Tuning of full digitization with cosmic-ray data

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(for the CGEM software group)
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Software, MC and cosmic-ray data

- CgemBoss665g

- MC: cosmic-ray events generated by CosmicGenerator-00-00-11
  add acceptance from two planes (top and bottom)
  full digitization: CgemDigitizerSvc-00-00-39

- Cosmic-ray data run17

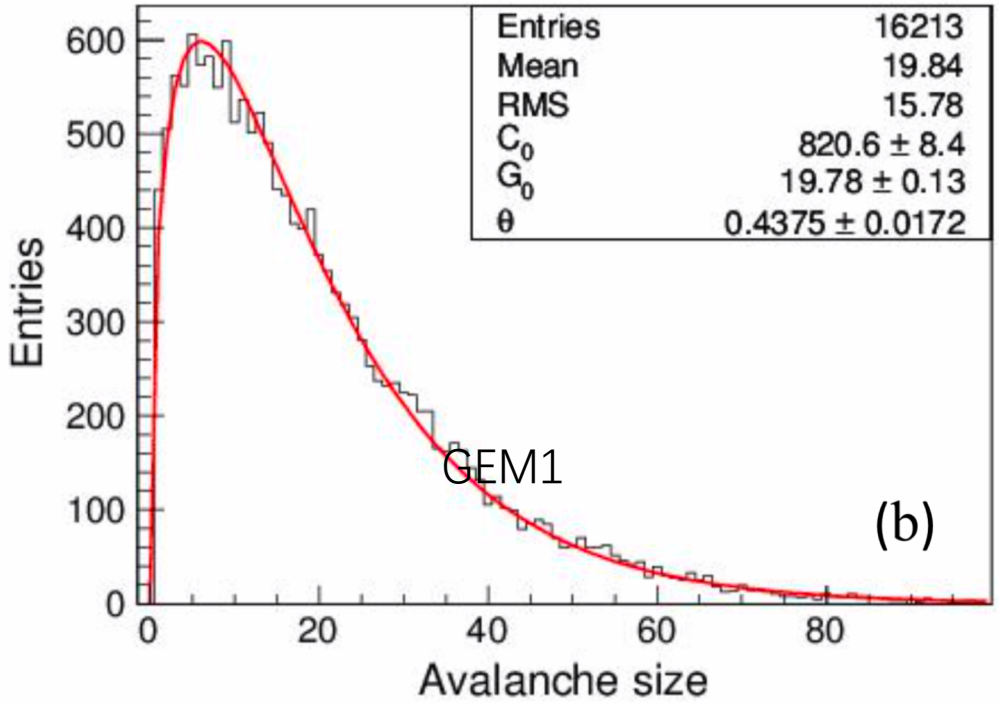
Cosmic-ray candidates selection

- Loop clusters with max charges on each half layer
- 3D straight line fitting
- Minimize χ^2 to get cosmic-ray candidates (4-clusters/event)
- $\chi^2<80$

More details can be added next time

Scan of gain

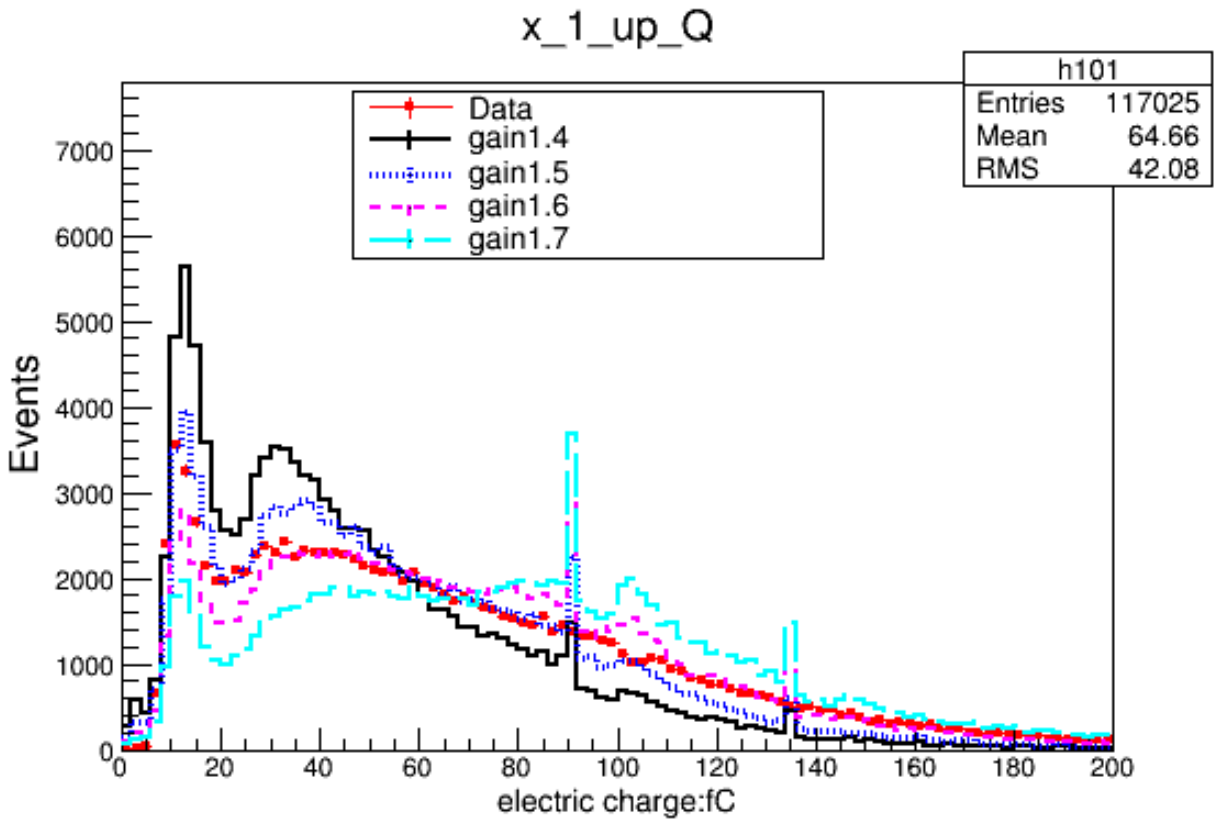
- For each GEM foil, the gain distribution can be fitted with Polya function:

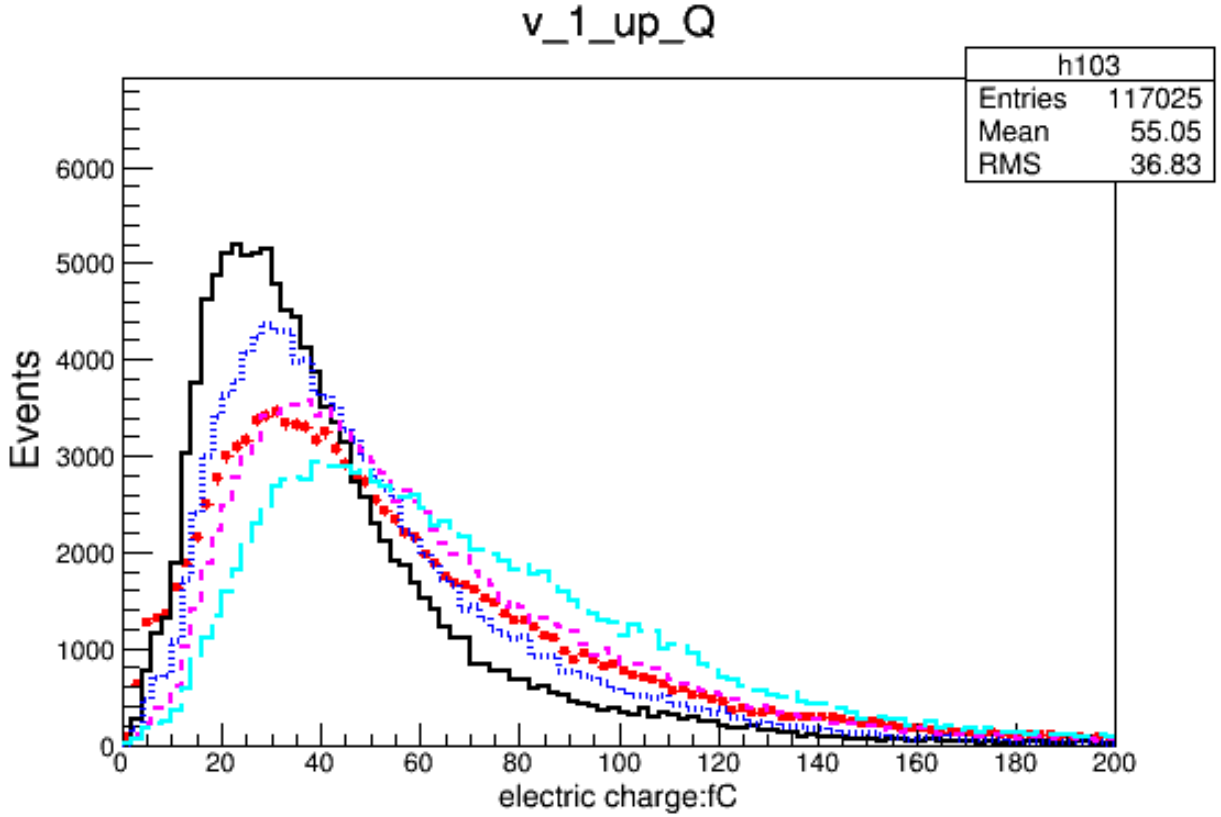


$G_0 \times 1.4$
$G_0 \times 1.5$
$G_0 \times 1.6$
$G_0 \times 1.7$

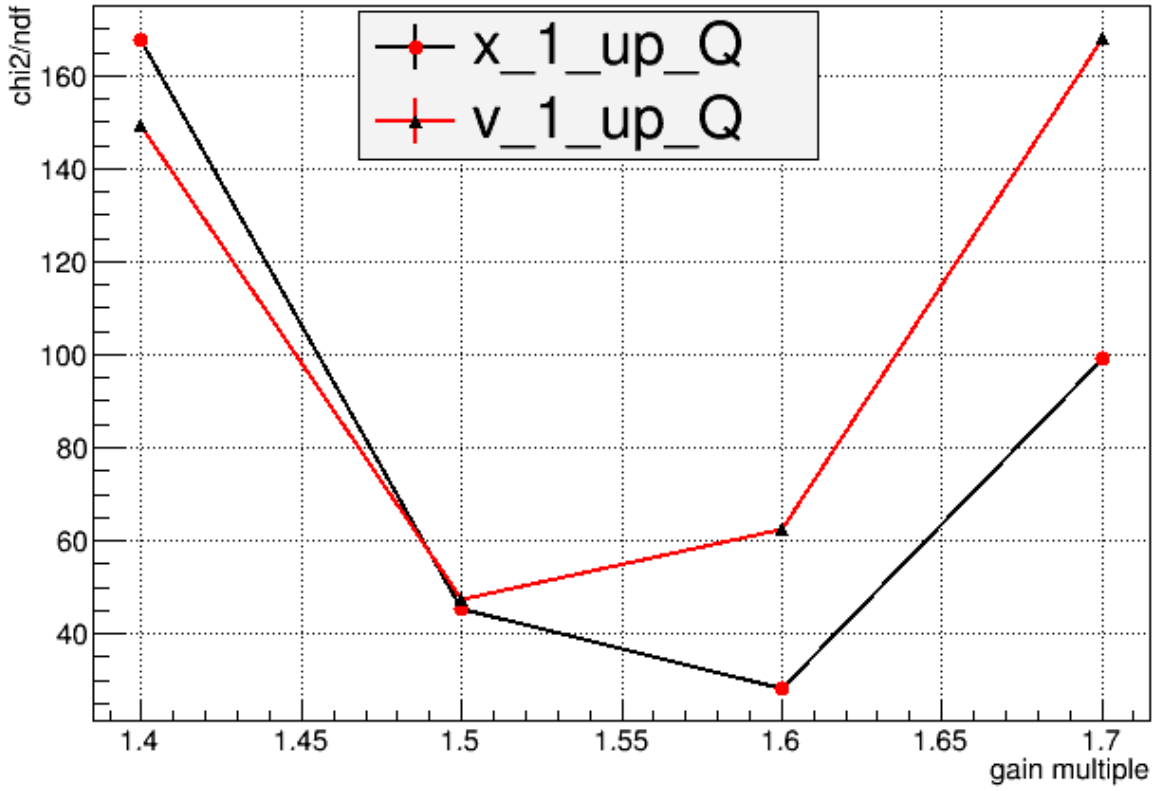
$$P(G) = C_0 \frac{(1+\theta)^{1+\theta}}{\Gamma(1+\theta)} \left(\frac{G}{G_0}\right)^{\theta} exp\left[-(1+\theta)\frac{G}{G_0}\right]$$

Charge distribution and rough scan of gain



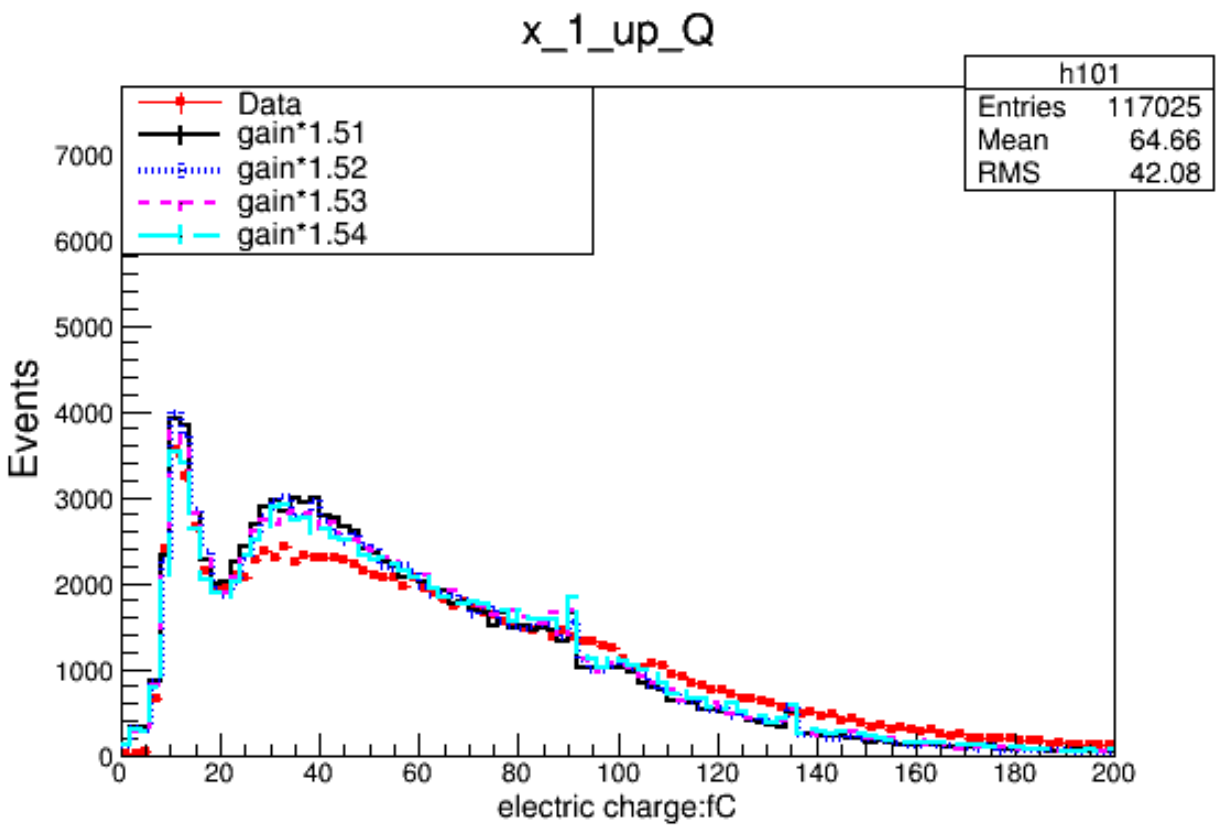


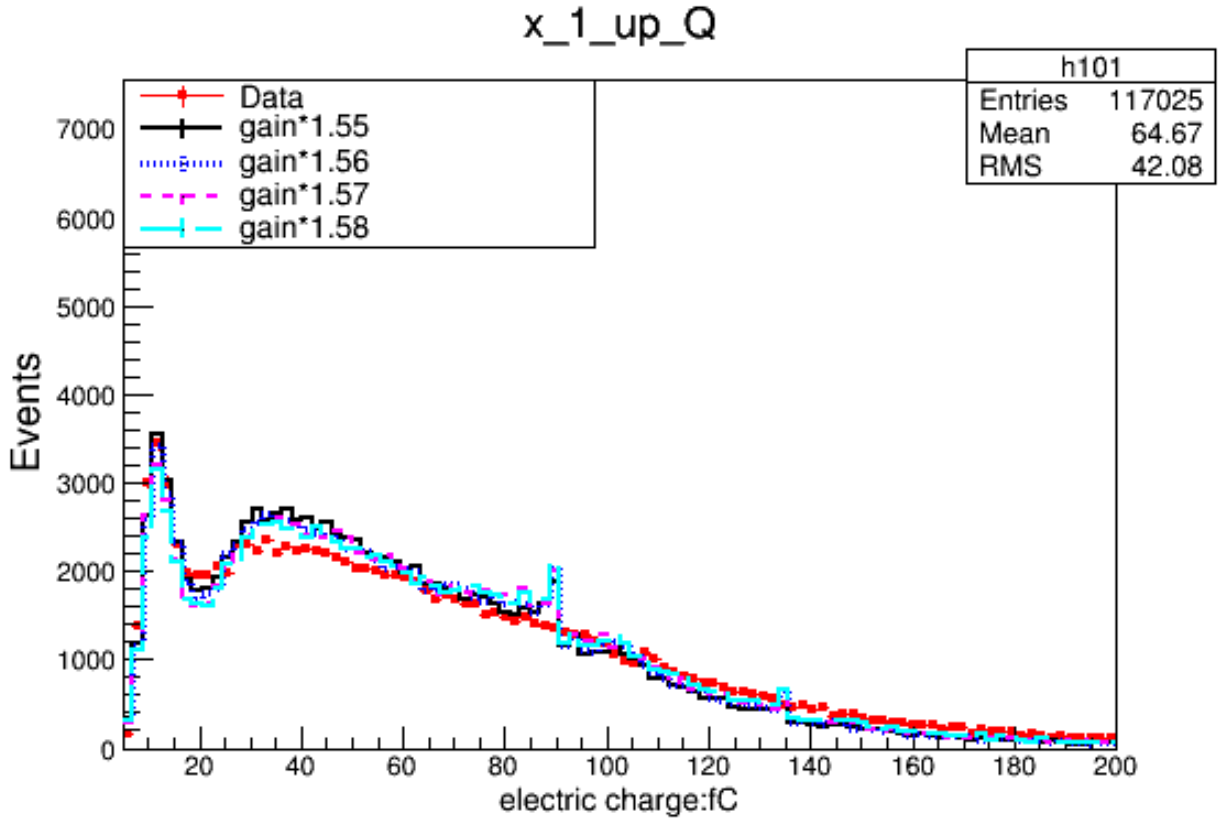
Charge distribution and rough scan of gain



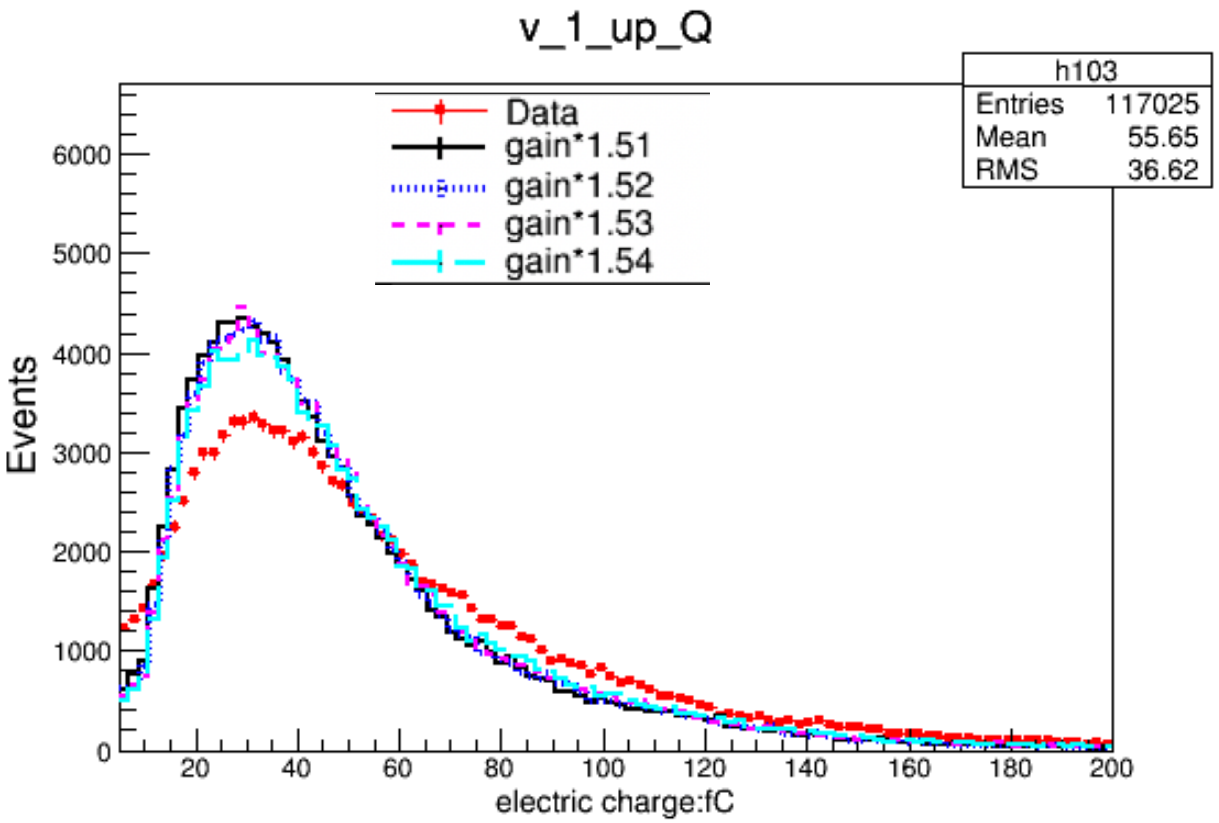
It seems optimal scale factor is 1.5~1.6

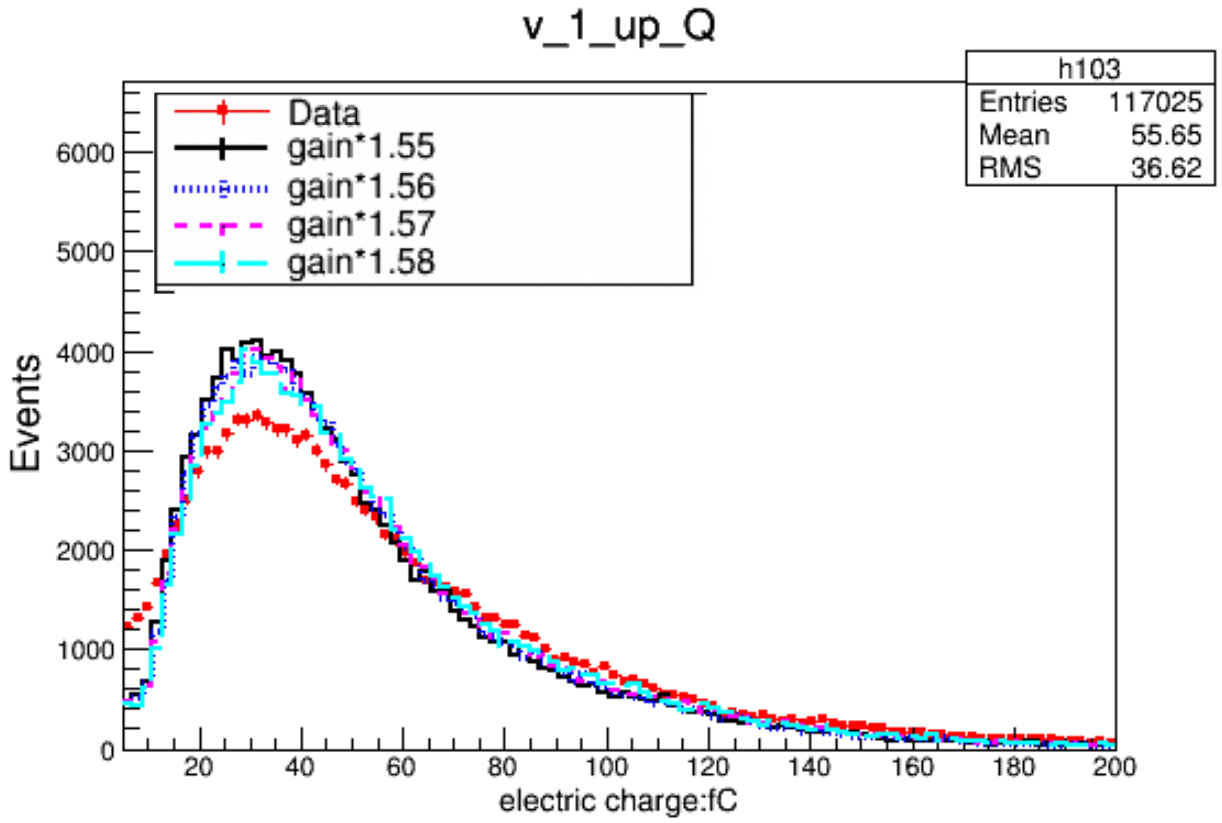
Fine scan of gain (in progress)



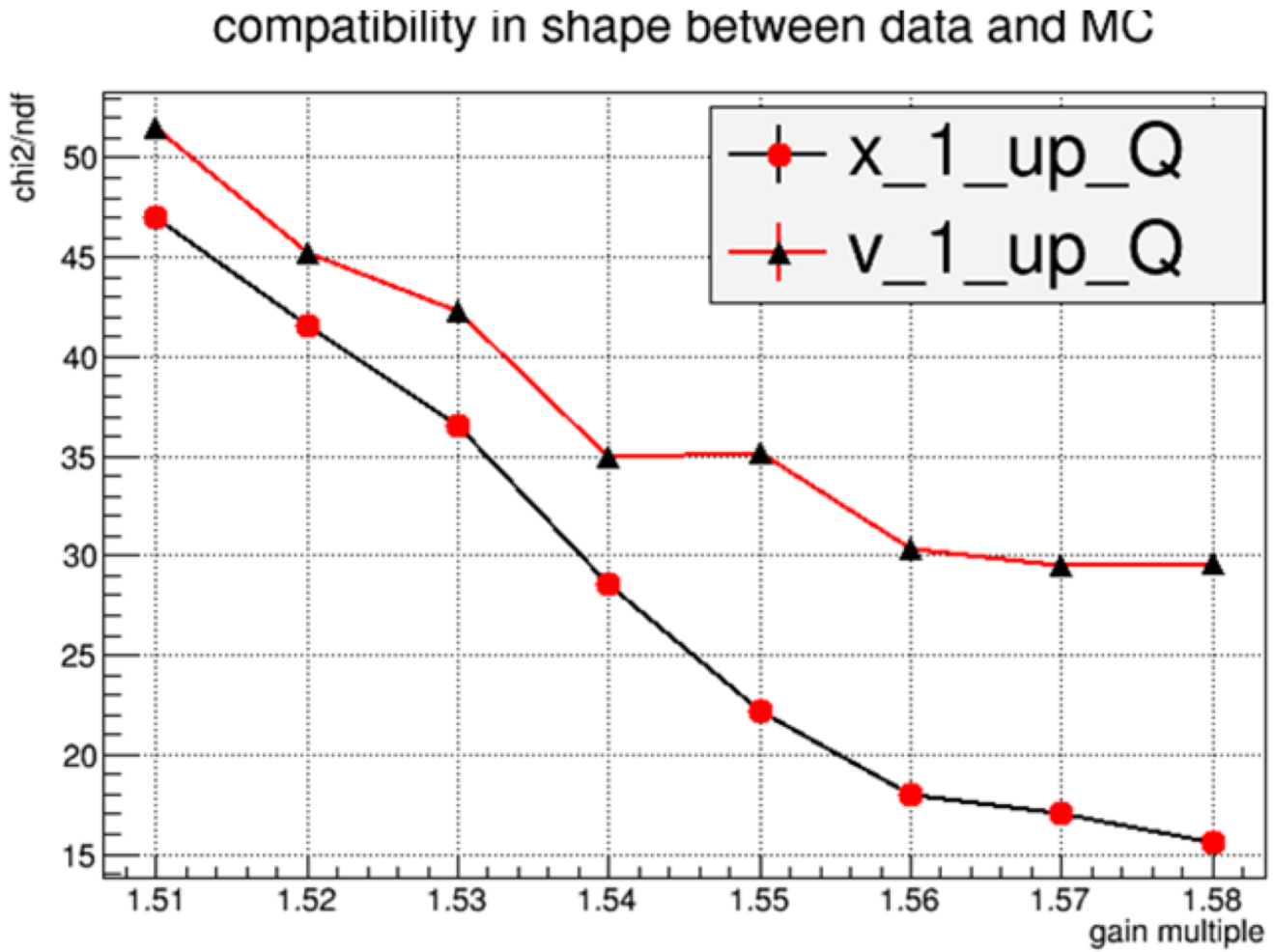


Fine scan of gain (in progress)



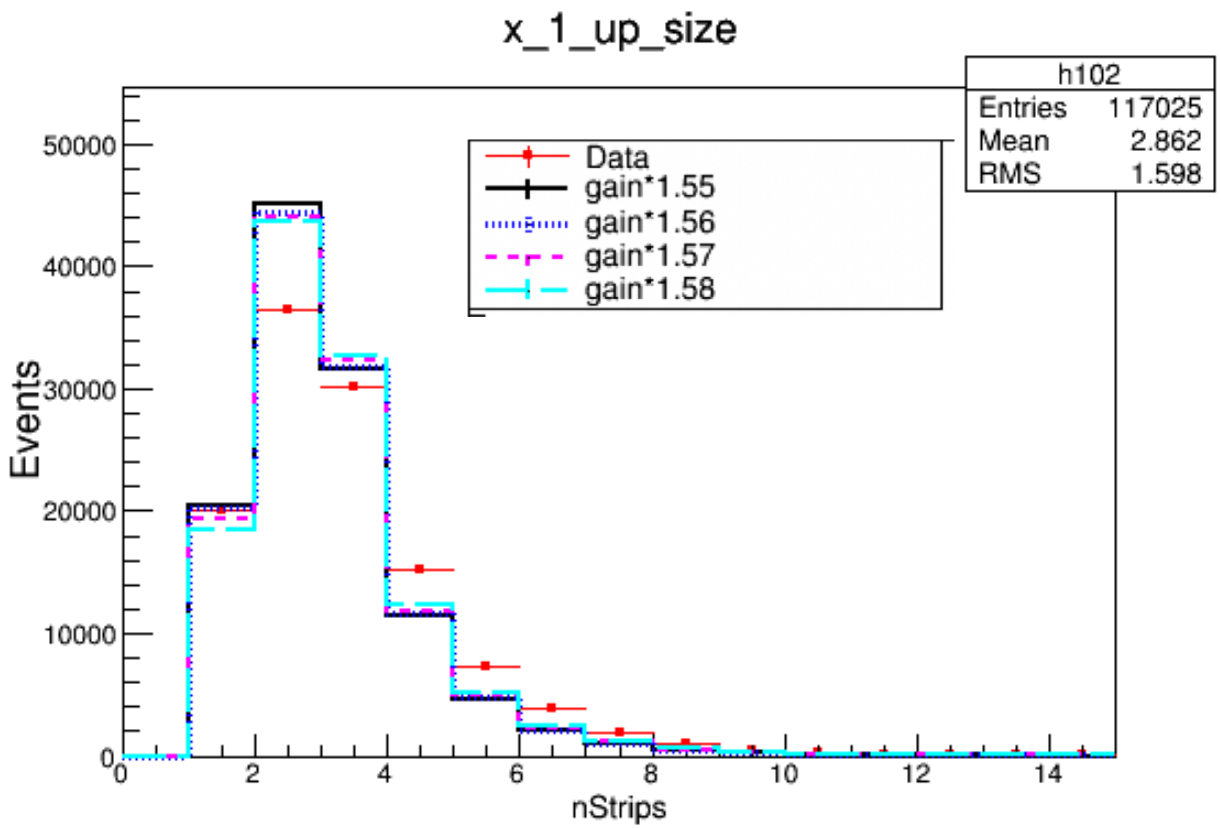


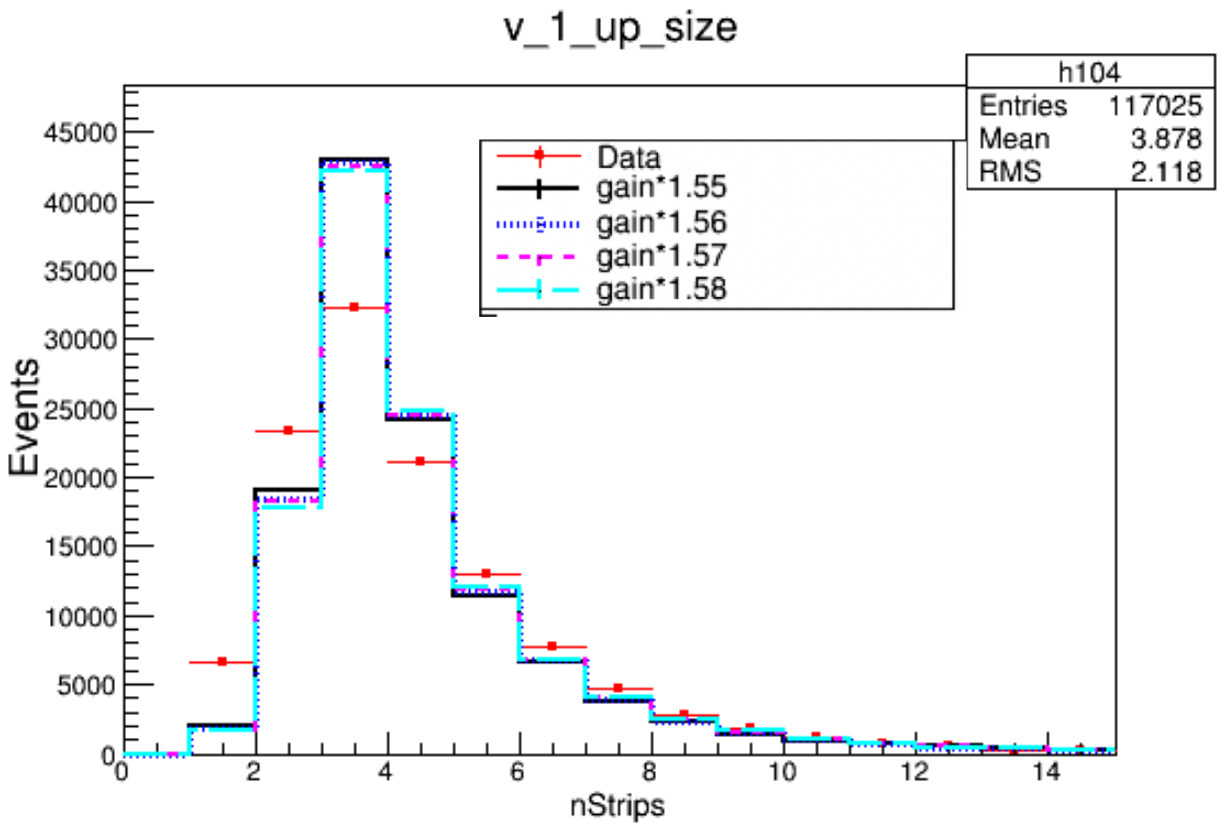
Fine scan of gain (in progress)



Scan with more scale factors is needed

Cluster size





Summary

- Some details are under investigation
- Digitization codes need careful check
- Progress made and preliminary results show a reasonable agreement between MC and data