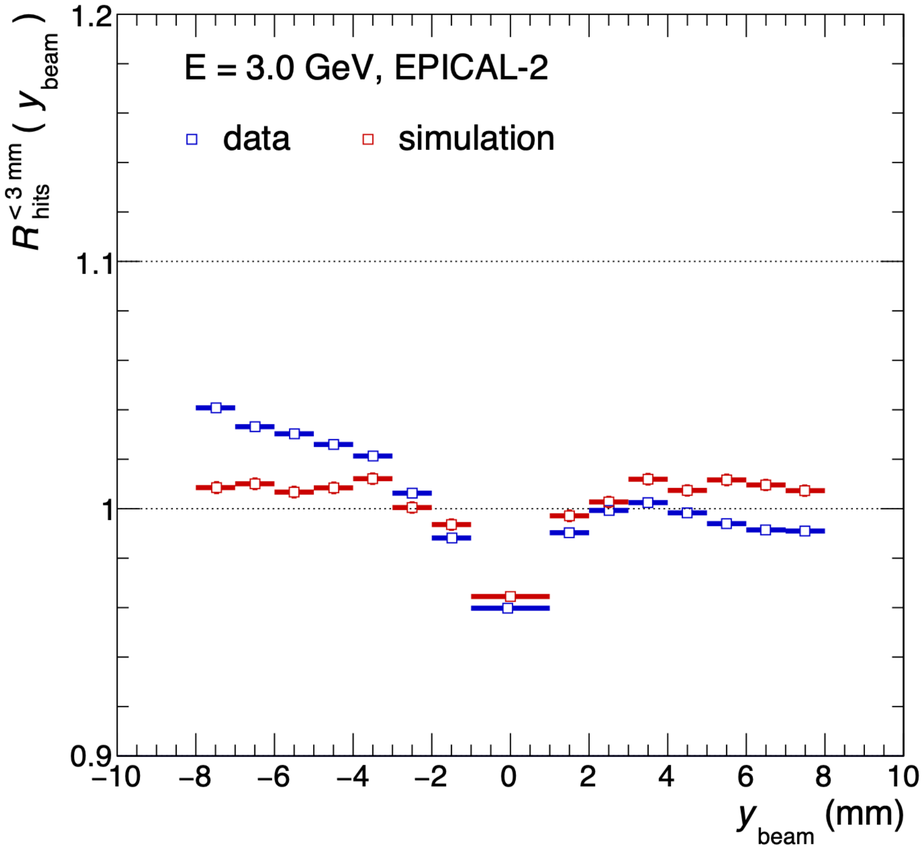
Relative Response Correction

Nick Sundstrom Epical Group Meeting Sept 26

Motivation



$$R_{\text{hits}}^{<3\,\text{mm}}(y_{\text{beam}}) = \frac{\left\langle N_{\text{hits}}^{<3\,\text{mm}}(y_{\text{beam}}) \right\rangle}{\left\langle \left\langle N_{\text{hits}}^{<3\,\text{mm}} \right\rangle \right\rangle}$$

$$N_{\text{hits}}^{<3\,\text{mm}}(y_{\text{beam}}) = \sum_{r<3\,\text{mm}} n_{\text{hits}}(r)$$

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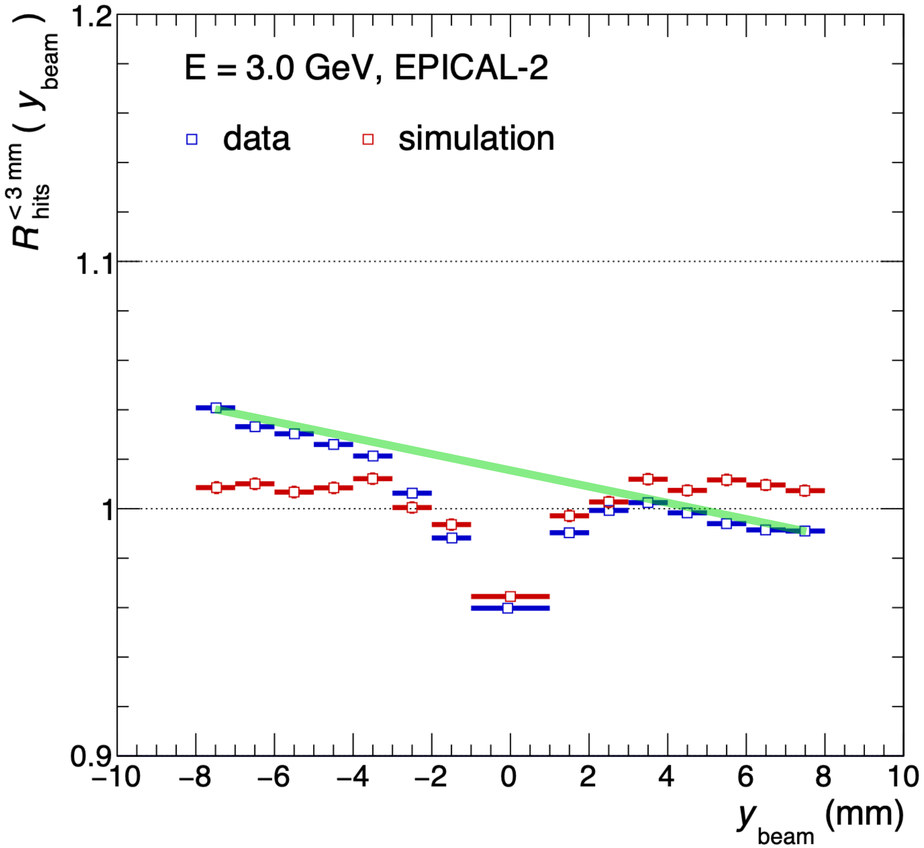
Motivation



$$R_{\text{hits}}^{<3\,\text{mm}}(y_{\text{beam}}) = \frac{\left\langle N_{\text{hits}}^{<3\,\text{mm}}(y_{\text{beam}}) \right\rangle}{\left\langle\left\langle N_{\text{hits}}^{<3\,\text{mm}} \right\rangle\right\rangle}$$

$$N_{\text{hits}}^{<3\,\text{mm}}(y_{\text{beam}}) = \sum_{r<3\,\text{mm}} n_{\text{hits}}(r)$$

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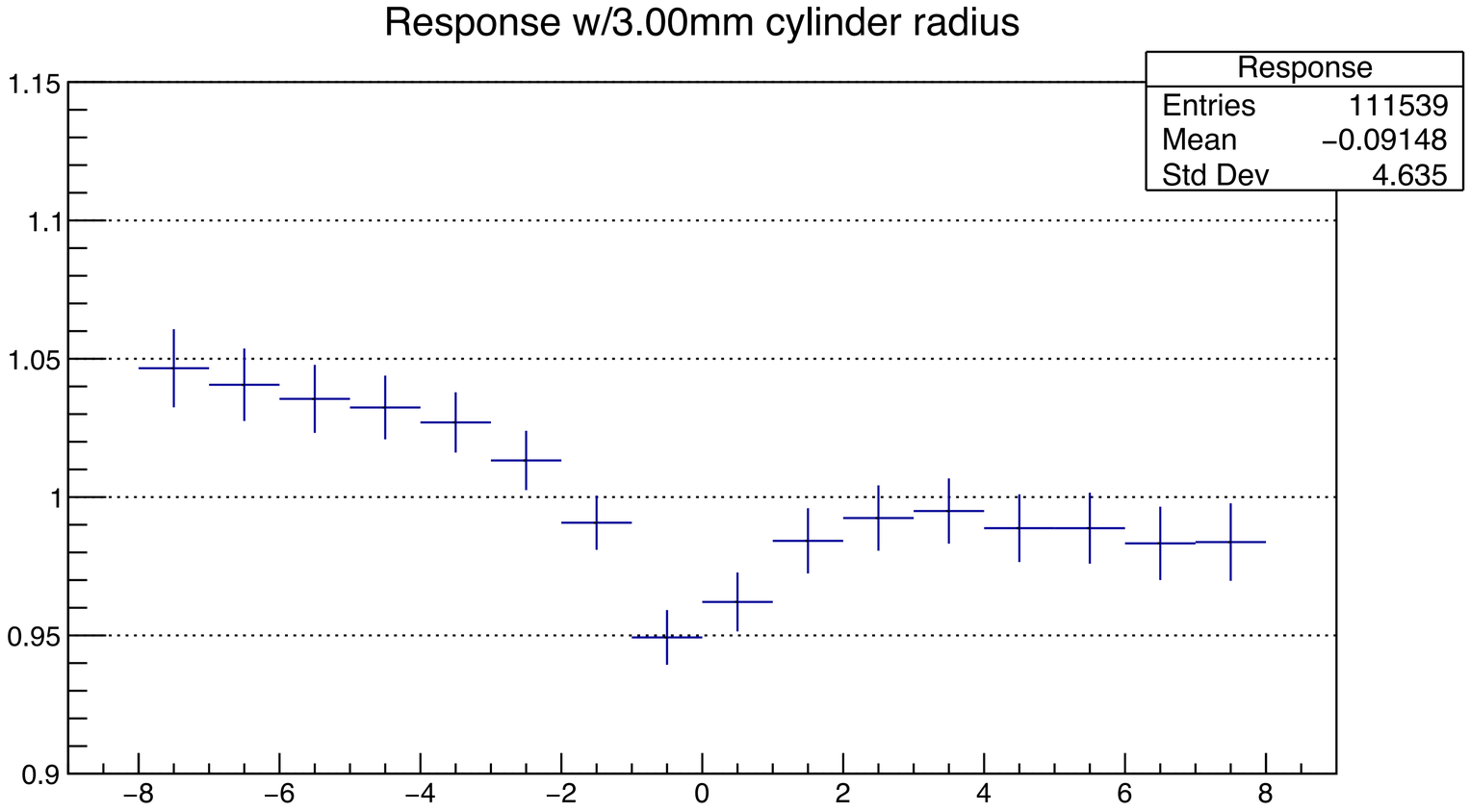
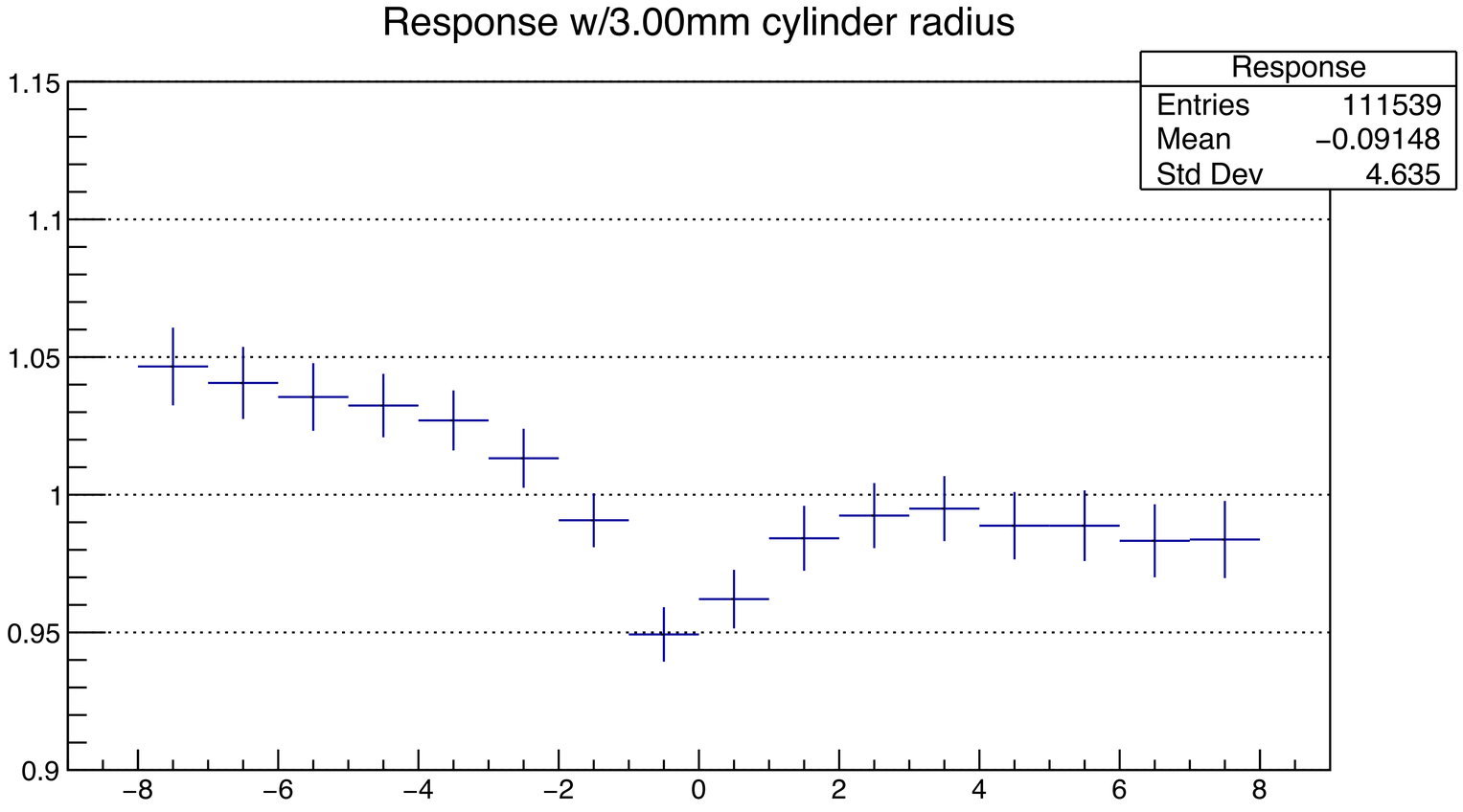
Goals

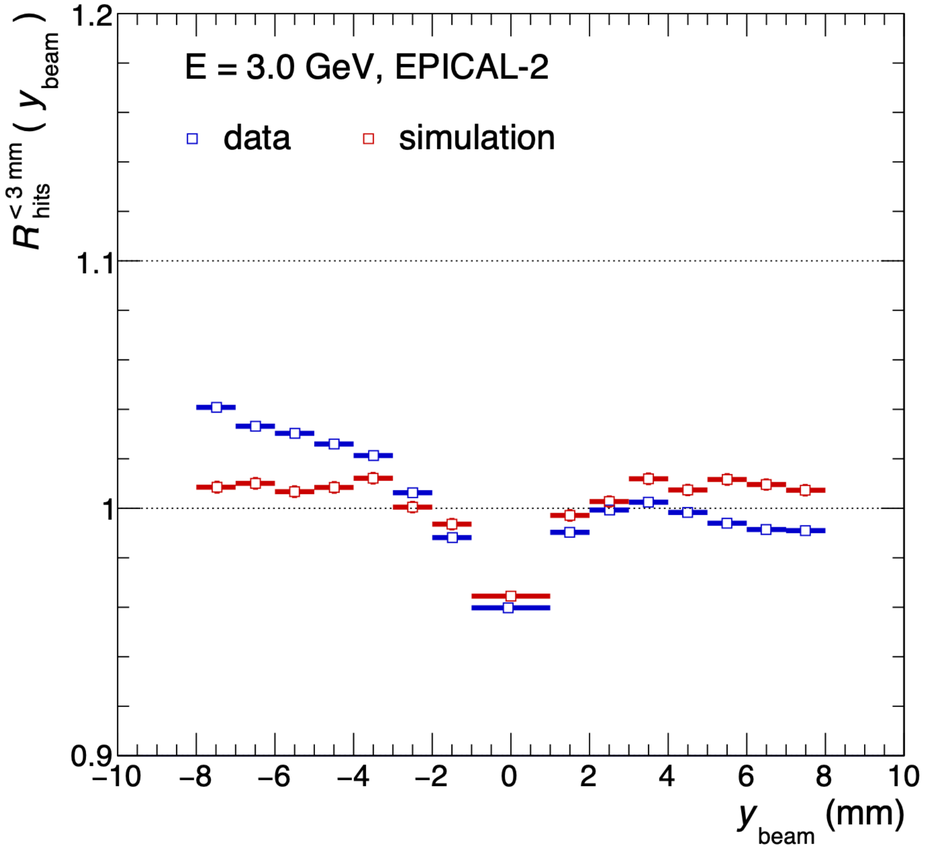
- Recreate the plot shown in the previous slide
- Generate new plots with varying cylinder radii
- Fit slopes in each relative response
- Correct for the apparent slope

3mm cylinder plot recreation

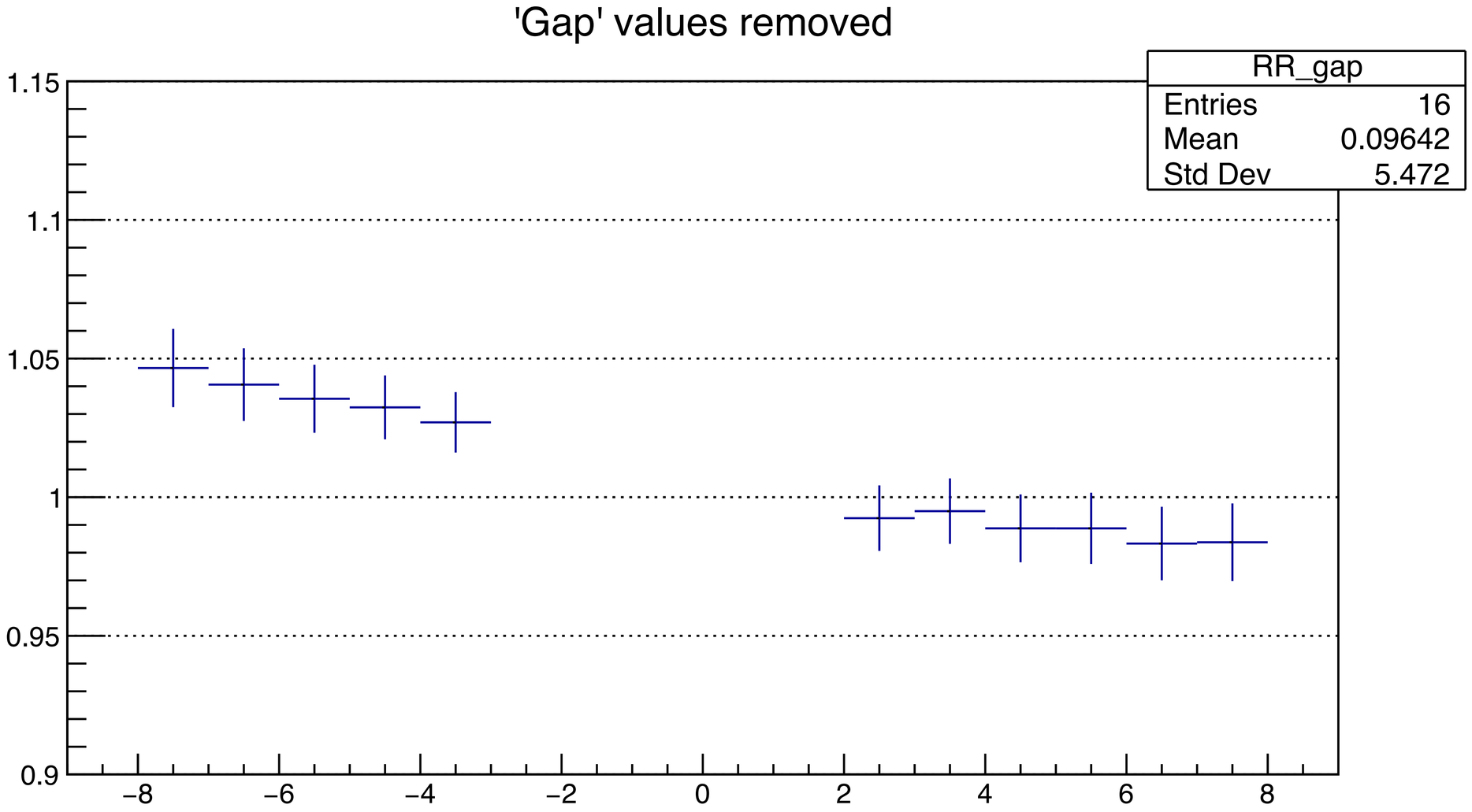


3mm cylinder plot recreation

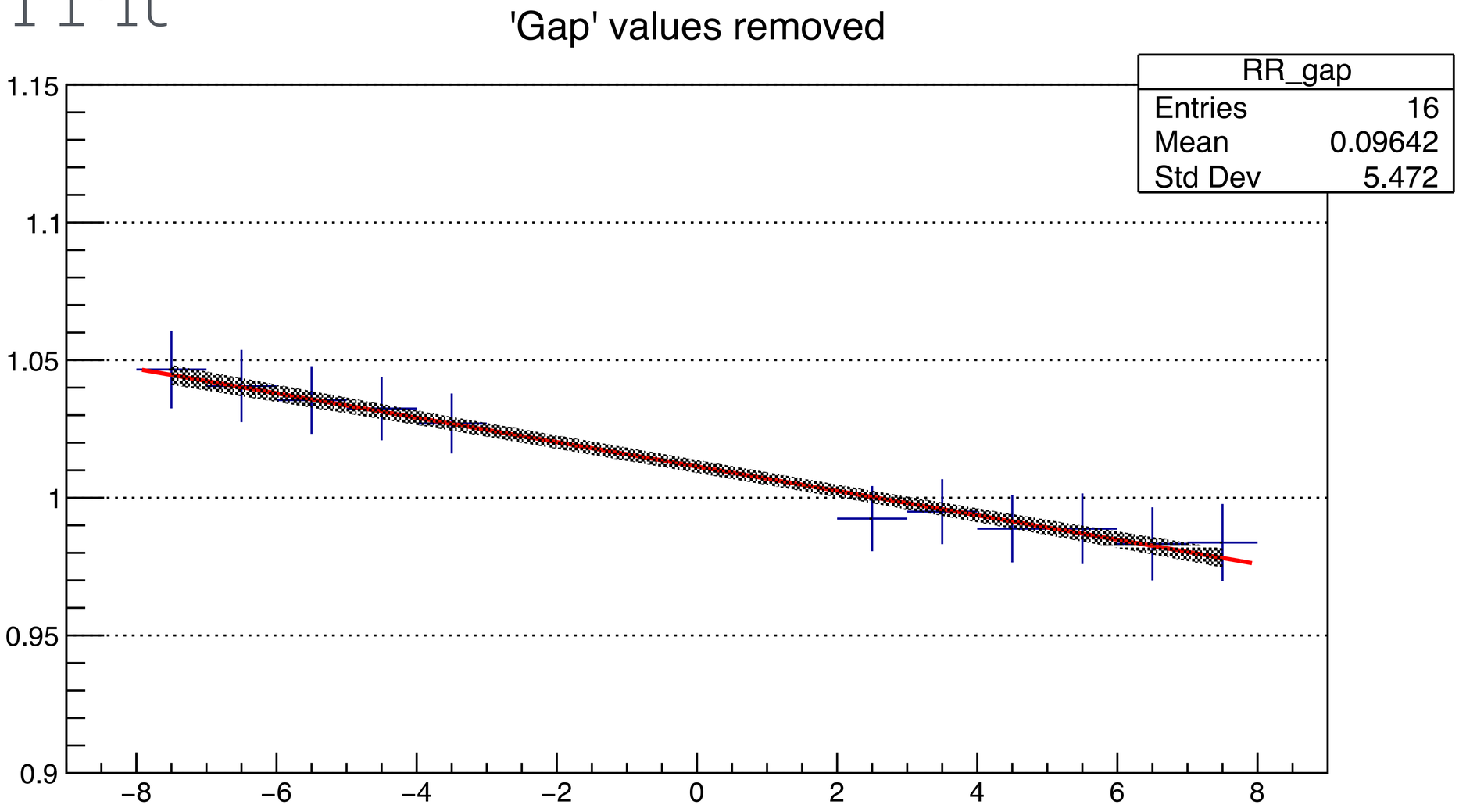




3mm Fit

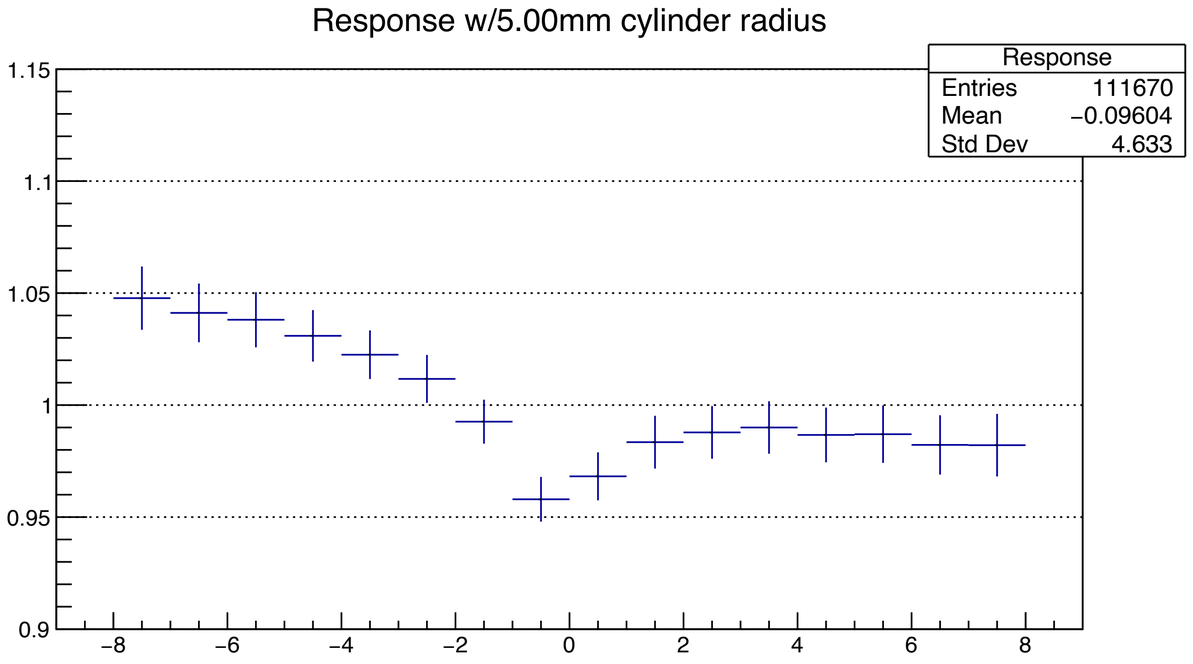

'Gap' values removed
RR_gap
Entries 16
Mean 0.09642
Std Dev 5.472
1.15
1.1
1.05
1
0.95
0.9
−8
−6
−4
−2
0
2
4
6
8

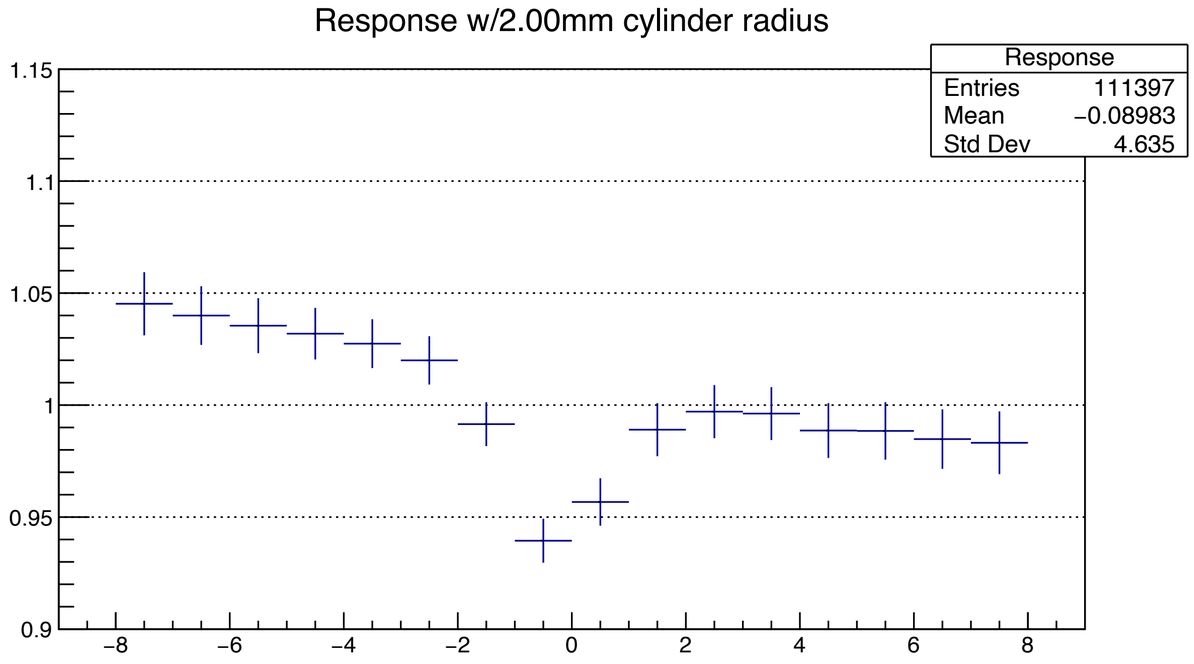
3mm Fit



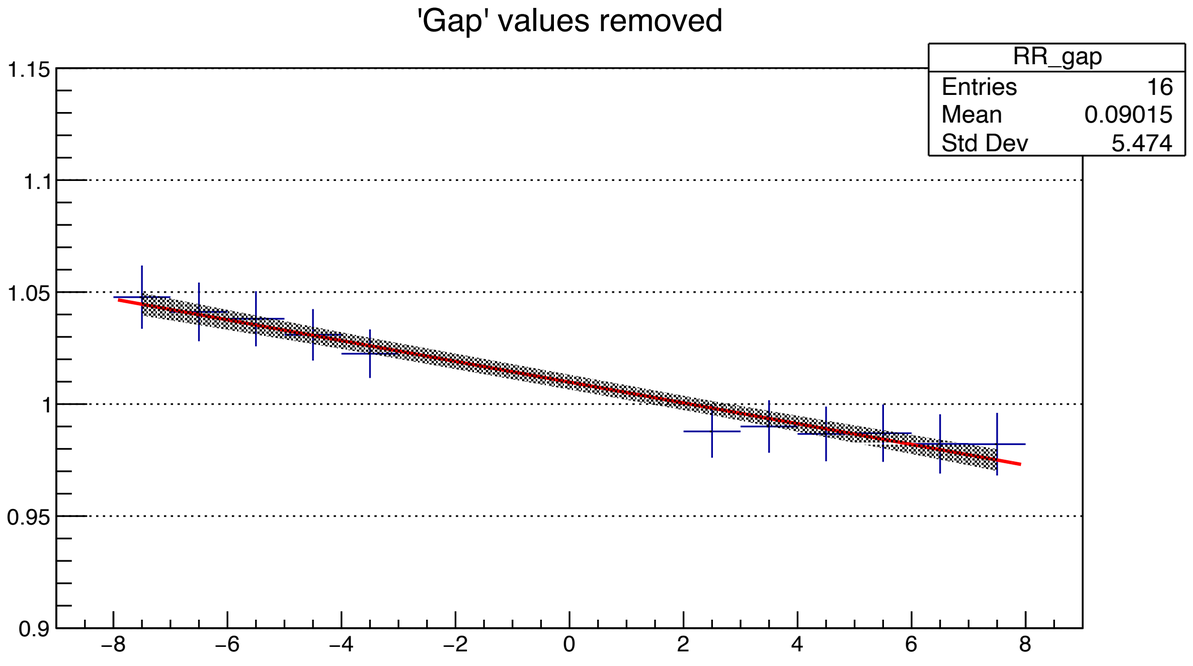
3mm Slope = -0.0044314 +/- 0.00019298

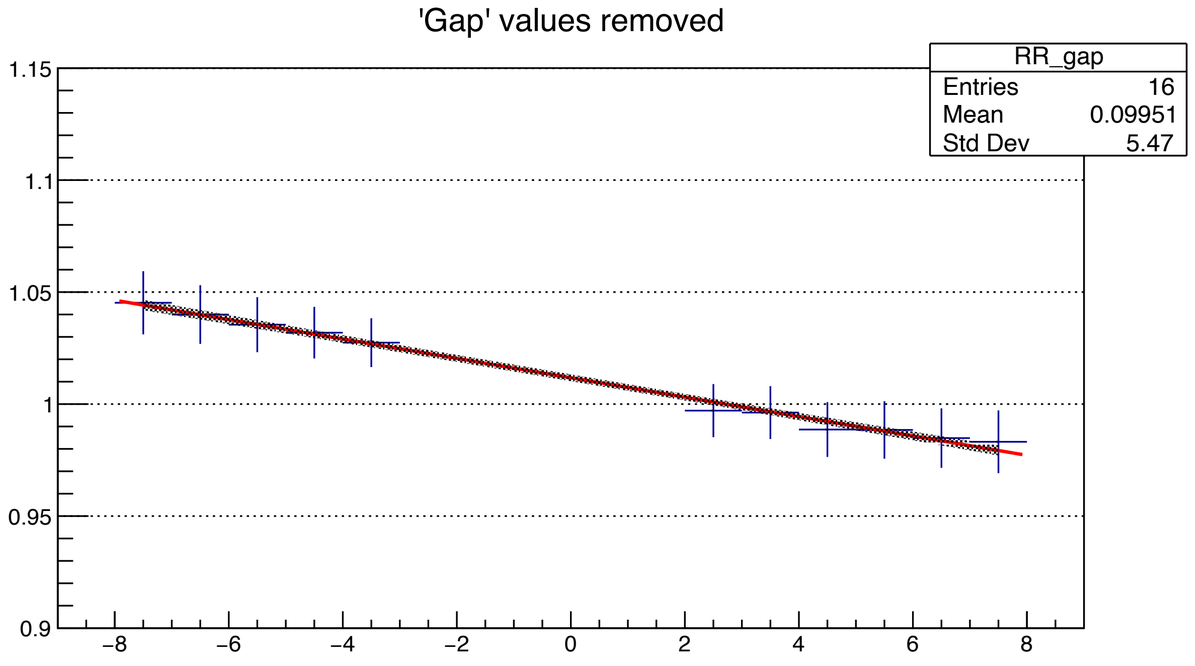
5mm and 2mm plots





5mm and 2mm Fit

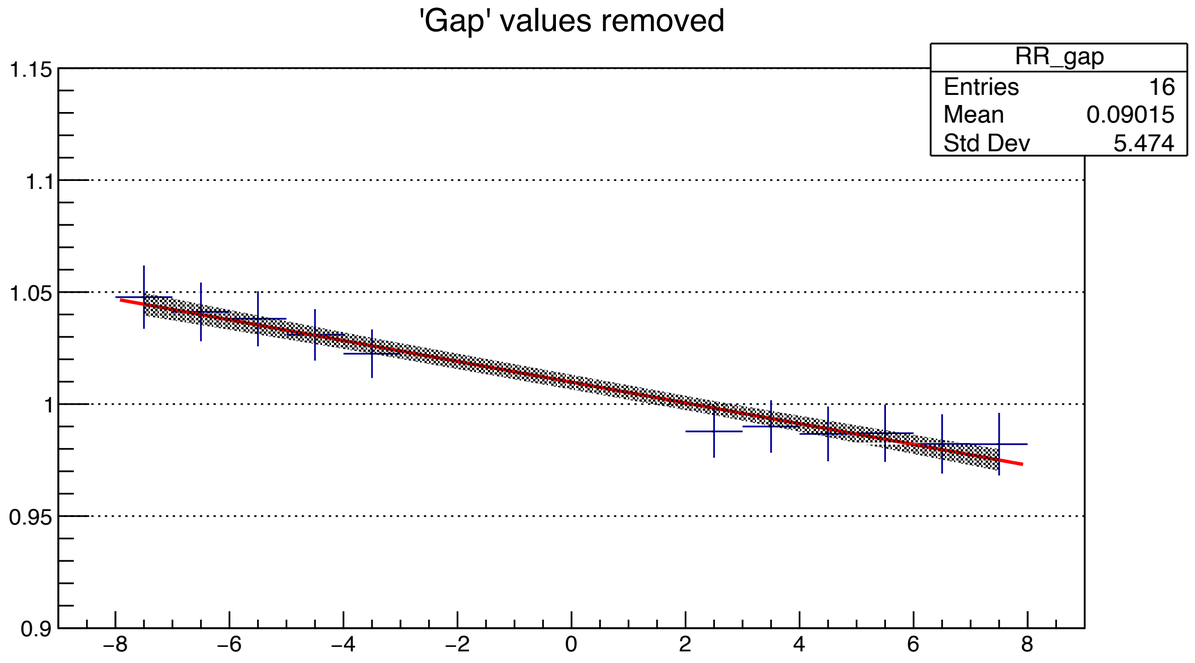


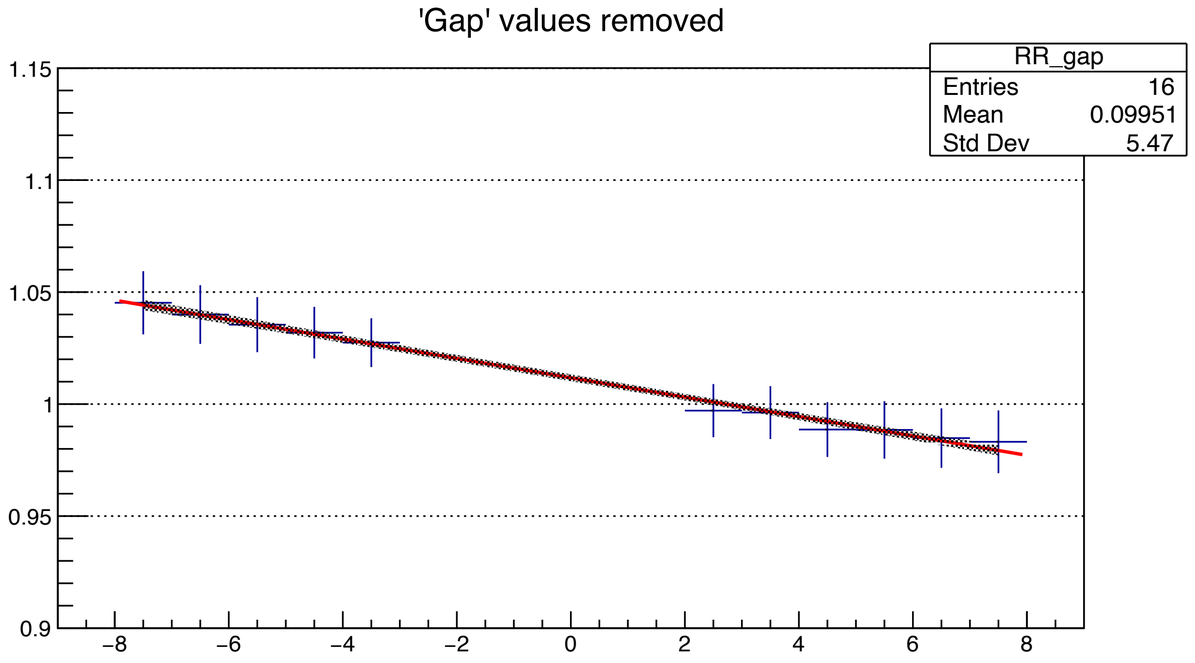


5mm slope = -0.00463638 +/- 0.000274234

2mm slope = -0.00432836 +/- 0.000125661

5mm and 2mm Fit



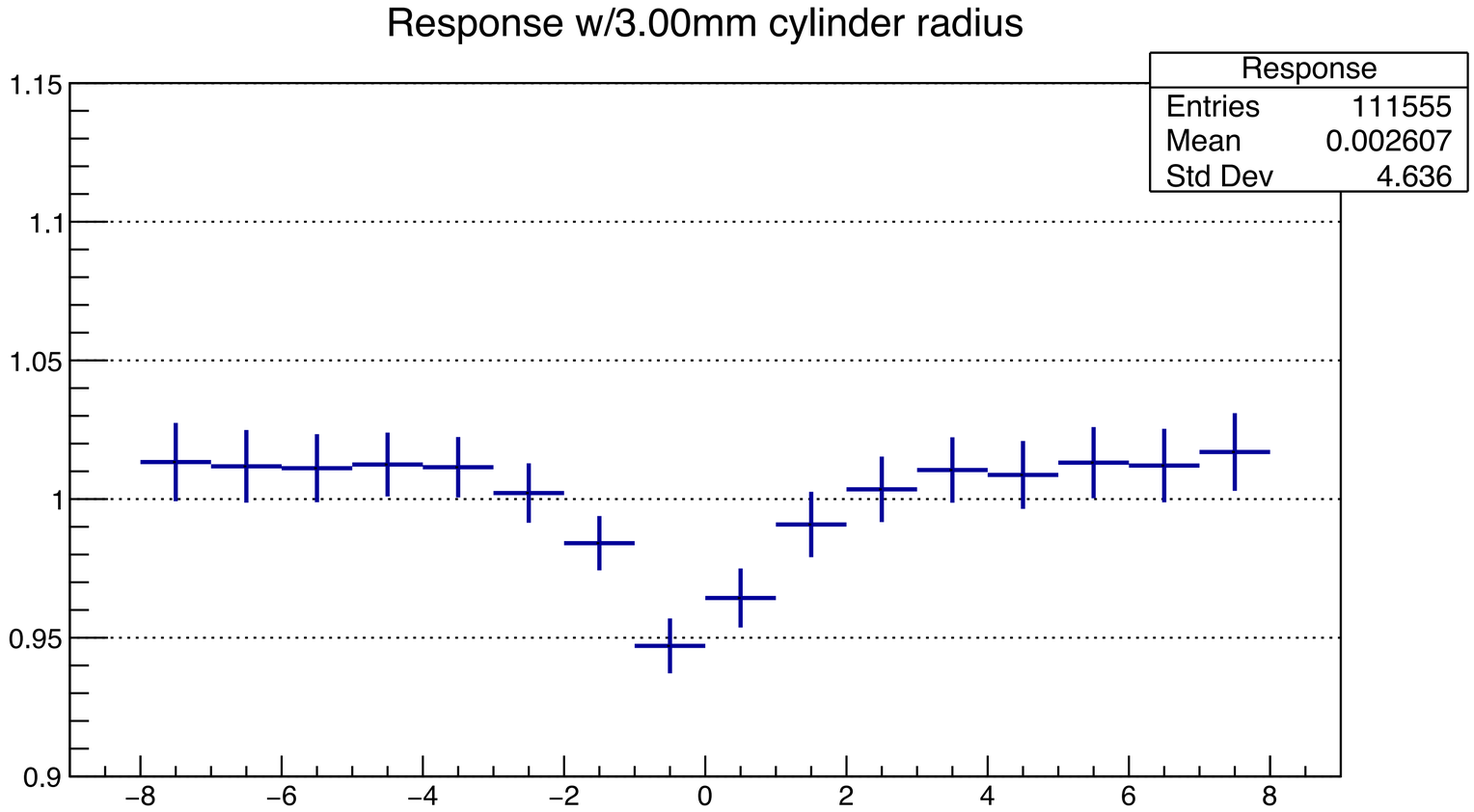


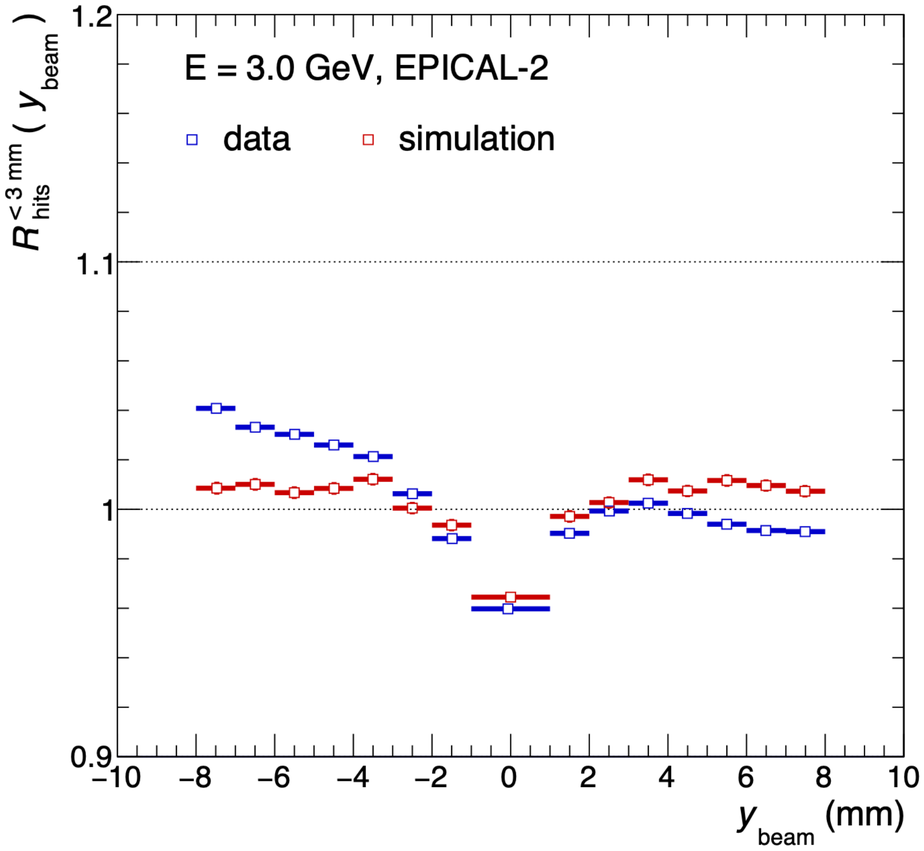
5mm slope = -0.00463638 +/- 0.000274234

2mm slope = -0.00432836 +/- 0.000125661

3mm Slope = -0.0044314 +/- 0.00019298

Correction


Response w/3.00mm cylinder radius
Response
Entries 111555
Mean 0.002607
Std Dev 4.636
1.15
1.1
1.05
1
0.95
0.9
−8
−6
−4
−2
0
2
4
6
8


E = 3.0 GeV, EPICAL-2
data
simulation
$R^{<3\ mm}_{hits}(y_{beam})$
1.2
1.1
1
0.9
−10
−8
−6
−4
−2
0
2
4
6
8
10
y_{beam} (mm)

Outlook

- Apply to SPS
- Compare with simulation at different cylinder radii
- Correct for the gap and compare to simulation without gap