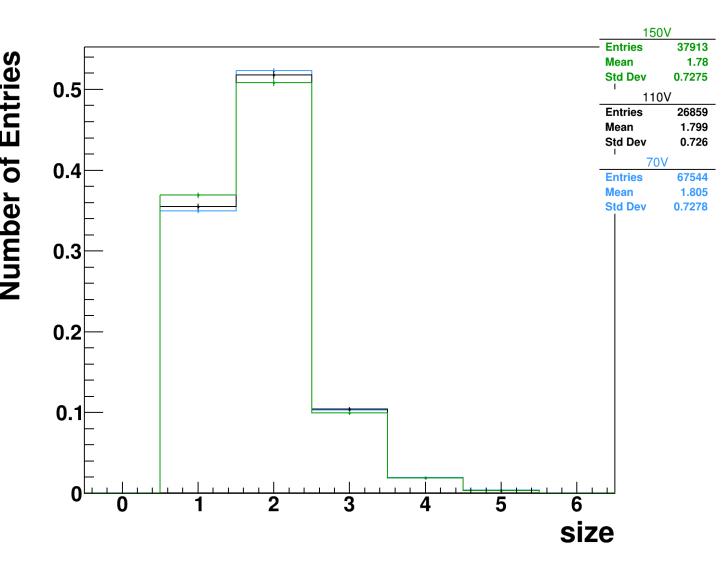# Cluser size vs Bias voltage

- Similar to the ETA plot from last week I decided to investigate the relation between cluster size and Bias voltage.

- Under normal circumstances diffusion within the silicon bulk is the major component for multi strip clusters which is given by

$$\sigma_y = \sqrt{2\frac{kT}{e}\frac{d^2}{V}}$$

- With a bias voltage of 70V we expect a diffusion value of ~9 micron.
- With 150V bias we expect a diffusion value of ~6 micron

Sensor charge sharing

- To the right is the cluster size distribution for clusters on track

- Green = 150V Bias

- Black = 110V Bias

- Blue = 70V Bias

- As expected the number of single size clusters is higher with higher bias voltage

- The actual effect is not very high but the main reason for two size clusters is the floating strips so in general two size clusters are still dominating

- Size four and five clusters seems strange to me. Either delta electrons or adding noise strips to normal clusters.

150V	
Entries	37913
Mean	1.78
Std Dev	0.7275

110V	
Entries	26859
Mean	1.799
Std Dev	0.726

70V	
Entries	67544
Mean	1.805
Std Dev	0.7278