# Raptor CCD Updates

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Coding Updates

- Different thresholds for spark cuts for each CCD

- Spark cut thresholds set in config

- If one CCD sees a spark, whole event is killed

- Tuning these thresholds, particularly for RMS cut

- Config read before opening input file (so can get cuts before getting biases)

- Have a function to add (rather than average) bias subtracted images, only including pixels above a given value

- Gaussian blurring being implemented

Image Sums

- Only including pixels > 100ADU. This number will be tuned for best finding sources

- Run from November in the lab

- CCD labelling incorrect

- Sources seen in 1 CCD

hBiasSubbed_run1323061_cam0
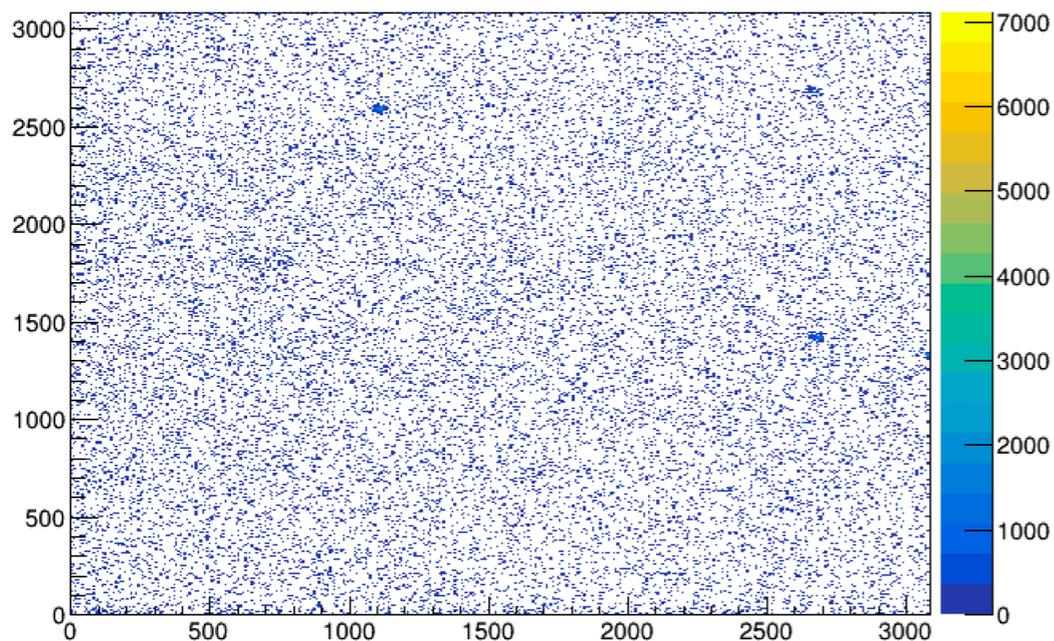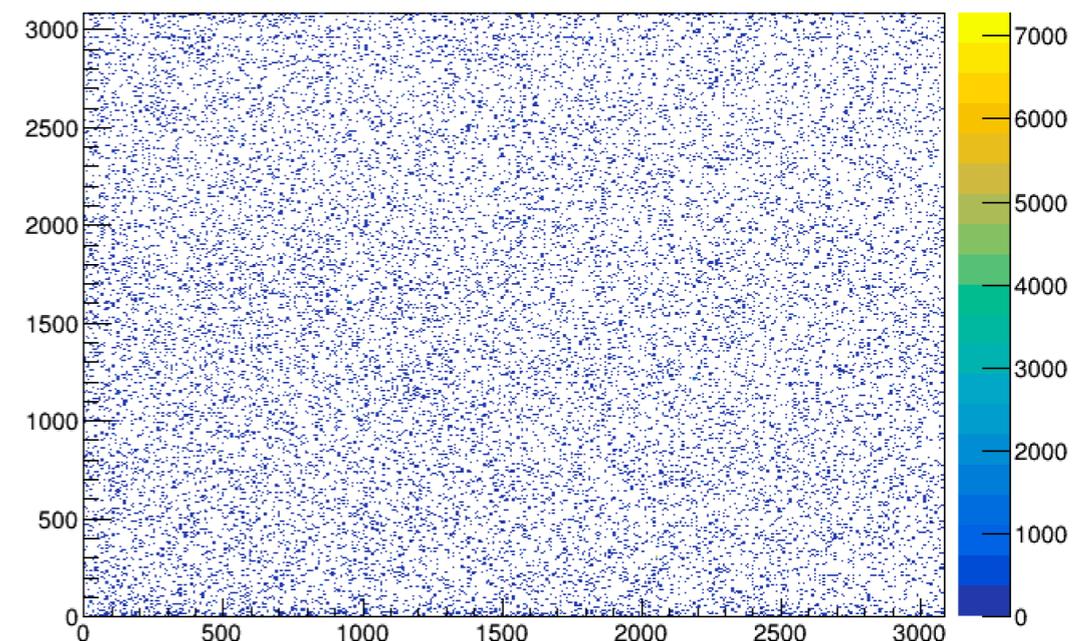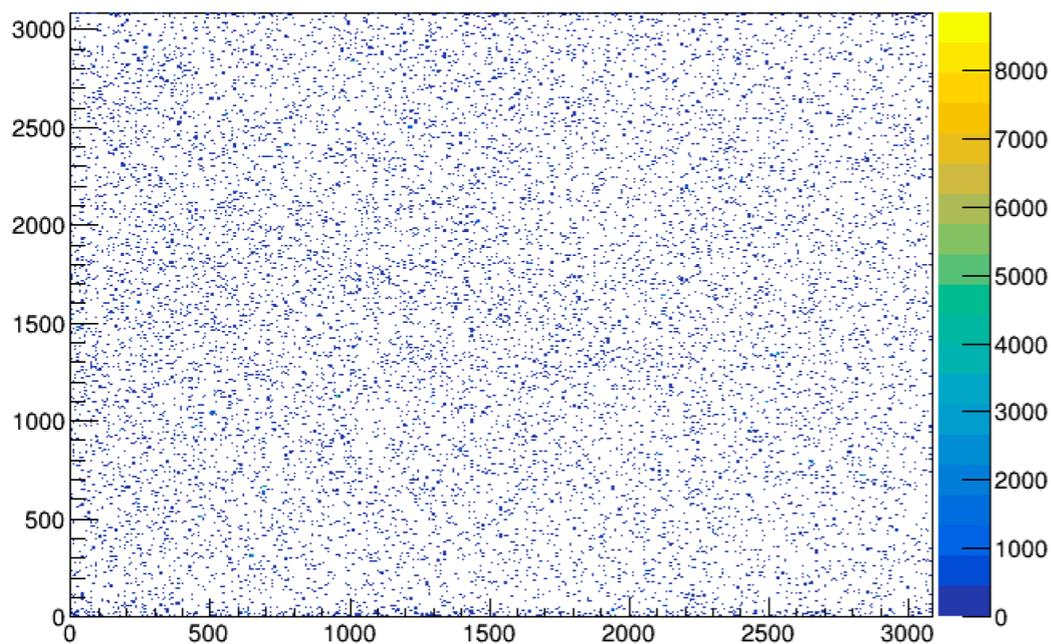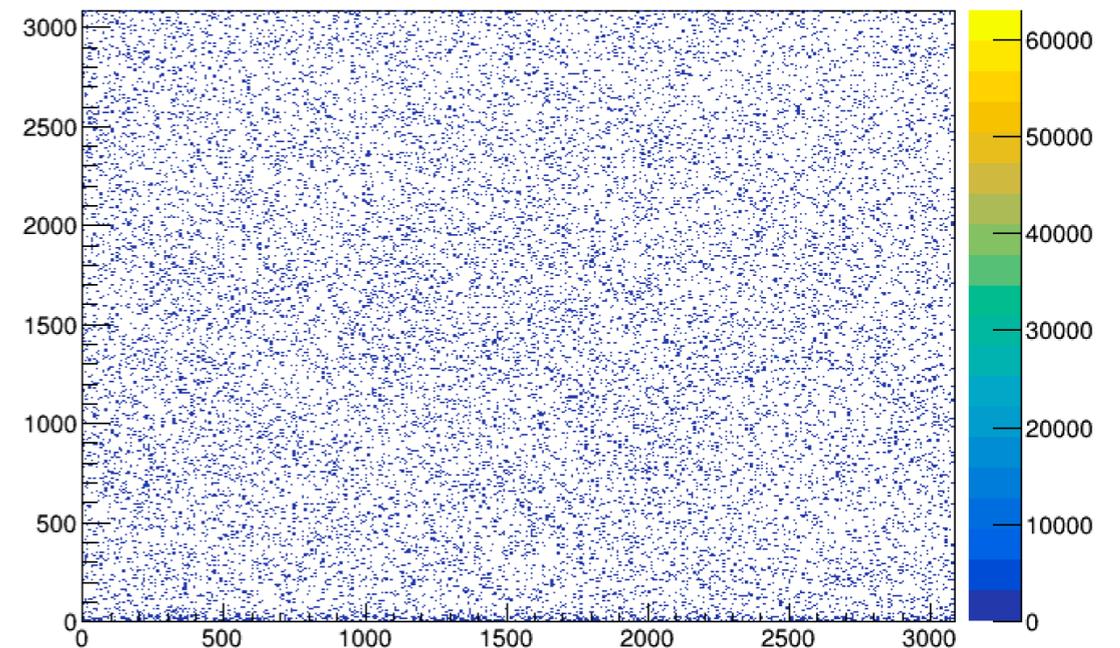

hBiasSubbed_run1323061_cam1

Image Sums

- Sources not seen in CCD '2' and '3' but have seen this behaviour before

- Now have this functionality can tune and use on a variety of runs

- Note the high ADU is because we're summing not averaging, these are bias subtracted

hBiasSubbed_run1323061_cam2
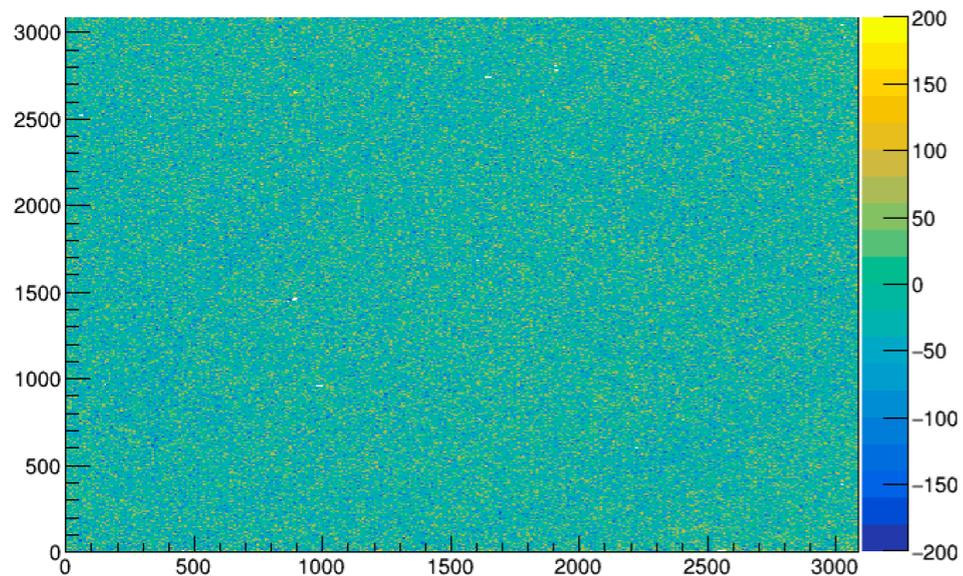

hBiasSubbed_run1323061_cam3

Spark Killing

- Cuts in place:

    - Kill if at least one CCD has RMS > a threshold

    - Kill if at least one CCD has a certain number of pixels above a certain ADU

- Have been tuning the thresholds to kill faint sparks

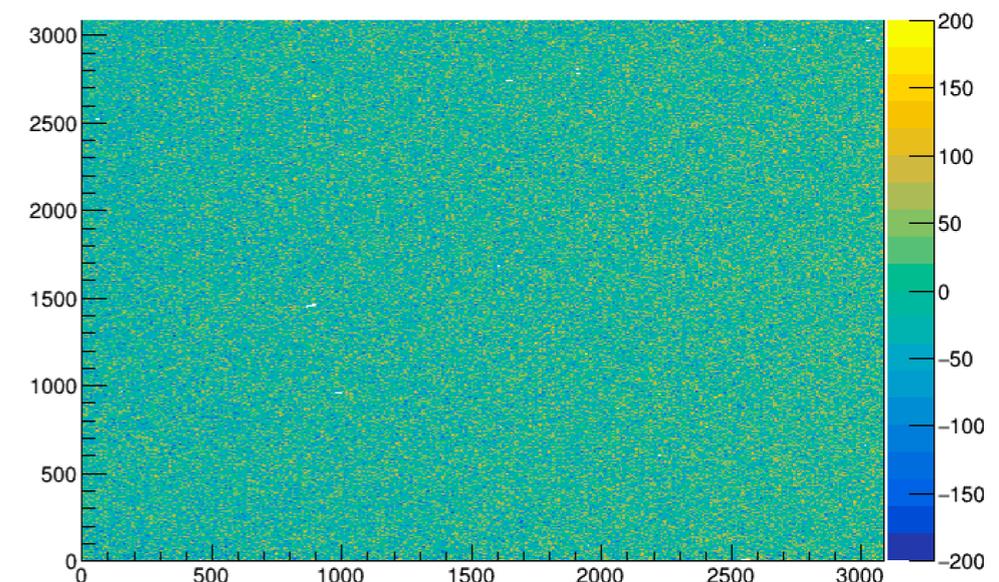**Pre Spark Killer**

hBiasSubbed_run1256060_cam0

Post Spark Killer

hBiasSubbed_run1256060_cam0

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Gaussian Blurring

- Implementing functions from IC students

- Add gaussian smearing of neighbouring pixels to each pixel

- So far running over 4x4 kernel, with gaussian width 1

- Had to convert function from running on 2D array to 1D vector of pixels + some unique pointer magic

- Following plots are very recent, still need to run tests on fake events to check that it is working as expected
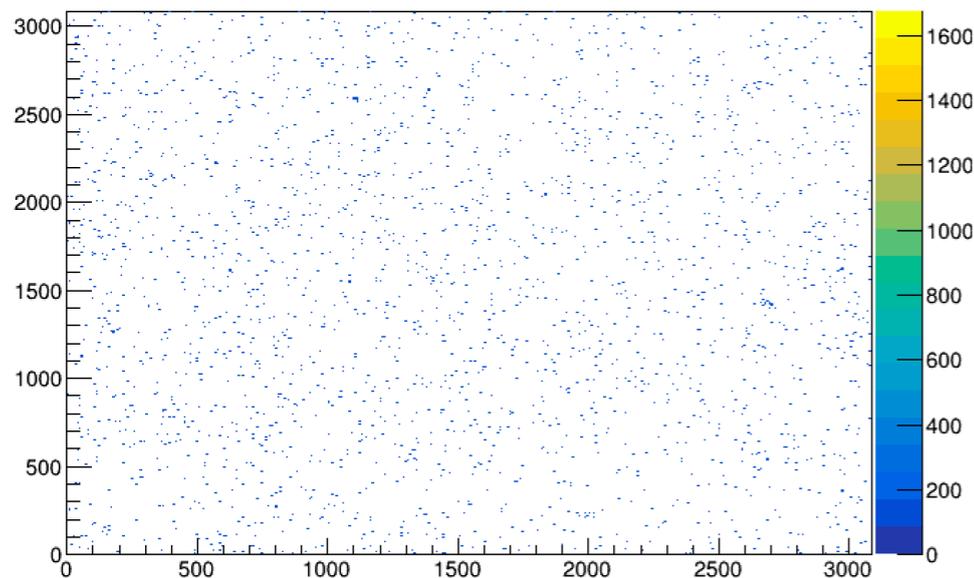
Gaussian Blurring

- Input is image sum for same run as slide 3, CCD '0', including only pixels >100ADU

- See large spreading, will need to tune parameters of the gaussian

- The input is actually only the sum of 2 events from this run (rather than the full 100), but this accidentally turned out to be a good proof of concept (see next slide)

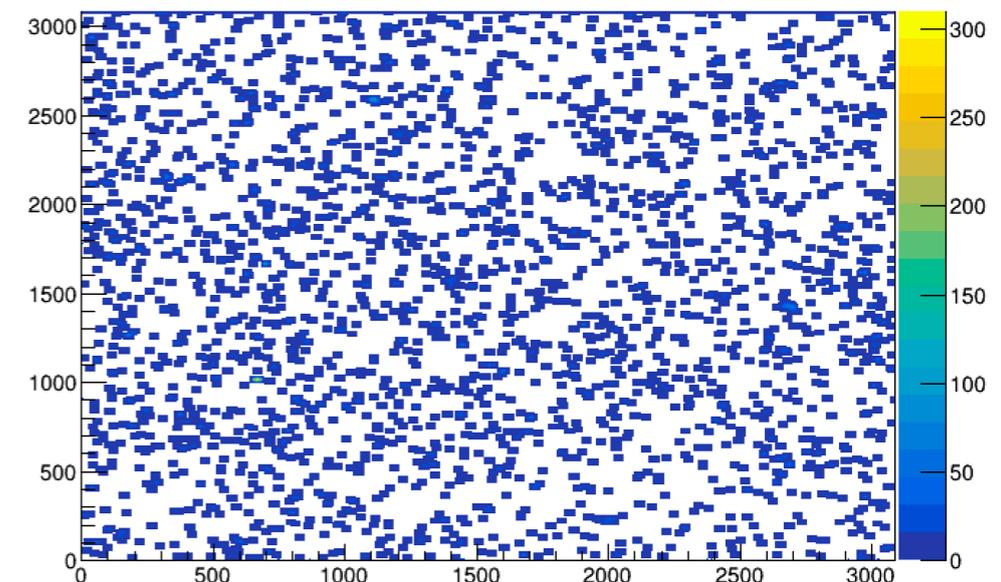**Pre Gaussian Blurring**

hBiasSubbed_run1323061_cam0

Post Gaussian Blurring
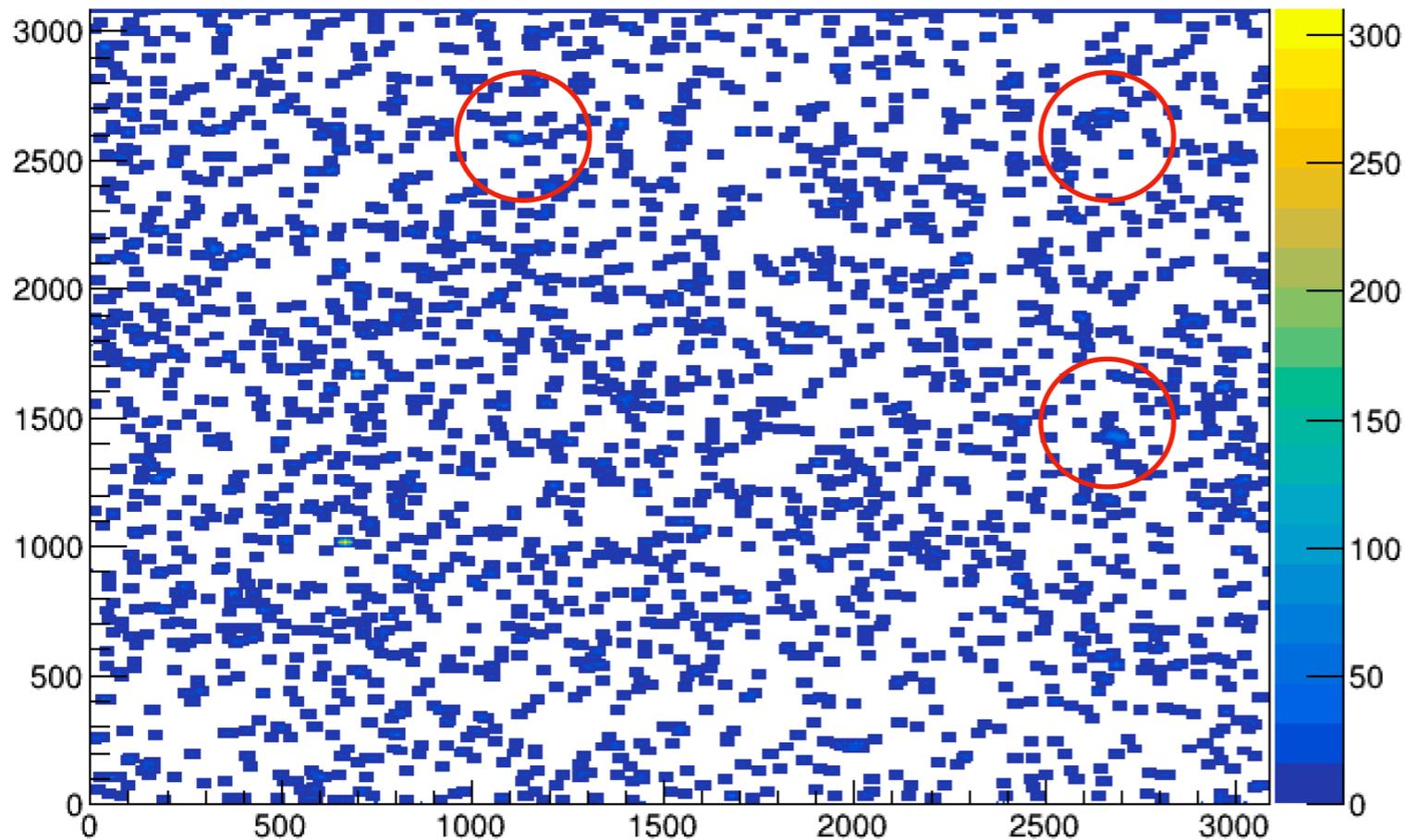

hGaussBlurr_run1323061_cam0

Gaussian Blurring

- Image on left is gaussian blurred sum of 2 images in run. Sources start to appear at correct locations after blurring

- On right is sum of 2 events pre blurring, no sources are seen

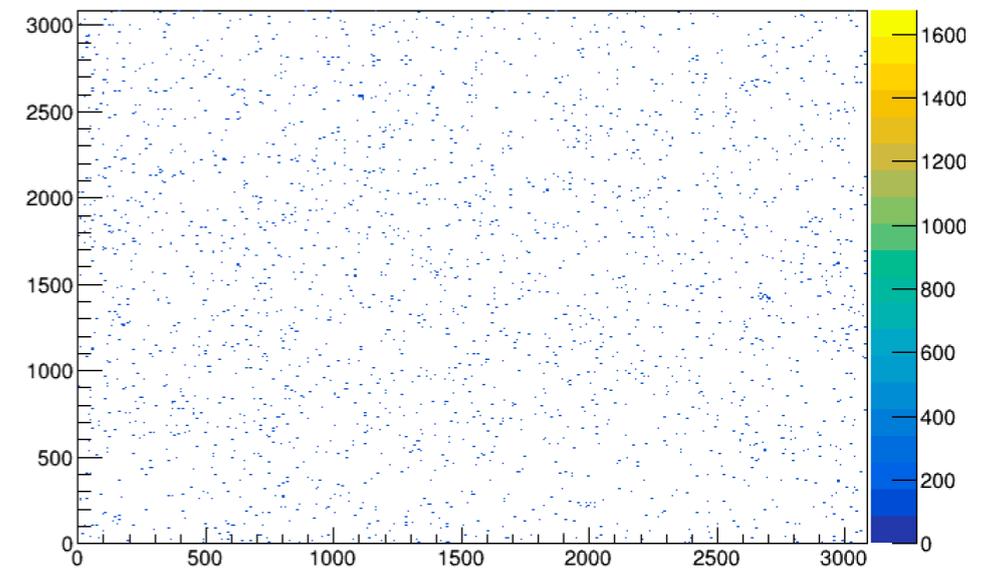- On bottom right is full sum so true location of sources

Sum of 2 images, Post Blurring
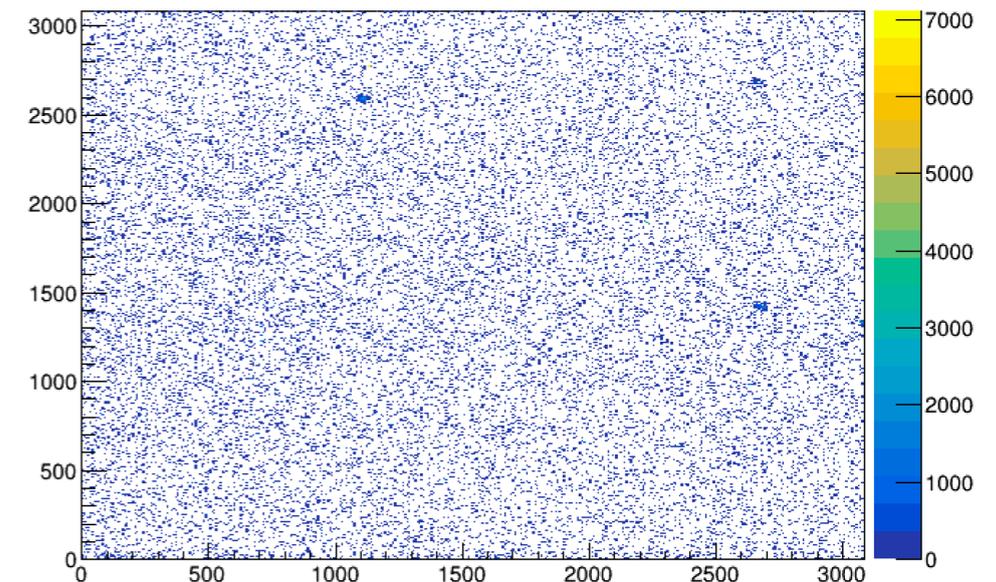
hGaussBlurr_run1323061_cam0

Sum of 2 images, No Blurring

hBiasSubbed_run1323061_cam0

Sum of 100 images, No Blurring

hBiasSubbed_run1323061_cam0

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Conclusion

- Spark killing functions working but more tuning to be done

- Have function to only include pixels above a threshold in image sum, value of threshold to be tuned

- First pass of Gaussian blurring is in place. Have run on the sum of some exposures from the lab. Need to do more tests to check it is behaving exactly as it should