

ZACHARY CHEN-WISHART 02/03/2020

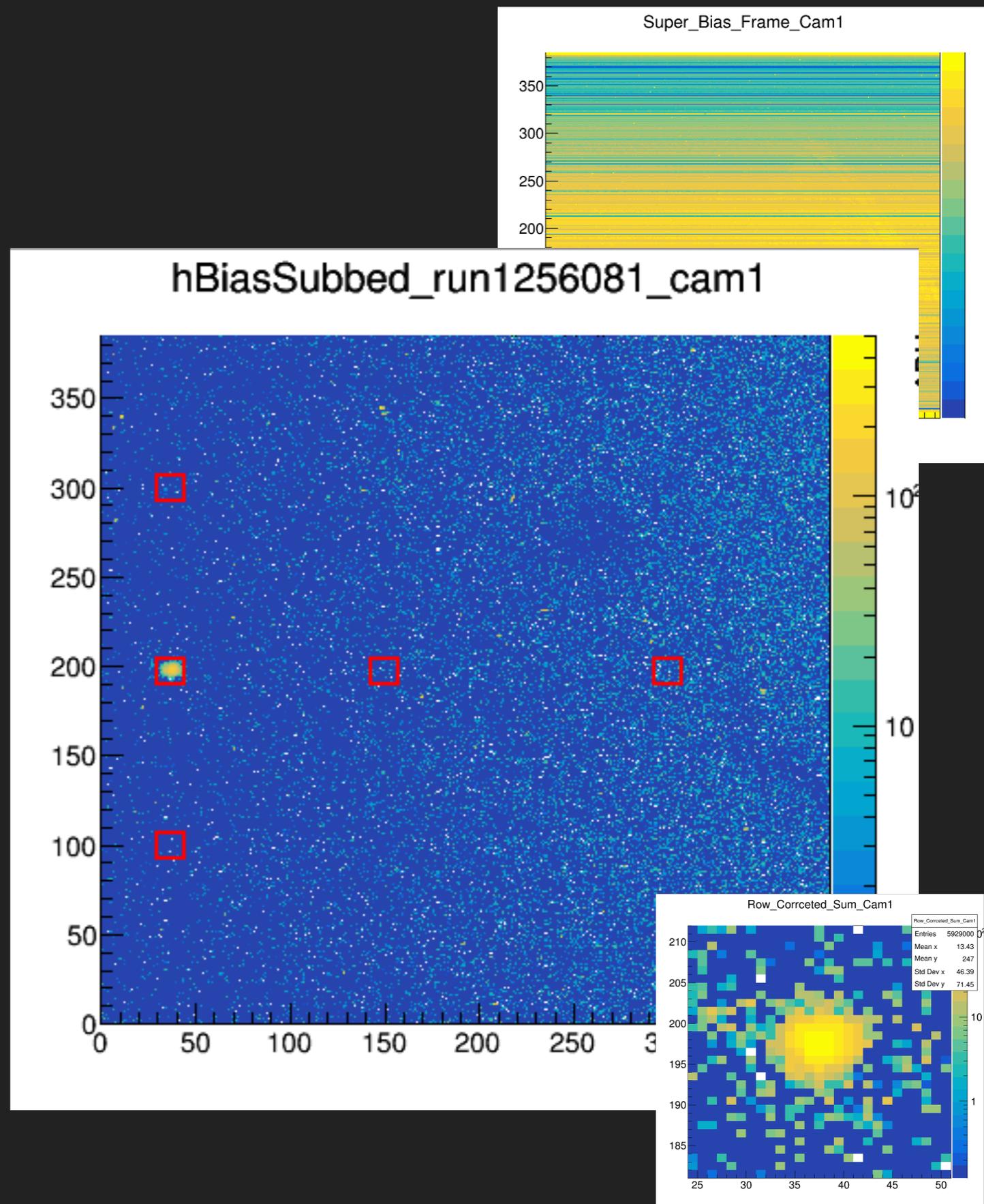
LIGHT SUM SQUARE

LIGHT SUM SQUARED

- ▶ These slides cover:
 - ▶ The "Abby Plot" with first order corrections (i.e. only roughly correcting for the gradient)
 - ▶ Checking for light in Camera 0 & 1 (3 had a broken shutter) in the good 3 Bar pure argon data where we see light in camera 2
 - ▶ The first results of the argon CO₂ data

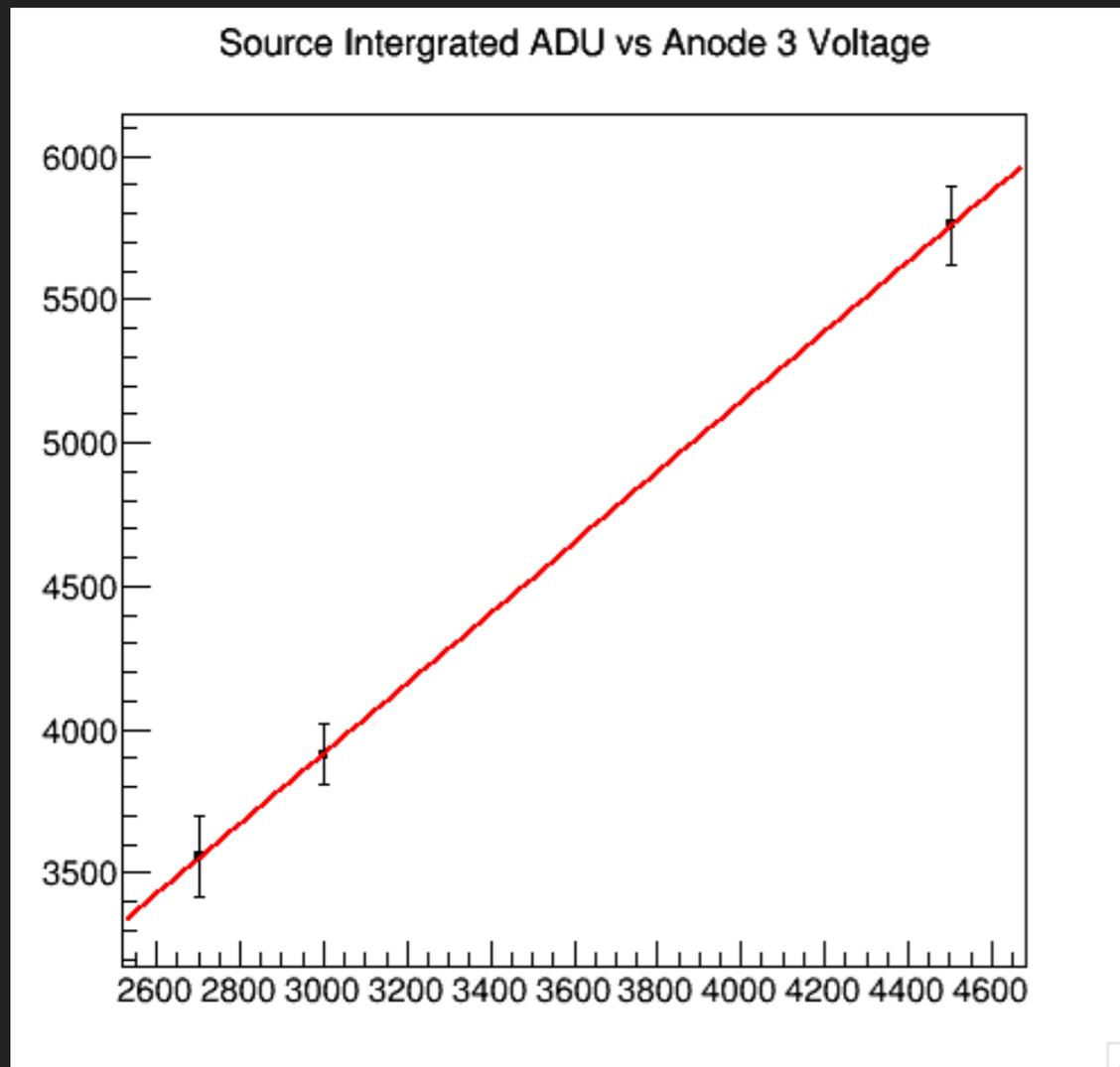
THE ABBEY PLOT

- ▶ I have made super bias frames from all runs taken that day and have run over the three runs for the plot
- ▶ Quick and dirty method assuming gradient in x only -> subtracting average of top and bottom boxes from source box

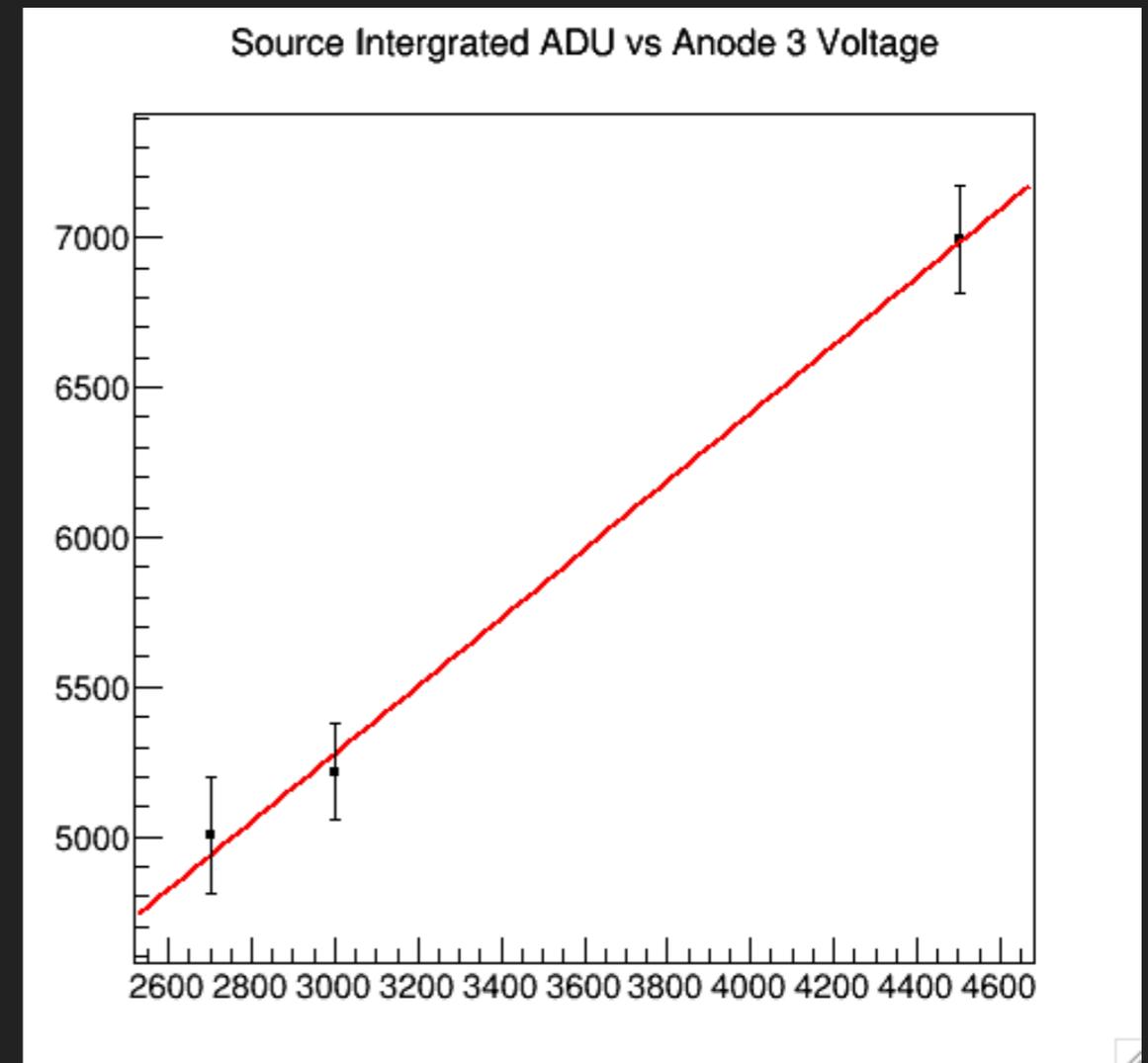


THE ABBEY PLOT

BEFORE GRADIENT SUBTRACTION



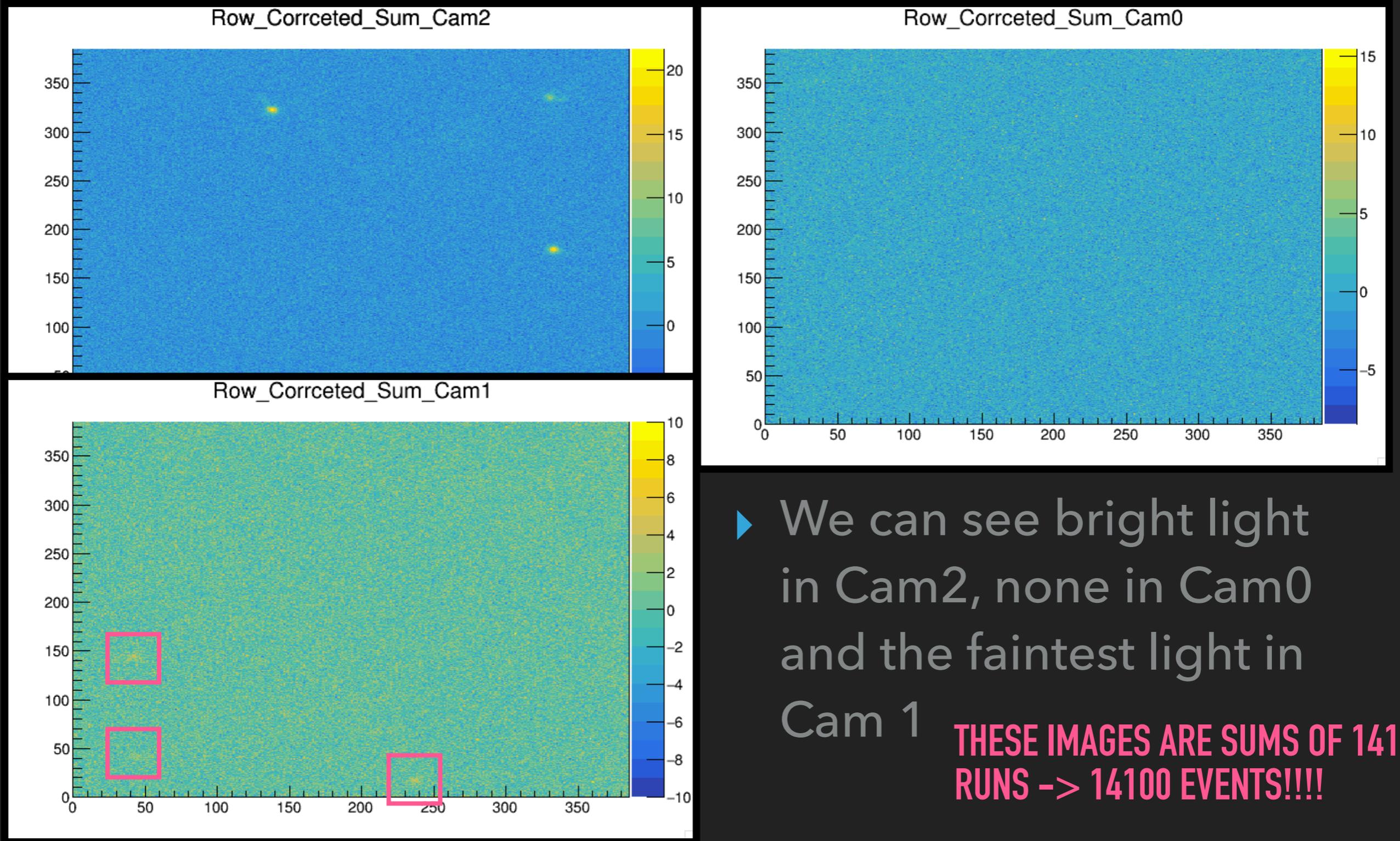
AFTER GRADIENT SUBTRACTION



Minimizer is Linear
 Chi2 = 0.0082743
 NDF = 1
 p0 = 238.824 +/- 338.635
 p1 = 1.22625 +/- 0.0997916

Minimizer is Linear
 Chi2 = 0.27756
 NDF = 1
 p0 = 1867.47 +/- 464.415
 p1 = 1.13641 +/- 0.133858

PURE ARGON CAMERAS 0 & 1 - LIGHT? NOT REALLY

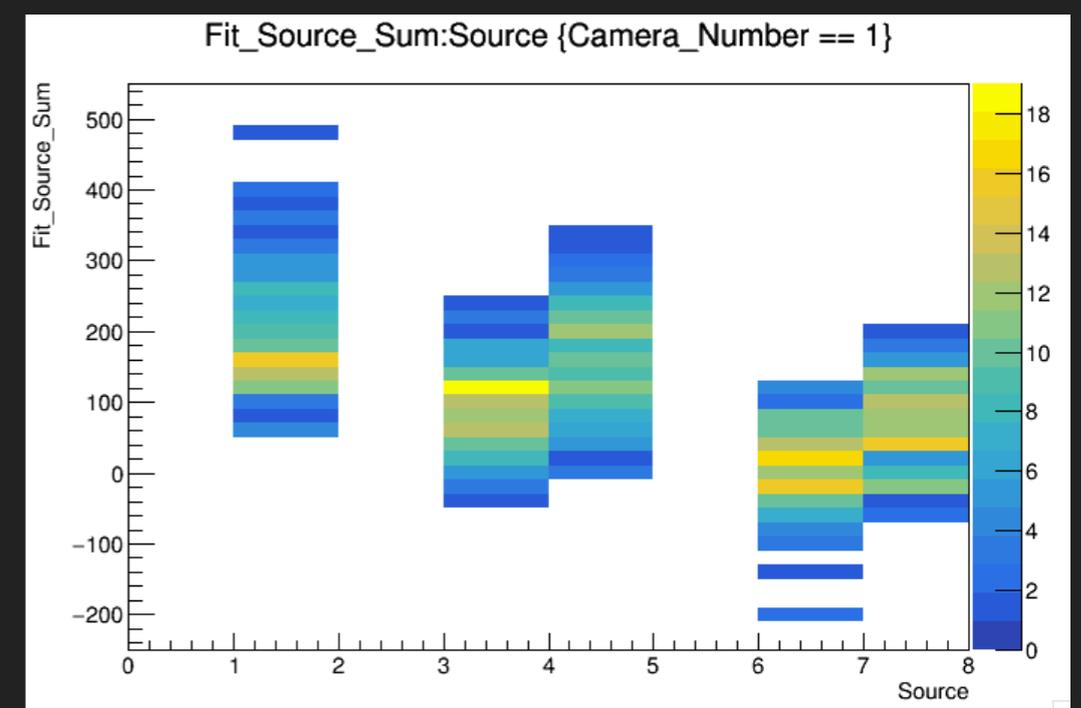
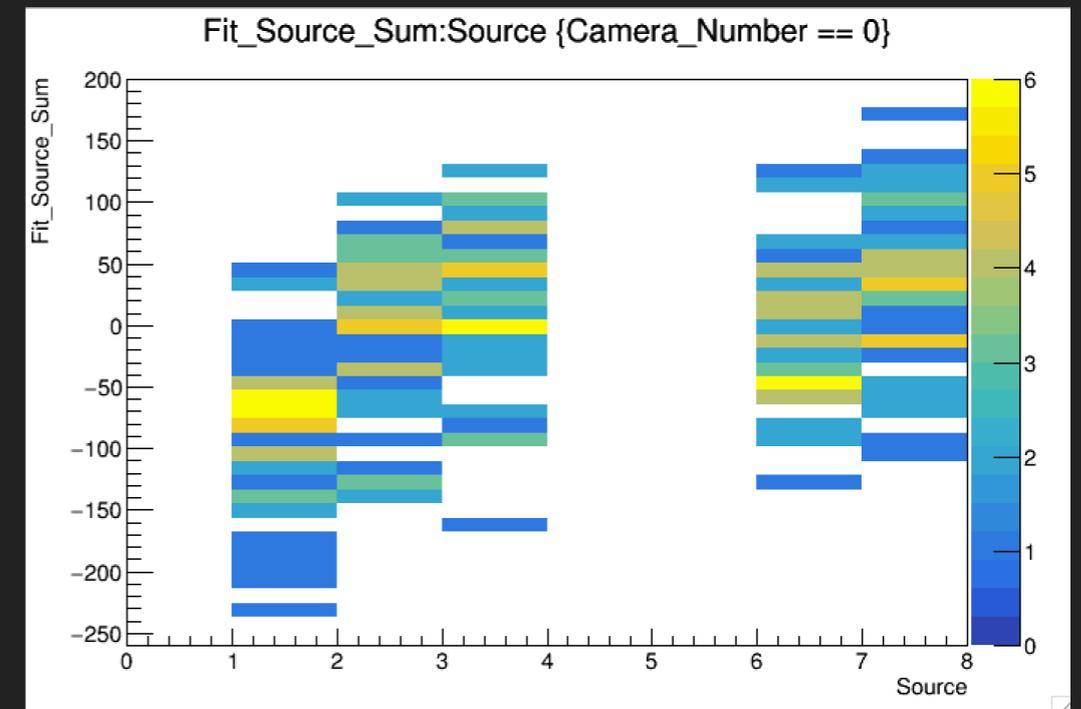


▶ We can see bright light in Cam2, none in Cam0 and the faintest light in Cam 1

THESE IMAGES ARE SUMS OF 141 RUNS -> 14100 EVENTS!!!!

PURE ARGON CAMERAS 0 & 1 - LIGHT? NOT REALLY

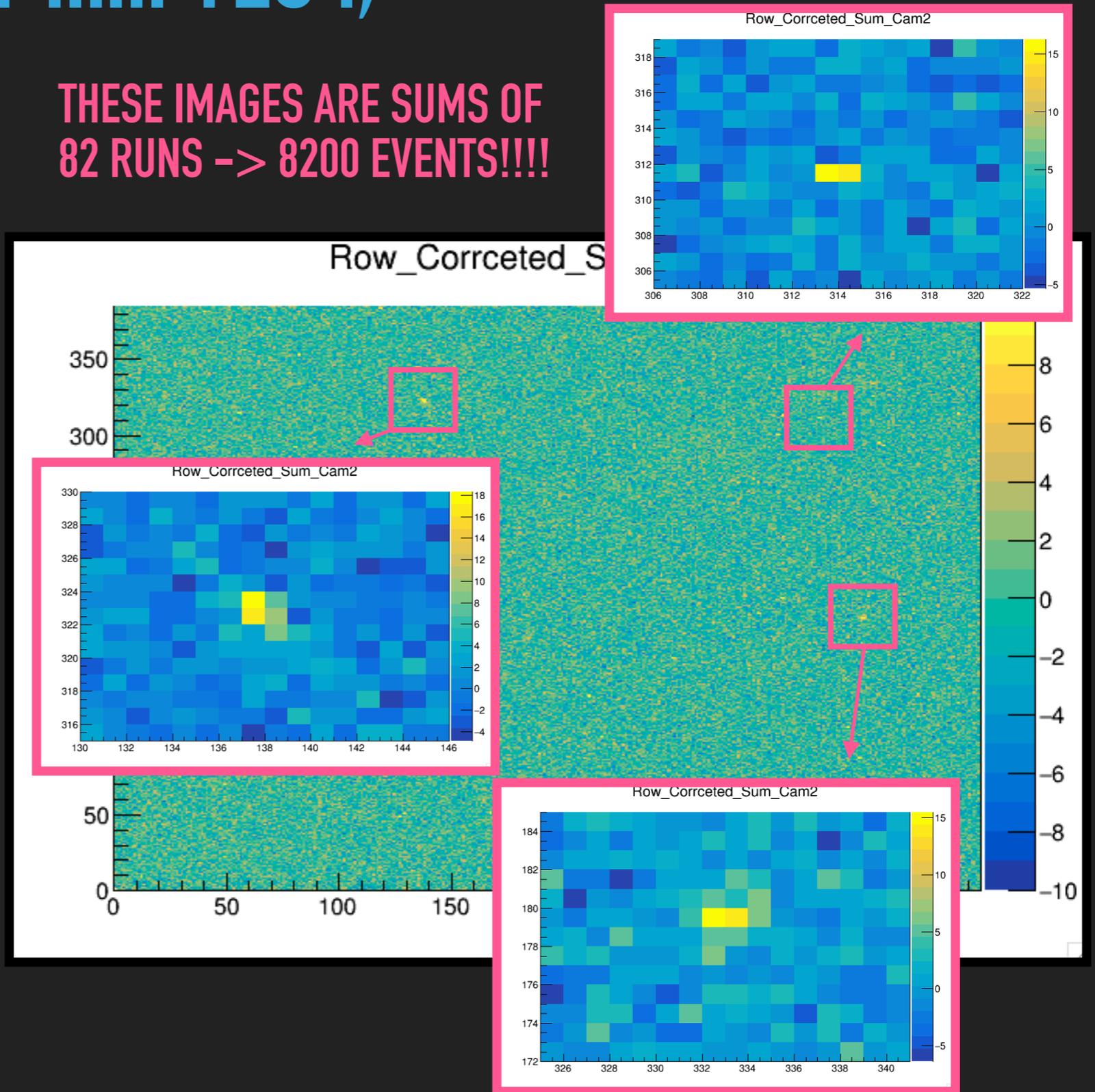
- ▶ This conclusion is backed up by the analysis ->
- ▶ So we see some very faint light in cam 1
- ▶ I have plotted Cam 1 integrated ADU vs voltage combinations (1, 2, 3, 3-1, 3-2 & 2-1) but we see so little light that these basically appear randomly distributed
- ▶ I therefor conclude that for the data on the 6th of Dec 2018 that analysis can not be done with Cams 0, 1 or 3



ARGON CO2 - LIGHT? YES :)

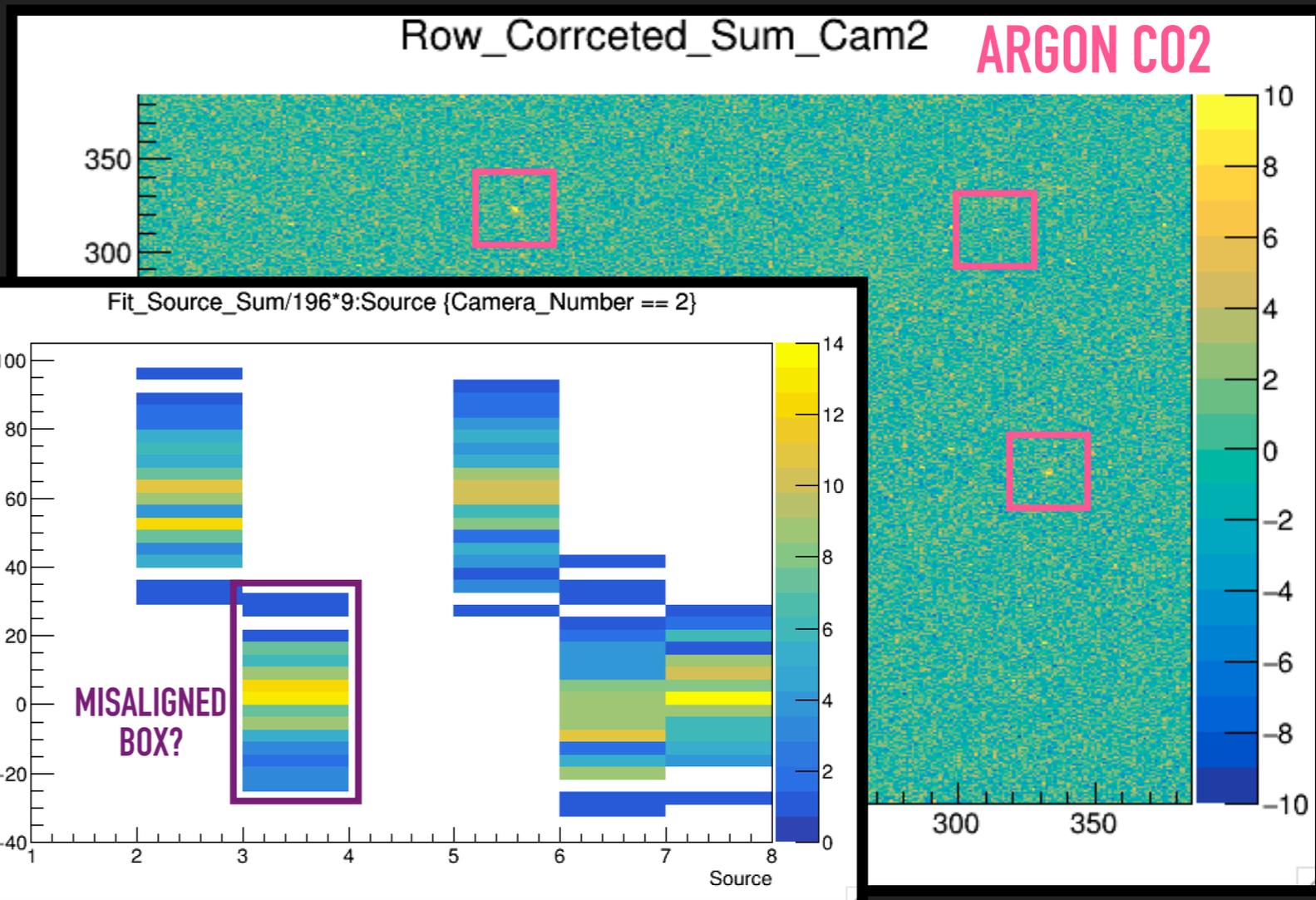
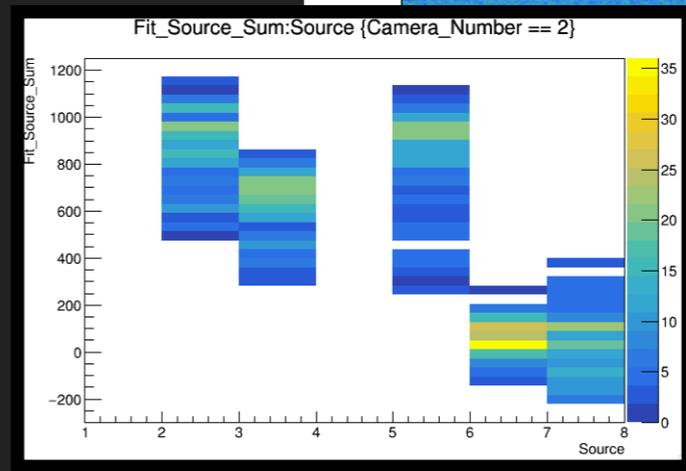
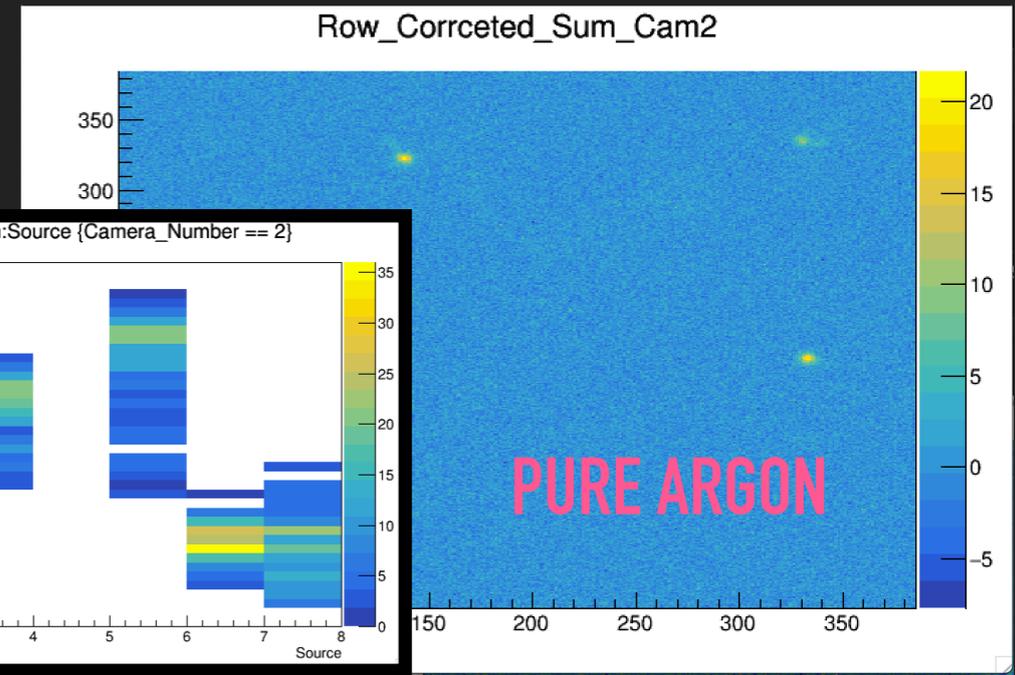
- ▶ We see sources!!!!
- ▶ They are very small but also quite bright!!!
- ▶ We can do small and bright!!!
- ▶ YAY!!!!!!

THESE IMAGES ARE SUMS OF 82 RUNS -> 8200 EVENTS!!!!



ARGON CO2 - LIGHT? YES :)

- ▶ So by moving from a 200 pixel box to a 9 pixel box (3x3) we can run the analysis and we pick up a decent light signal
- ▶ FYI we see approx 10 times less light in argon CO2 but due to less diffusion we have a smaller error as the variance scales linearly with number of pixels in a box



LIGHT SUM SQUARED – CONCLUSION

- ▶ Pure Argon:
 - ▶ We see good light in Cam 2 and can do a voltage vs light analysis
 - ▶ However we do not have the data set required i.e. fixing two anode voltages at a time and varying the other so that we can calculate the light gains dependence on anode voltages and differences between them
- ▶ Argon CO₂:
 - ▶ I have shown light gain and will this week be able to show integrated ADU vs voltages
 - ▶ However in terms of data to analyses we are in the same position as for pure argon
- ▶ I think we need more data