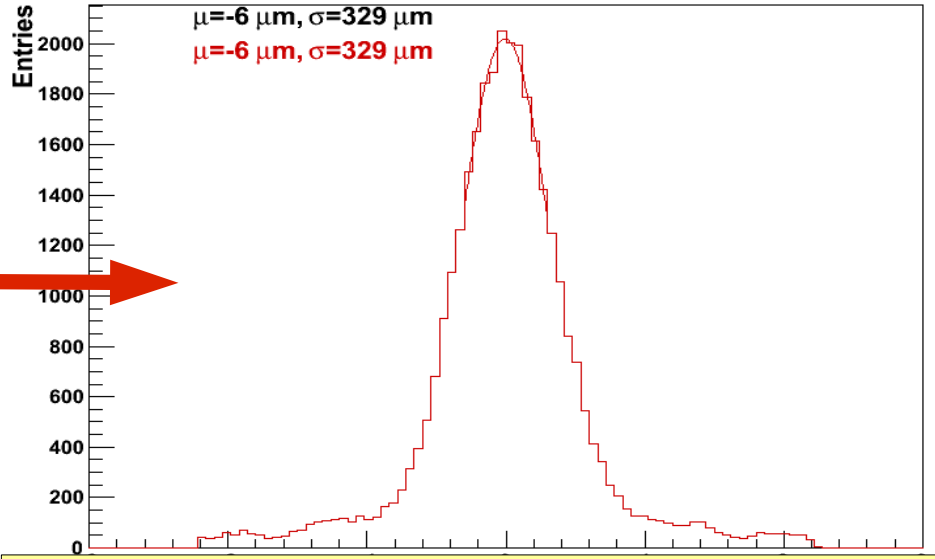


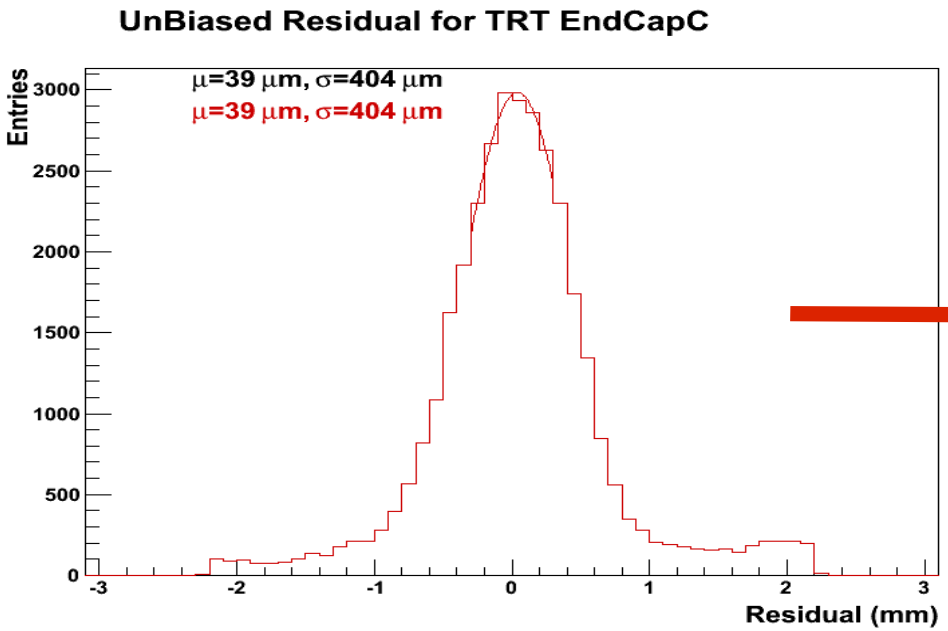


Calibration Iterations

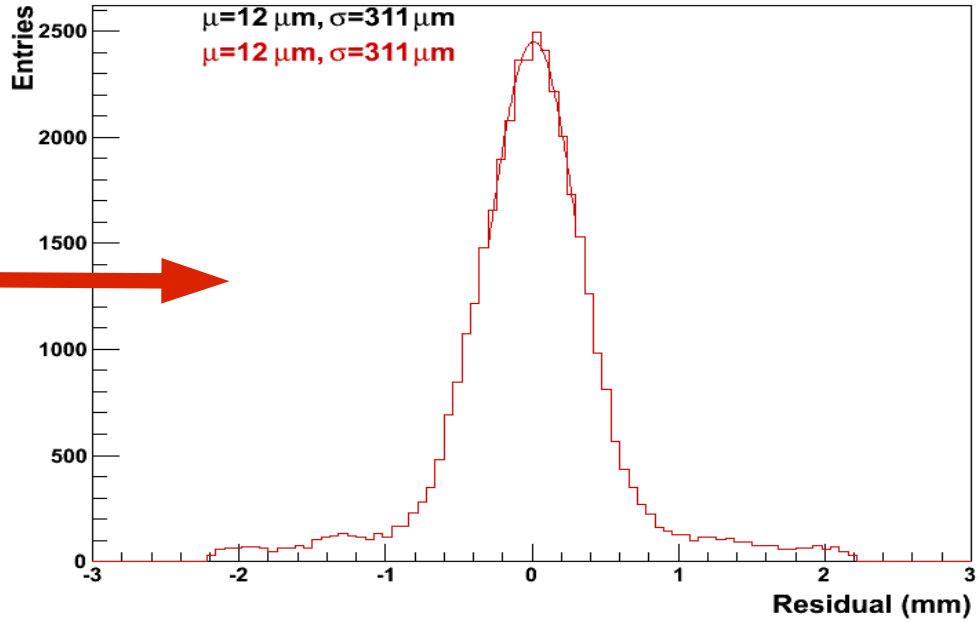


After alignment & calibration Iterations





After alignment & calibration Iterations



Conclusions / To do

Conclusions

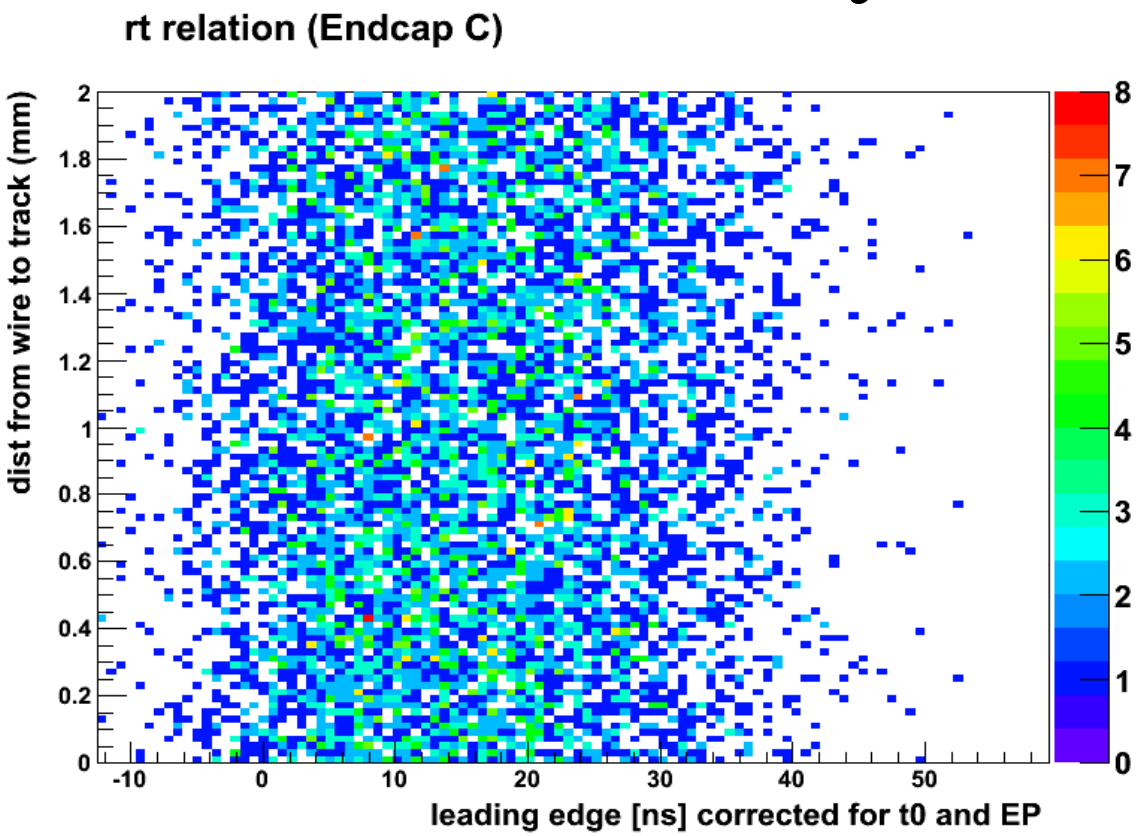
Alignment of Endcaps is behaving reasonably.
First estimate of Endcap misalignments.
After L1 alignment, larger changes with calibration iterations
Resolution changes from O(400 mum) to O(300 mum)
Developed Much Needed Analysis Tools for Endcap

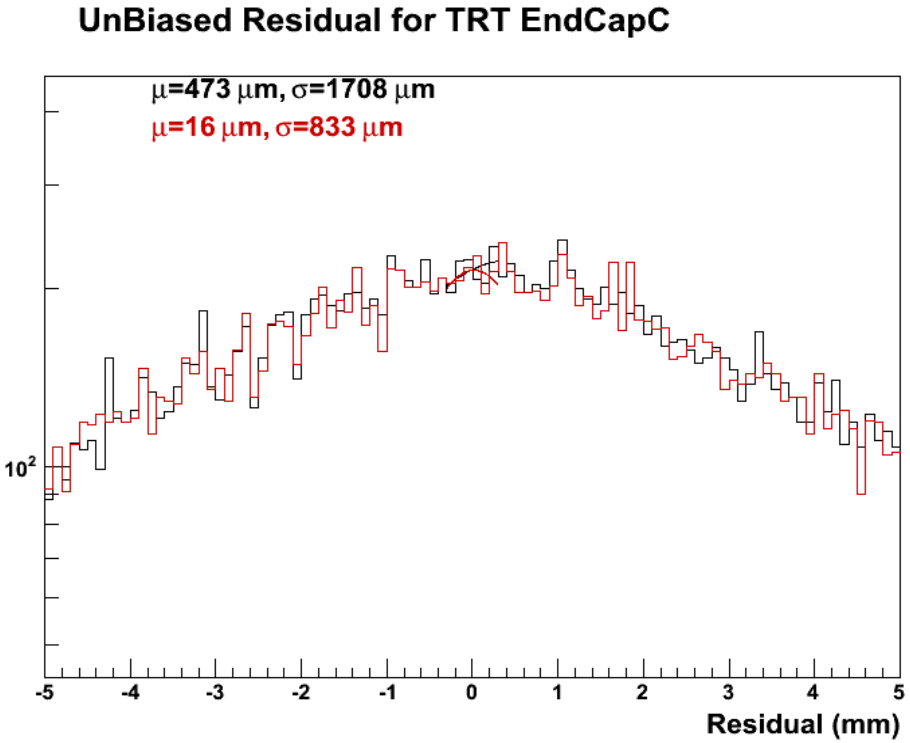
To Do

Converge on a calibration (largely underway, see backup)
Rerun L1 Alignment on converged calibration. (running)
Estimate the uncertainties in alignment parameters.
Repeat w/ Bon
    know big differences between Bon And Boff

Backup

TRT-Only Endcap tracks

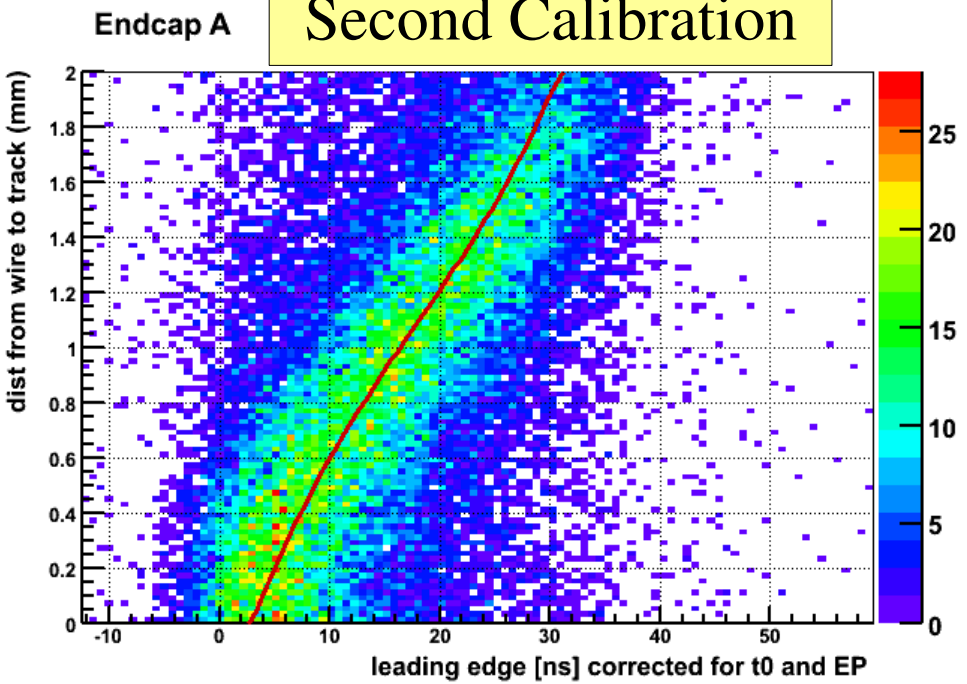




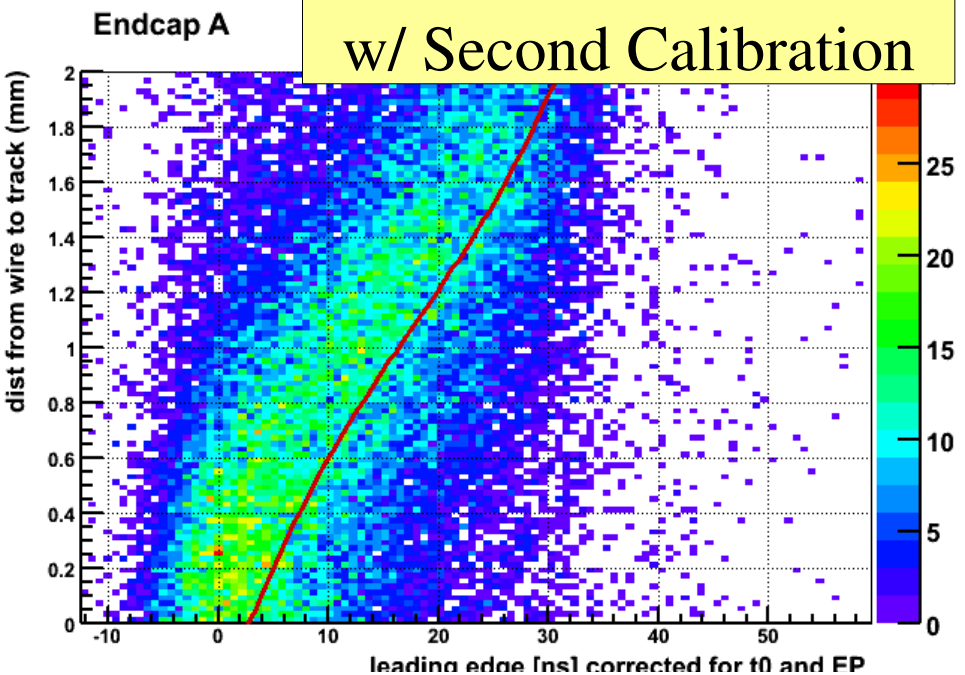
More Calibration Iterations

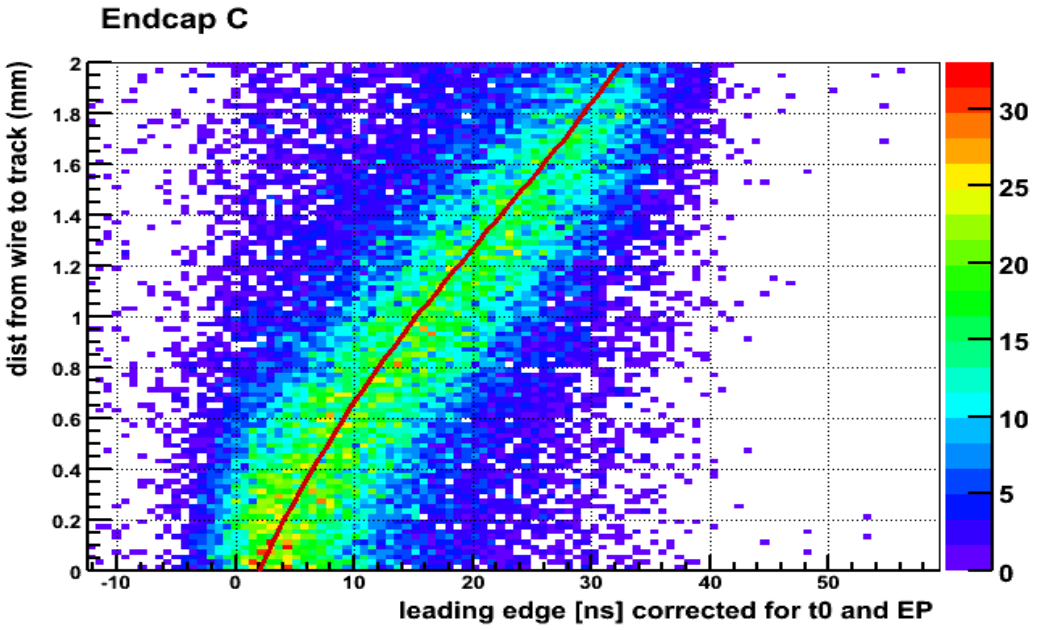
Calibrate r(t) relation

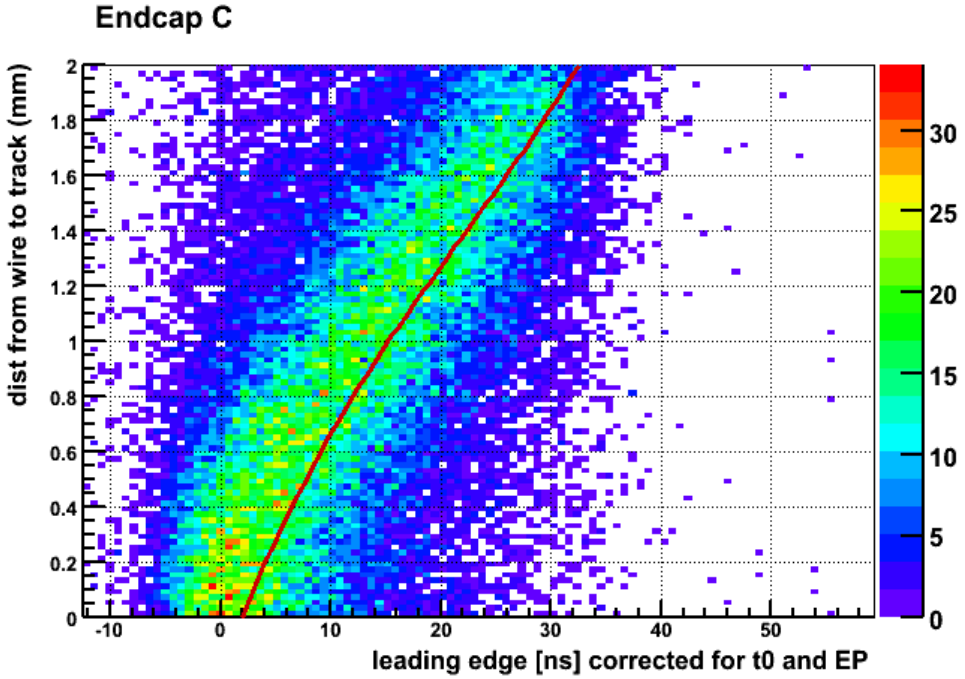
Second Calibration



After Reconstruction w/ Second Calibration

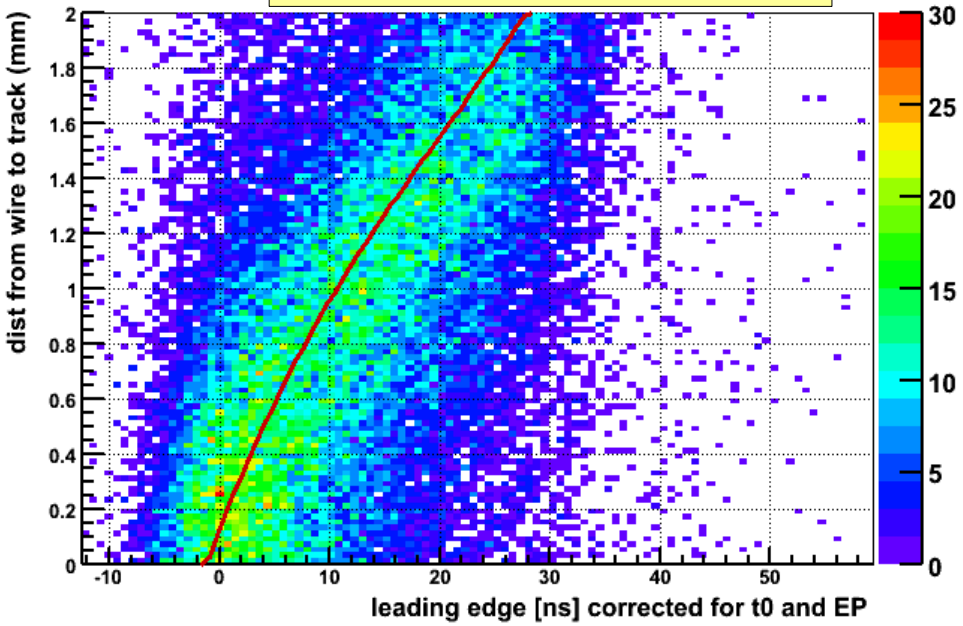




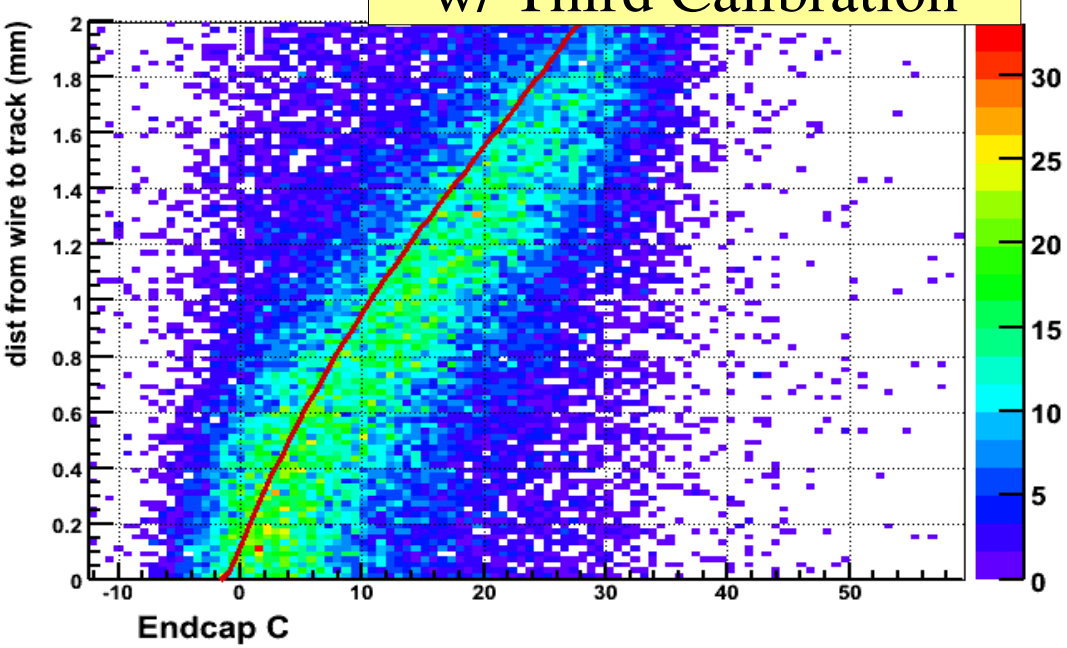


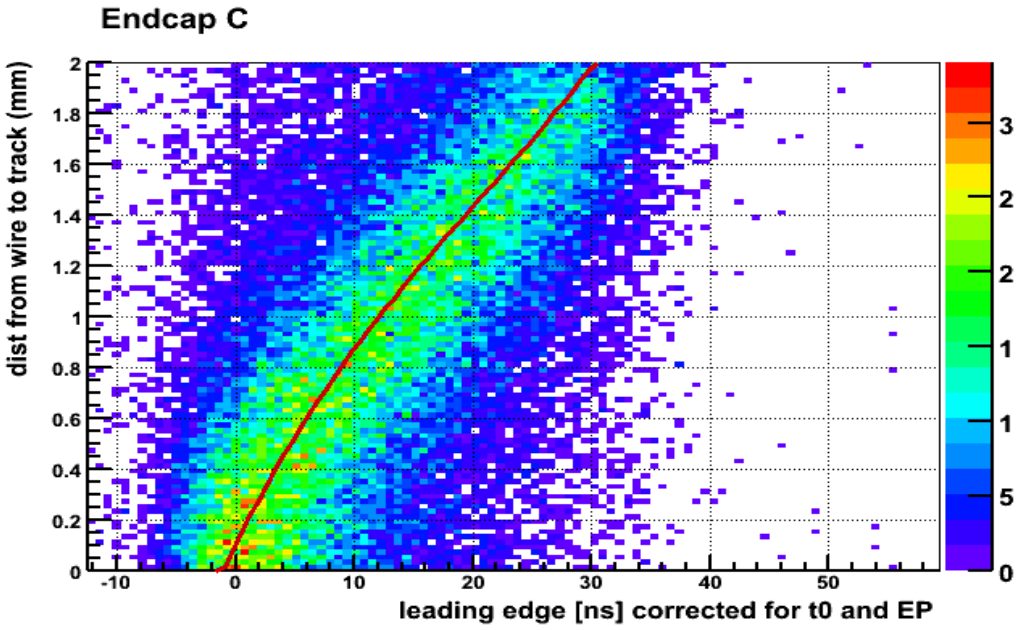
Calibrate r(t) relation

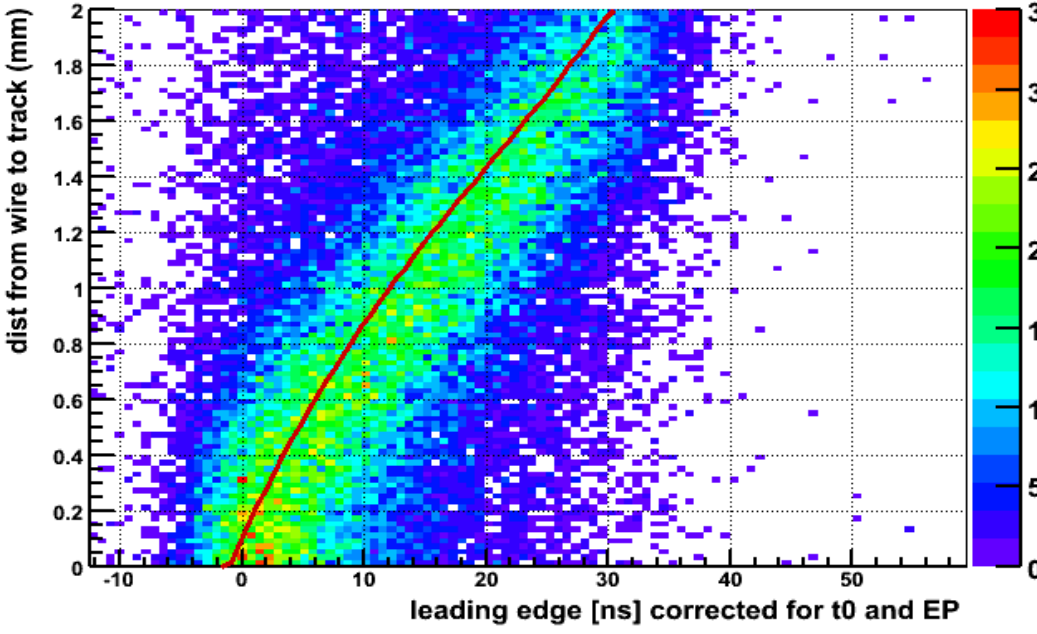
Third Calibration



After Reconstruction w/ Third Calibration

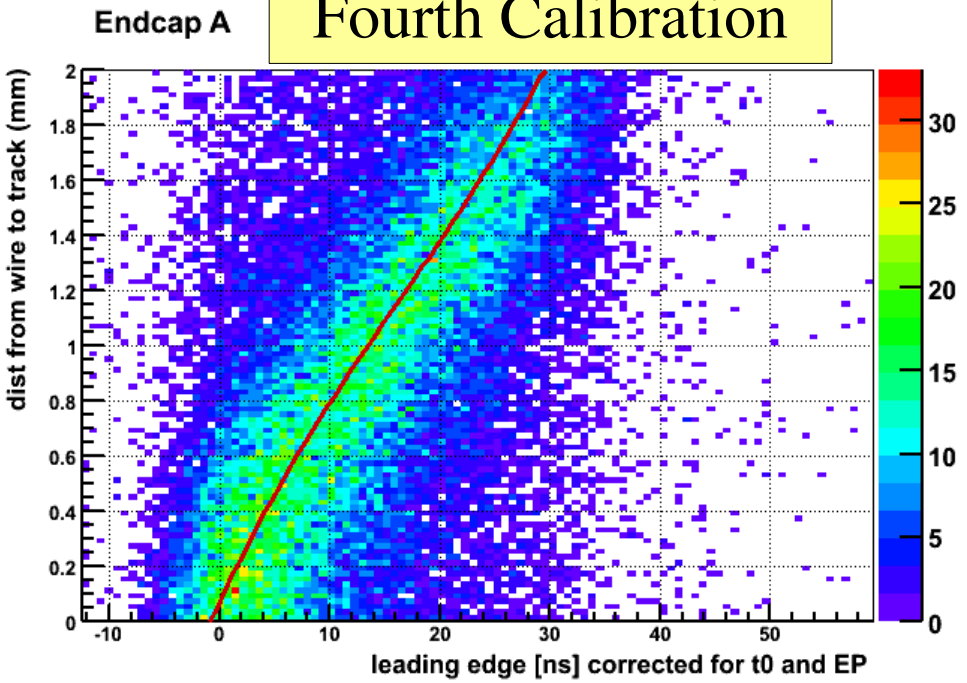






Calibrate r(t) relation

Fourth Calibration



After Reconstruction
w/ Fourth Calibration