

FCAL calibration updates

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for the **GlueX** Collaboration

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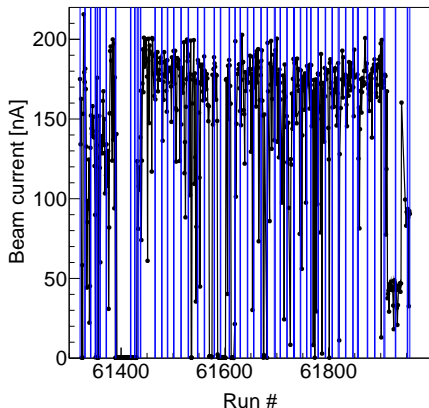
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PRIMEX phase 1 data set

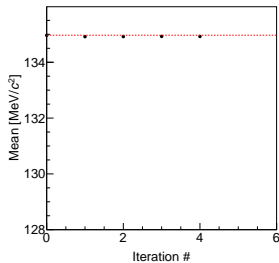
48 days of data taking

- 1 entire with only empty target
 - 8 days with bad runs and/or no beam
 - 38 days with physics runs
 - ▶ Be run, day 1 to 3
 - ▶ He run, day 7 to 8, 11 to 20, 24 to 27, 29 to 48
- => 5 periods with continuous data taking

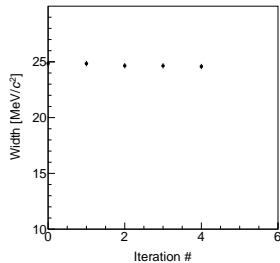
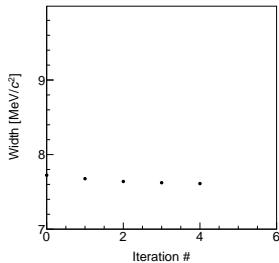
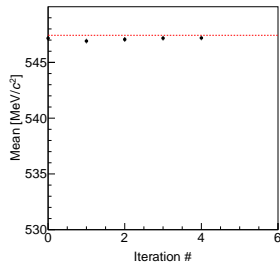


Overall QC vs iteration

• π^0

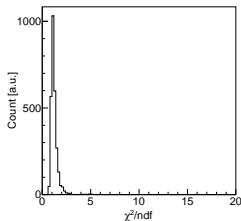


• η

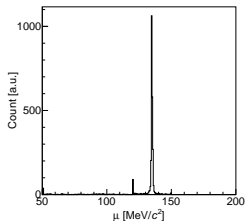


Overall QC, summary distributions

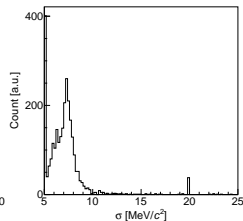
● χ^2 distribution



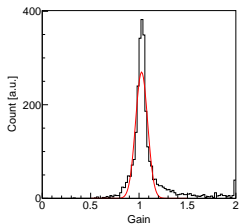
● Fitted peak distribution



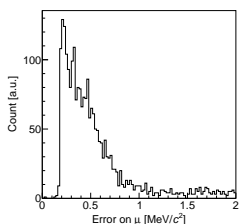
● Fitted width distribution



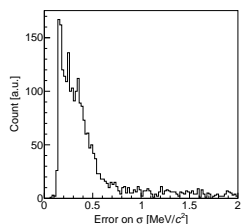
● Gain distribution



● Fitted peak error distribution

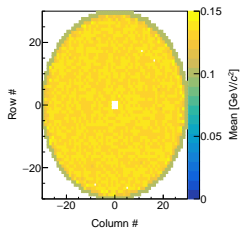


● Fitted width error distribution

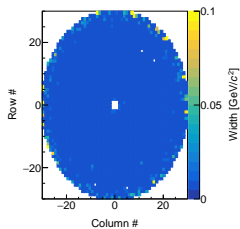


Overall QC, summary maps

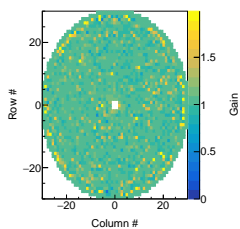
● Fitted peak map



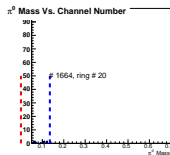
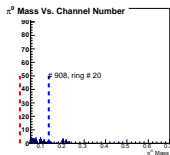
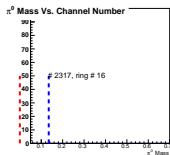
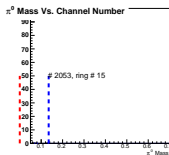
● Fitted width map



● Gain map



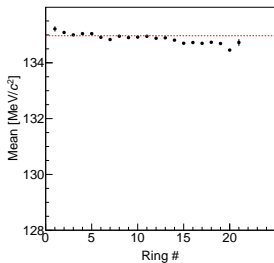
Overall QC, bad channels



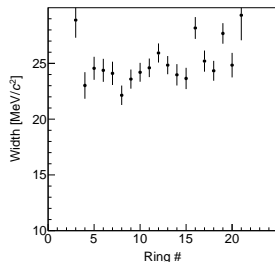
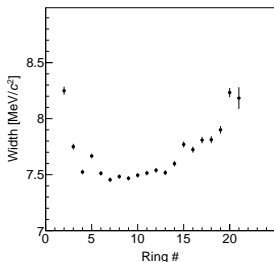
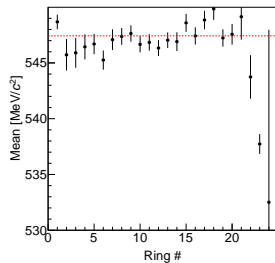
QC per rings

If radius divided by 5 cm, there is 24 rings

● π^0



● η



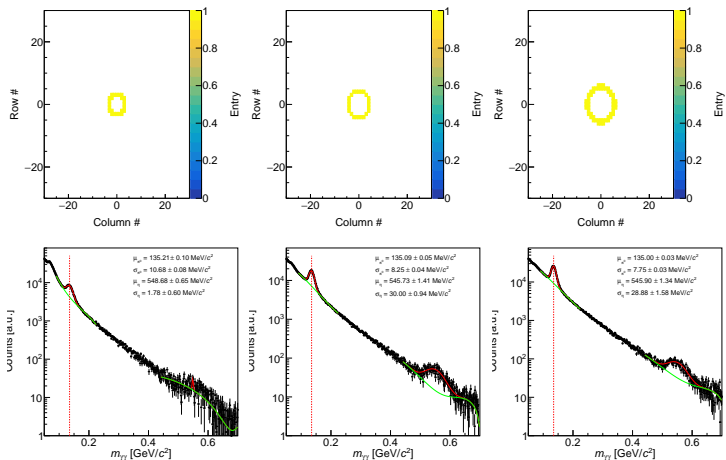
QC per rings

If radius divided by 5 cm, there is 24 rings

● Ring 1

● Ring 2

● Ring 3



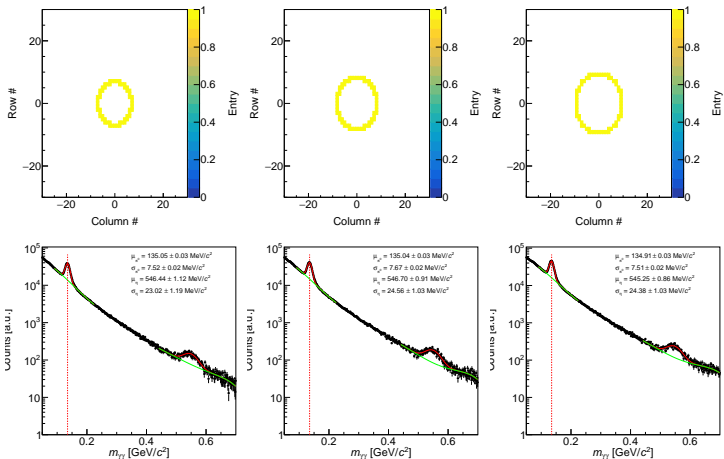
QC per rings

If radius divided by 5 cm, there is 24 rings

● Ring 4

● Ring 5

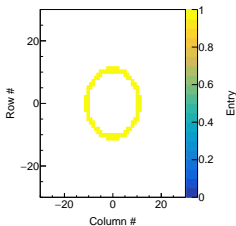
● Ring 6



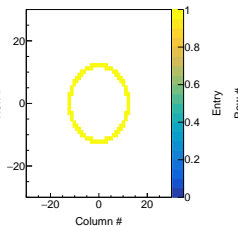
QC per rings

If radius divided by 5 cm, there is 24 rings

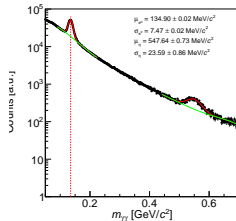
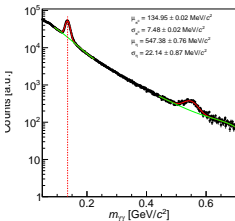
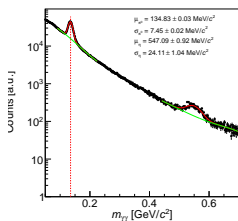
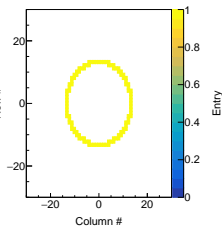
● Ring 7



● Ring 8



● Ring 9



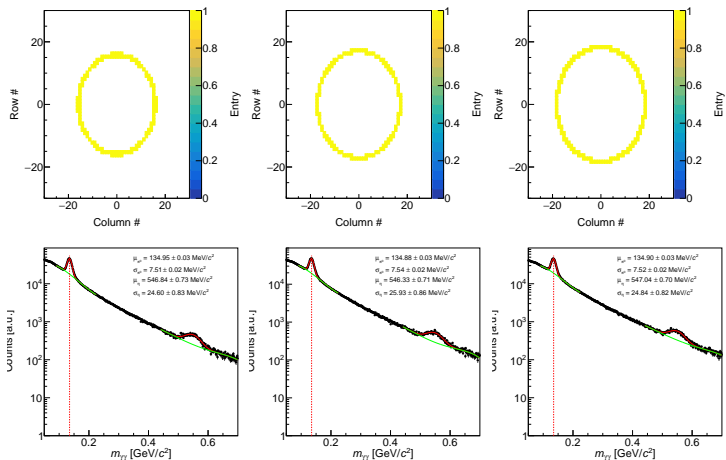
QC per rings

If radius divided by 5 cm, there is 24 rings

● Ring 11

● Ring 12

● Ring 13



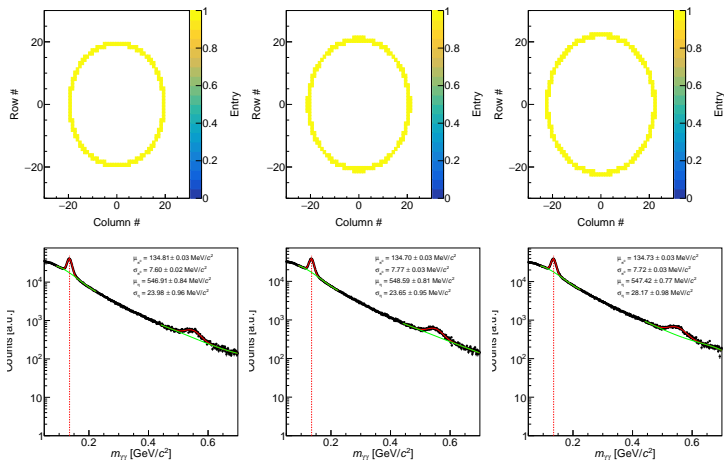
QC per rings

If radius divided by 5 cm, there is 24 rings

● Ring 14

● Ring 15

● Ring 16



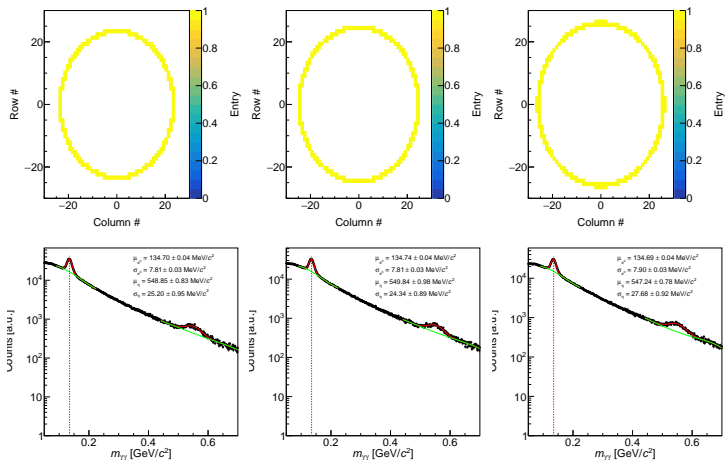
QC per rings

If radius divided by 5 cm, there is 24 rings

● Ring 17

● Ring 18

● Ring 19



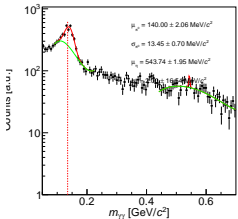
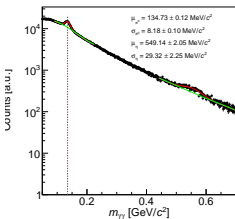
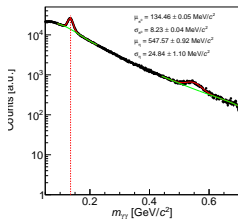
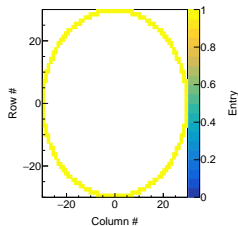
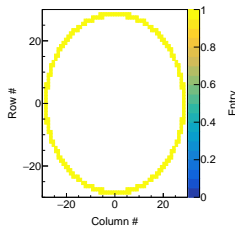
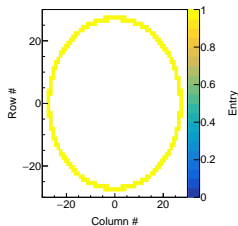
QC per rings

If radius divided by 5 cm, there is 24 rings

● Ring 20

● Ring 21

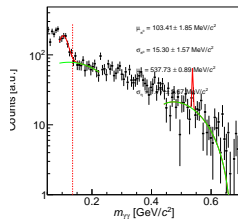
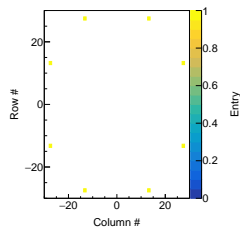
● Ring 22



QC per rings

If radius divided by 5 cm, there is 24 rings

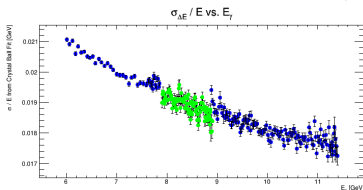
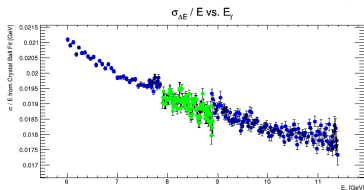
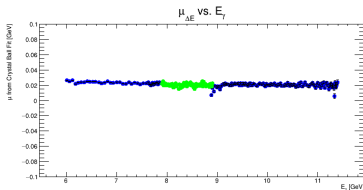
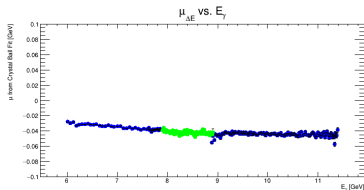
- Ring 23



QC with Compton process

- Drew implemented in his Compton PLUGIN, QC histograms
- Look at $E_{CAL} + E_{FCAL} - E_{\gamma}$ distribution overall, per rings, vs E_{FCAL}

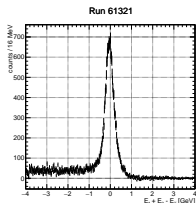
Fit results of $E_{CAL} + E_{FCAL} - E_{\gamma}$ distribution for all rings



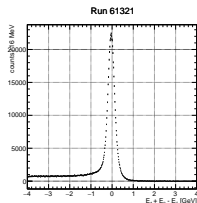
QC with Compton process

- Top row, no energy dependence correction
- Bottom row, energy dependence correction applied

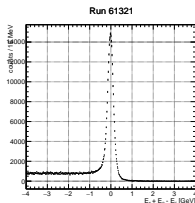
• Ring 1



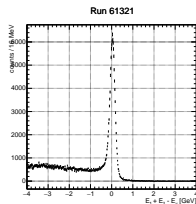
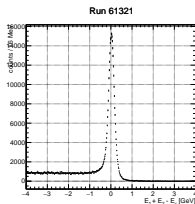
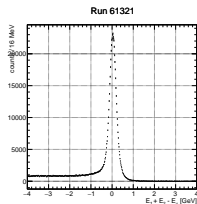
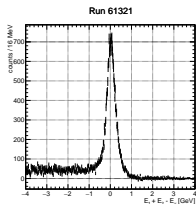
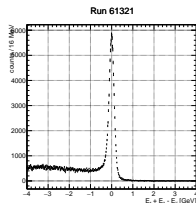
• Ring 2



• Ring 3



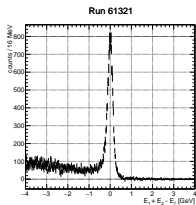
• Ring 4



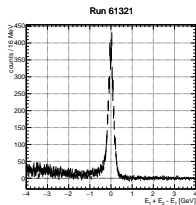
QC with Compton process

- Top row, no energy dependence correction
- Bottom row, energy dependence correction applied

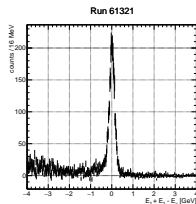
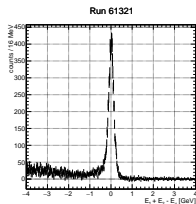
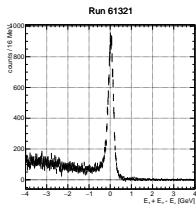
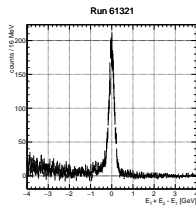
• Ring 5



• Ring 6



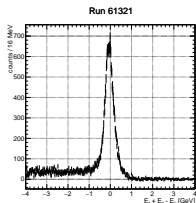
• Ring 7



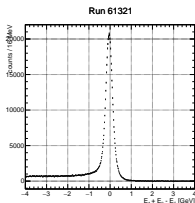
QC with Compton process

- Top row, no energy dependence correction
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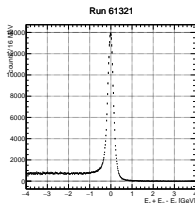
• Ring 1



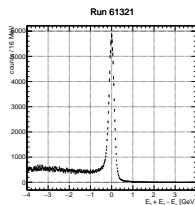
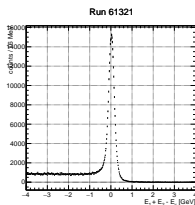
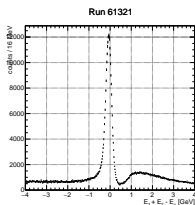
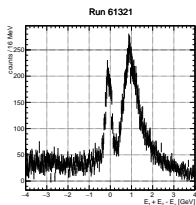
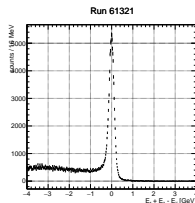
• Ring 2



• Ring 3



• Ring 4



Conclusion

Automatic gains matching is working nicely and submits a report after each iteration
(https://halldweb.jlab.org/primexd/fcal_qc/)

QC based on Drew's Compton analysis implemented and will be used at the next monitoring launch

To-do-list

- Gains matching QC (almost done)
- Energy dependence correction per ring for each or all run periods