TB24 paramtrisation exercise

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Introduction

Look at TB24 e+ energy scan

Define electrons as per Elisa's talk

Studies by Andrea on position scan seem to point to inhomogeneity in response at the edge between modules

Try to extract resolution by parametrising energy response as a function of variable sensitive to energy sharing between modules/impact point in Y

Tried three variables:

- Asymmetry of side cells: A_S =(TS11-TS15)/(TS11+TS15)
- Partial barycenter: (TS00-27.7*TS11+27.27*TS15)/(TS00+TS11+TS115)
- YDWC2

At first view asymmetry works best, but still very preliminary, parametrisation extracted interactively, not much tuning, etc. Show results only for asymmetry

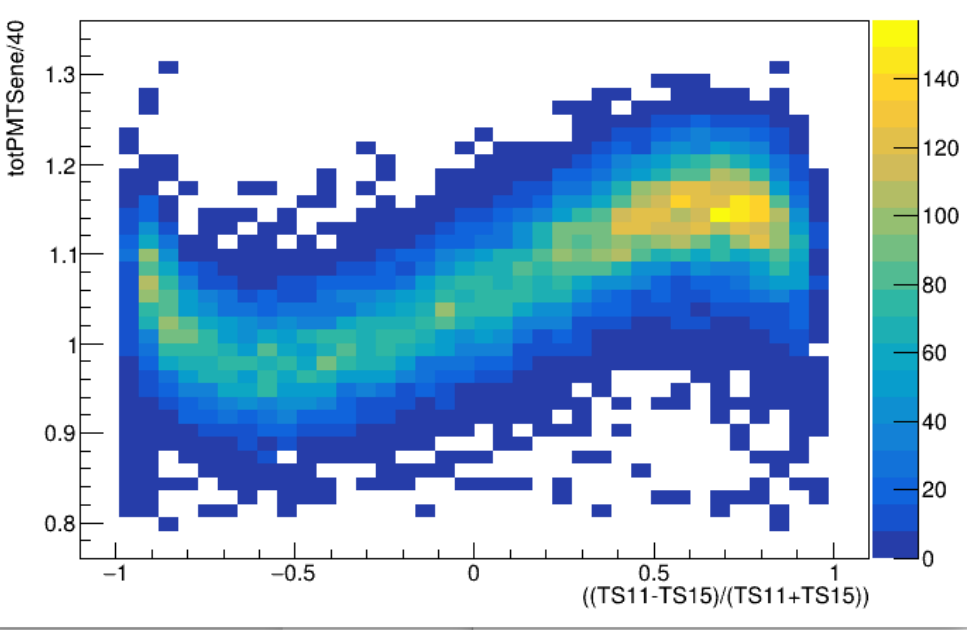
Scintillator parametrisation

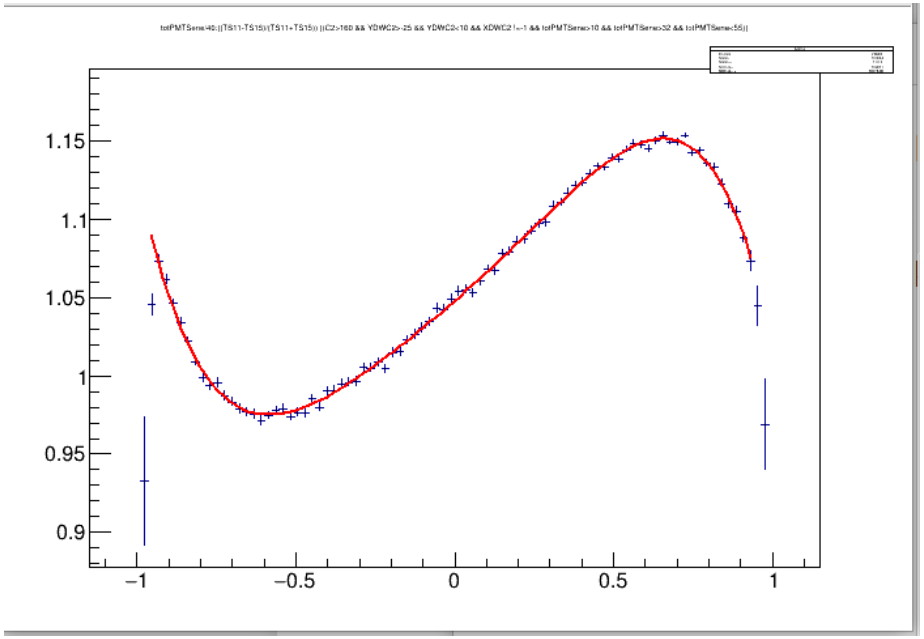
Use 40 GeV run (774):

Plot:

totPMTSene/40 versus

A_S=(TS11-TS15)/(TS11+TS15)





Parametrise with 5th degree polynomial: $f_S(A_S)$

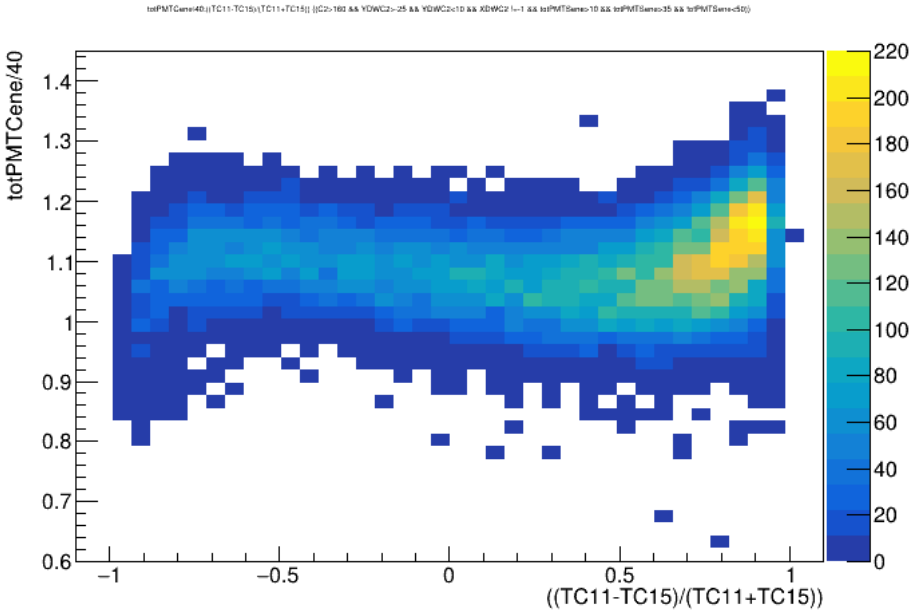
Cerenkov parametrisation

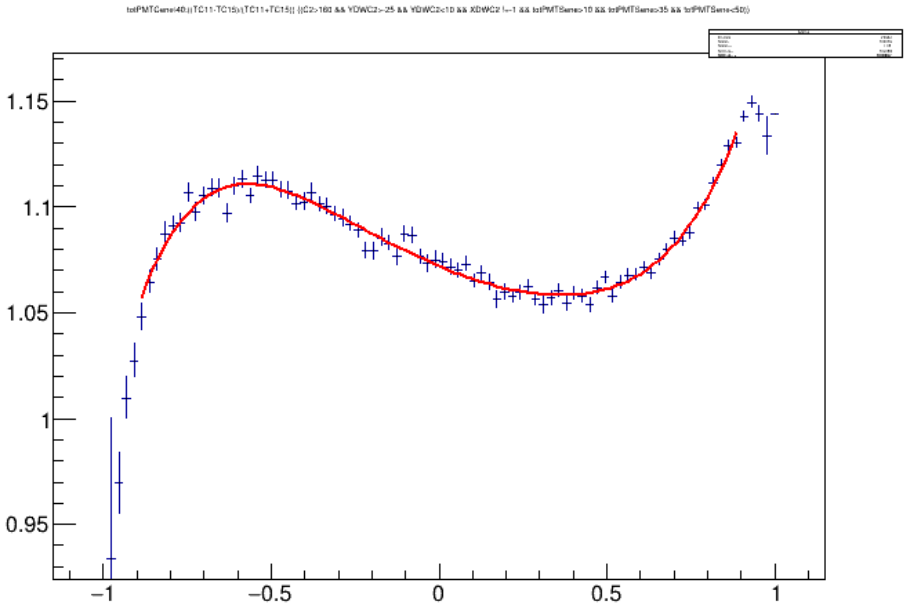
Use 40 GeV run (774):

Plot:

totPMTCene/40 versus

A_C=(TC11-TC15)/(TC11+TC15)





Parametrise with 5th degree polynomial: $f_C(A_C)$

Procedure

For Sci and Cer extract parametrised functions

$f_S(A_S)$ and $f_C(A_C)$

For each event calculate energies as

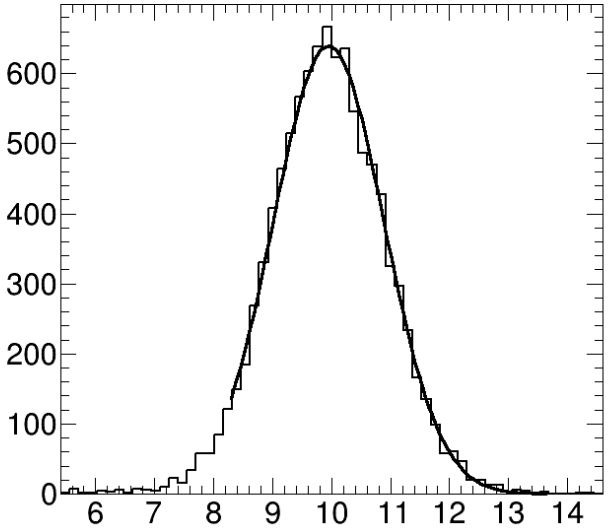
E_S=totPMTSene/$f_S(A_S)$

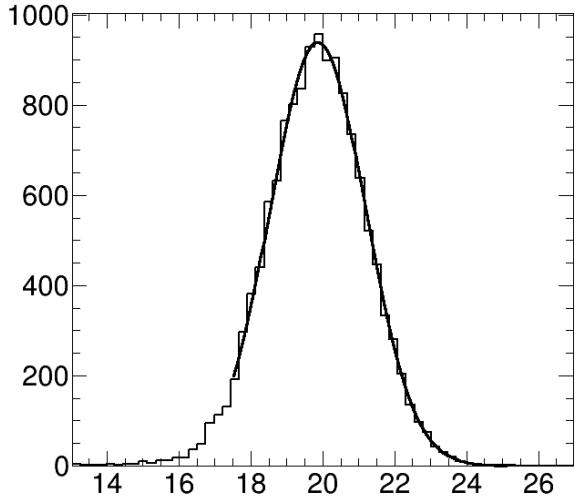
E_C=totPMTCene/$f_C(A_C)$

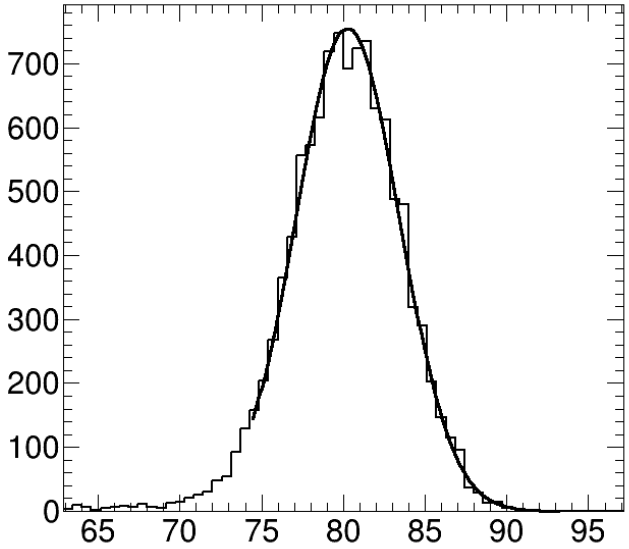
Fit energy peaks and extract resolutions as for TB23

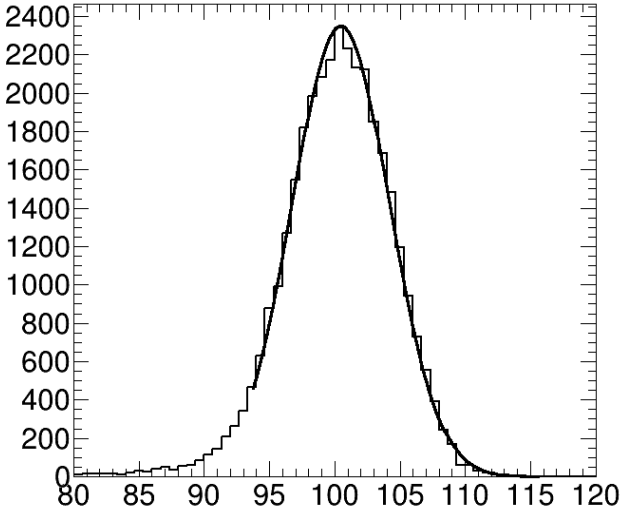
Best results by requiring both A_S and A_C to be within +-0.5, show results in that condition

Cerenkov peaks

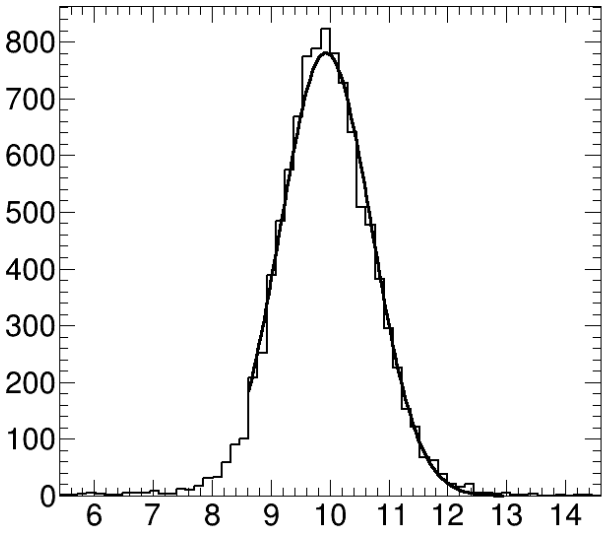


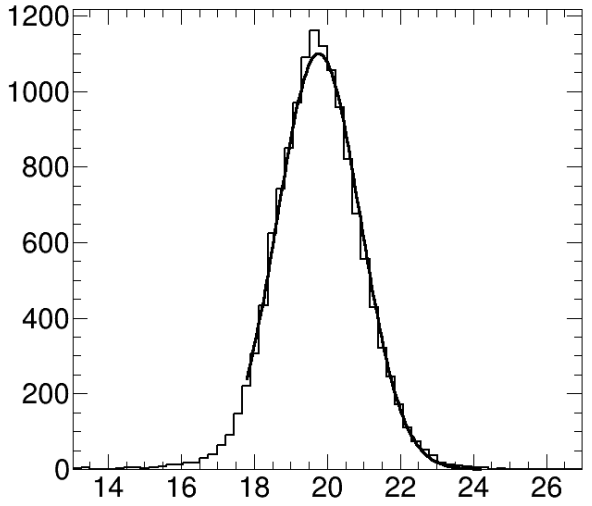


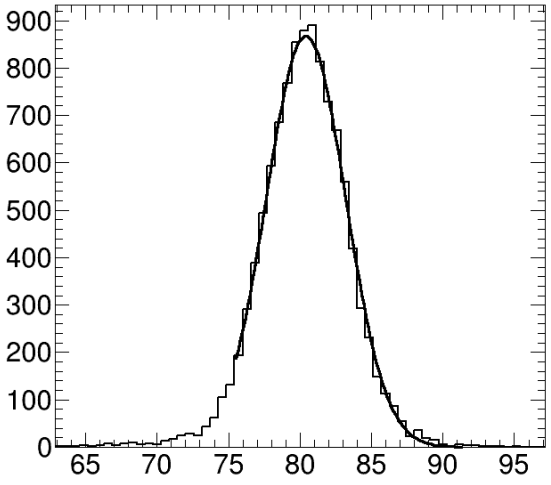


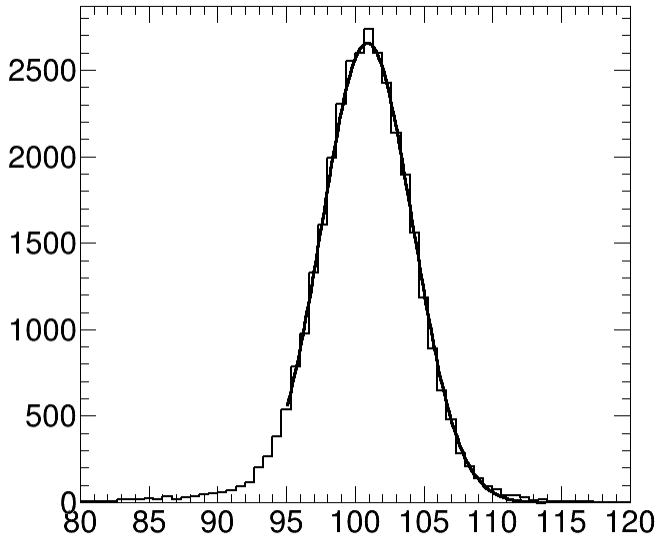


Scintillator peaks

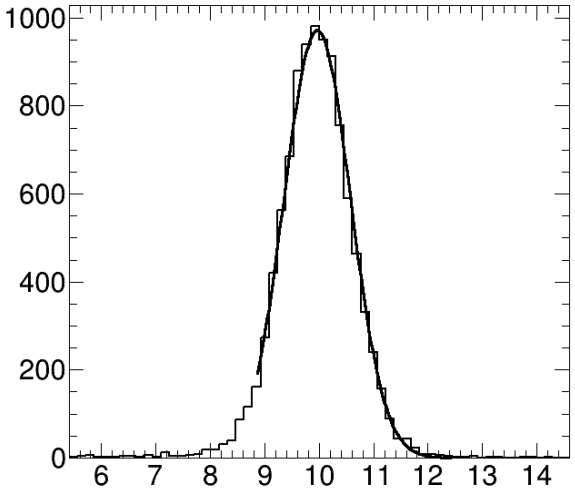


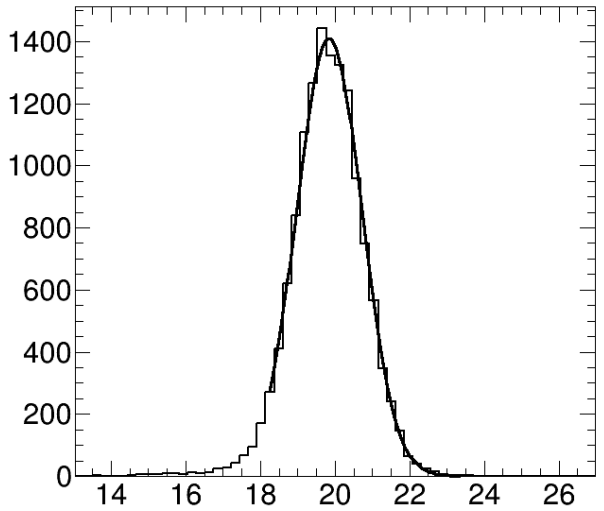


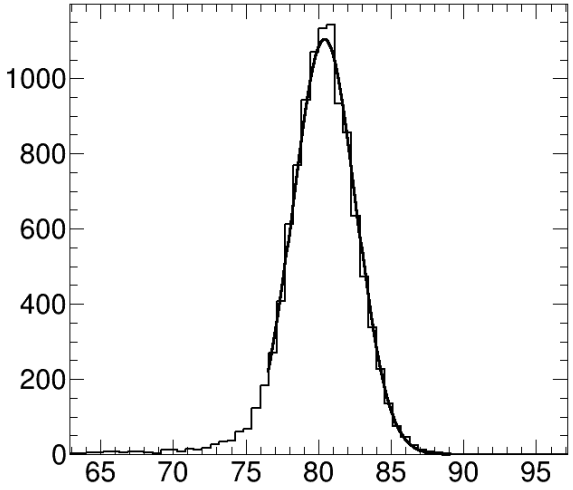


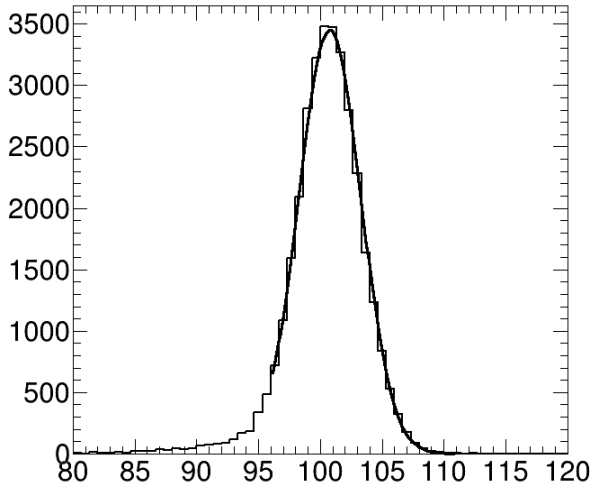


Total peaks


1000
800
600
400
200
0
6 7 8 9 10 11 12 13 14

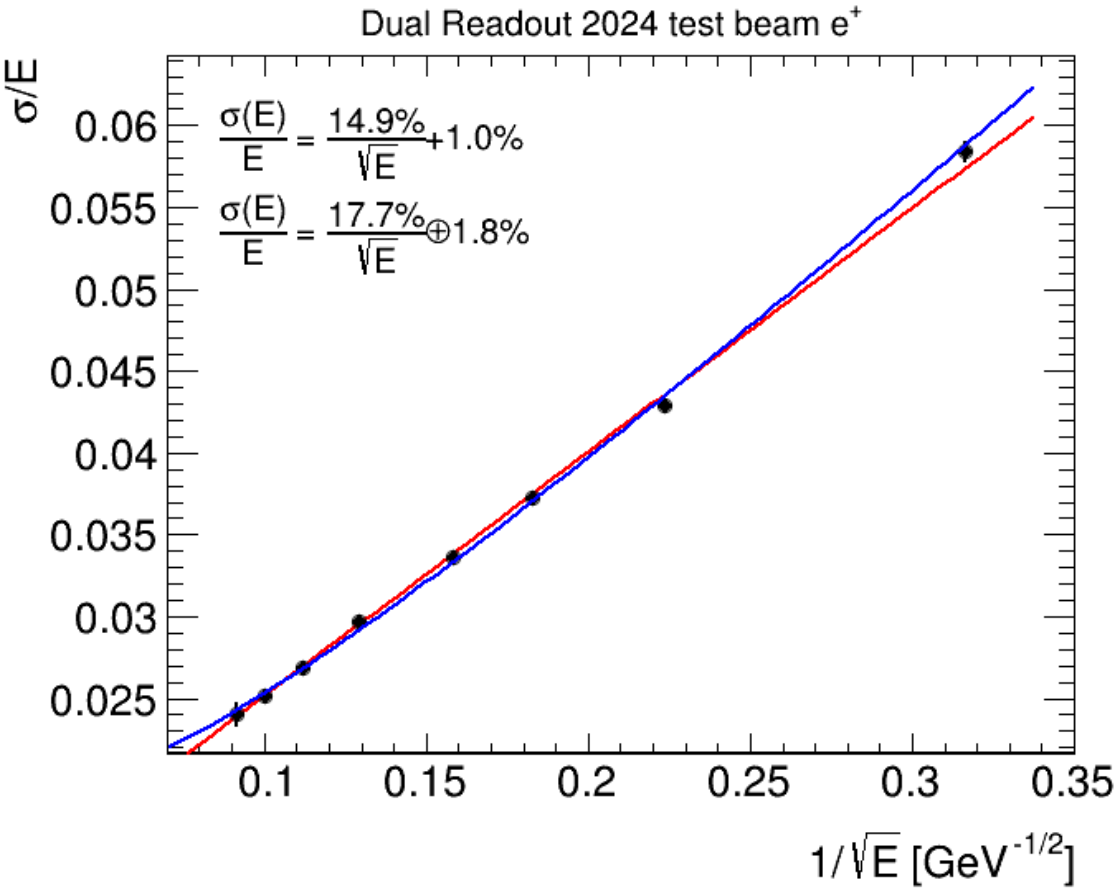

1400
1200
1000
800
600
400
200
0
14 16 18 20 22 24 26


1000
800
600
400
200
0
65 70 75 80 85 90 95

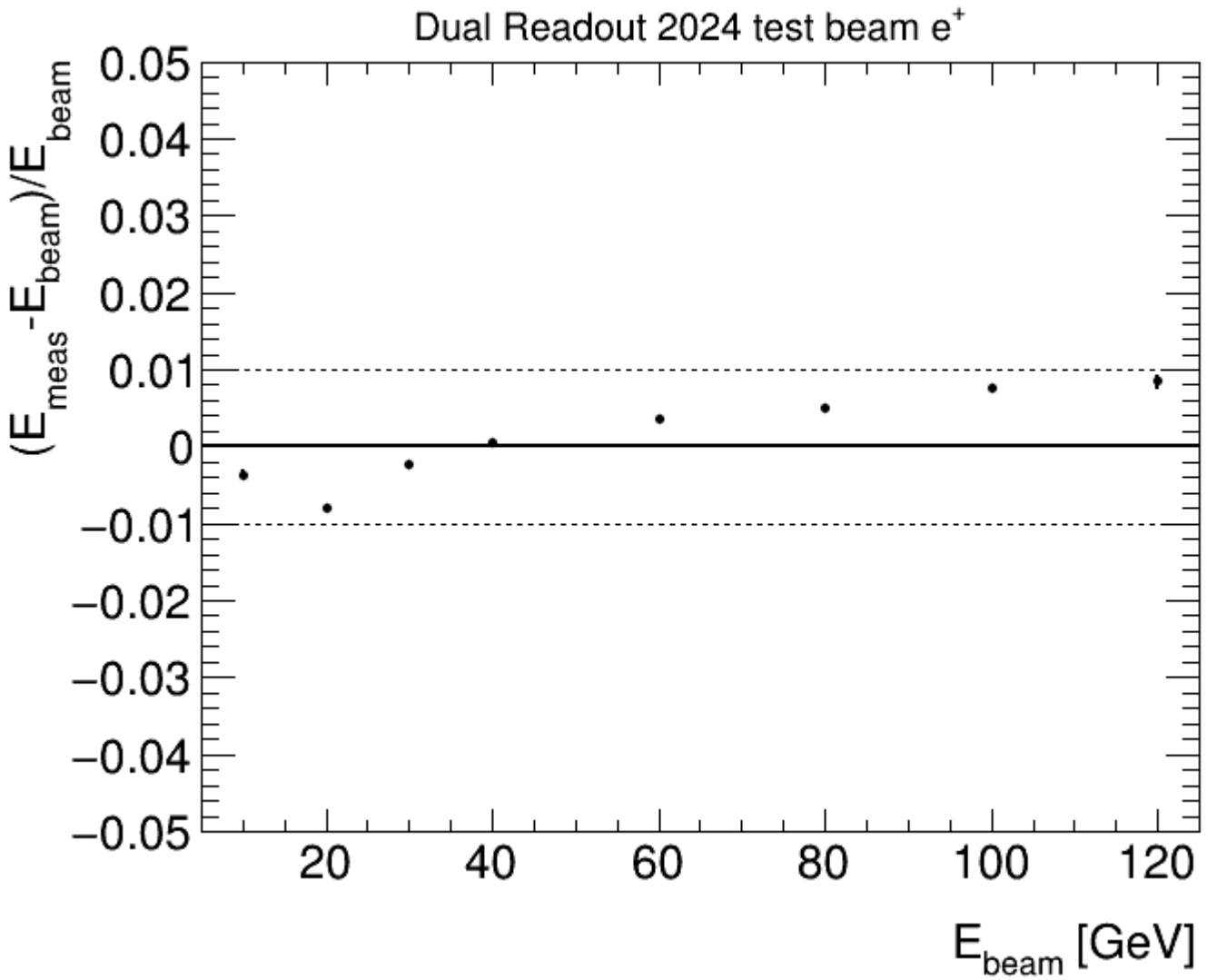

3500
3000
2500
2000
1500
1000
500
0
80 85 90 95 100 105 110 115 120

Resolution

Results by requiring asymmetry between -0.5 and 0.5



Linearity


Dual Readout 2024 test beam e+
(Emeas-Ebeam)/Ebeam
0.05
0.04
0.03
0.02
0.01
0
−0.01
−0.02
−0.03
−0.04
−0.05
20
40
60
80
100
120
Ebeam [GeV]

Resolution S and C