Update: Thermal Imaging

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ISU WEEKLY STAVE QA MEETING

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Motivation

▶ When finding the stave image and then zooming in on the pipe area, the current code required the user to input the four corners in which to cut the image. What has been developed is a way to automate this process and make it better.

▶ Example of a poor conversion on the right.
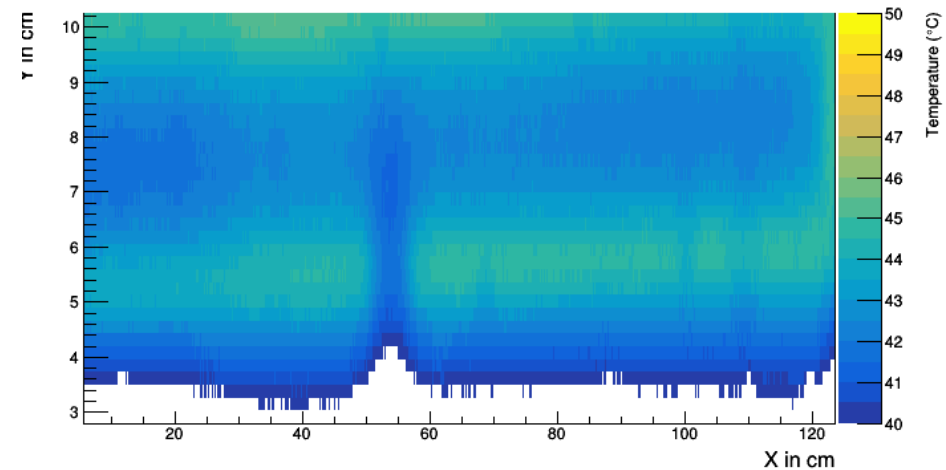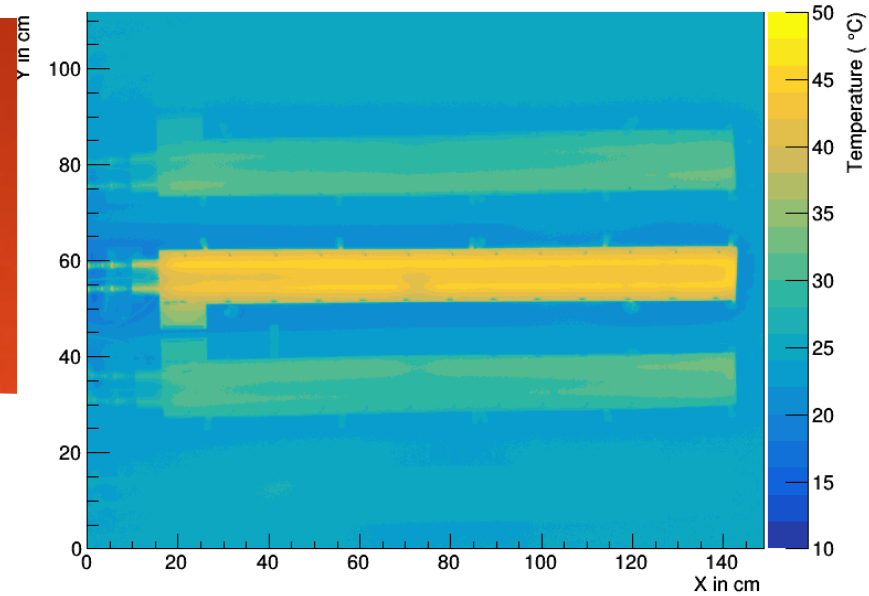
This is the problem that you can run into using the current program. The points chose were not good, so all following plots will be poor.

Canny Edge Detector

- An image manipulation addition to python called OpenCV, is used to perform most of the manipulation

- The first thing to do is apply a Canny Edge Detector to the image to find the important shapes.

- About the Algorithm: The Process of Canny edge detection algorithm can be broken down to 5 different steps:

  1. Apply Gaussian filter to smooth the image in order to remove the noise

  2. Find the intensity gradients of the image

  3. Apply non-maximum suppression to get rid of spurious response to edge detection

  4. Apply double threshold to determine potential edges

  5. Track edge by hysteresis: Finalize the detection of edges by suppressing all the other edges that are weak and not connected to strong edges.
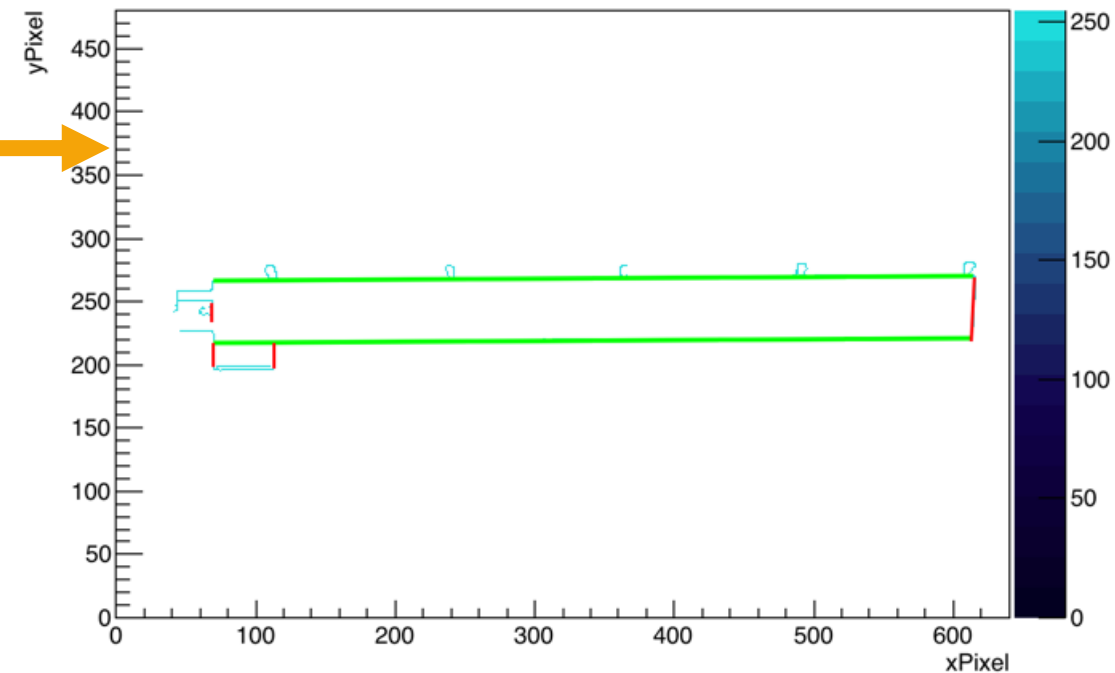
- https://en.wikipedia.org/wiki/Canny_edge_detector

StavePlot
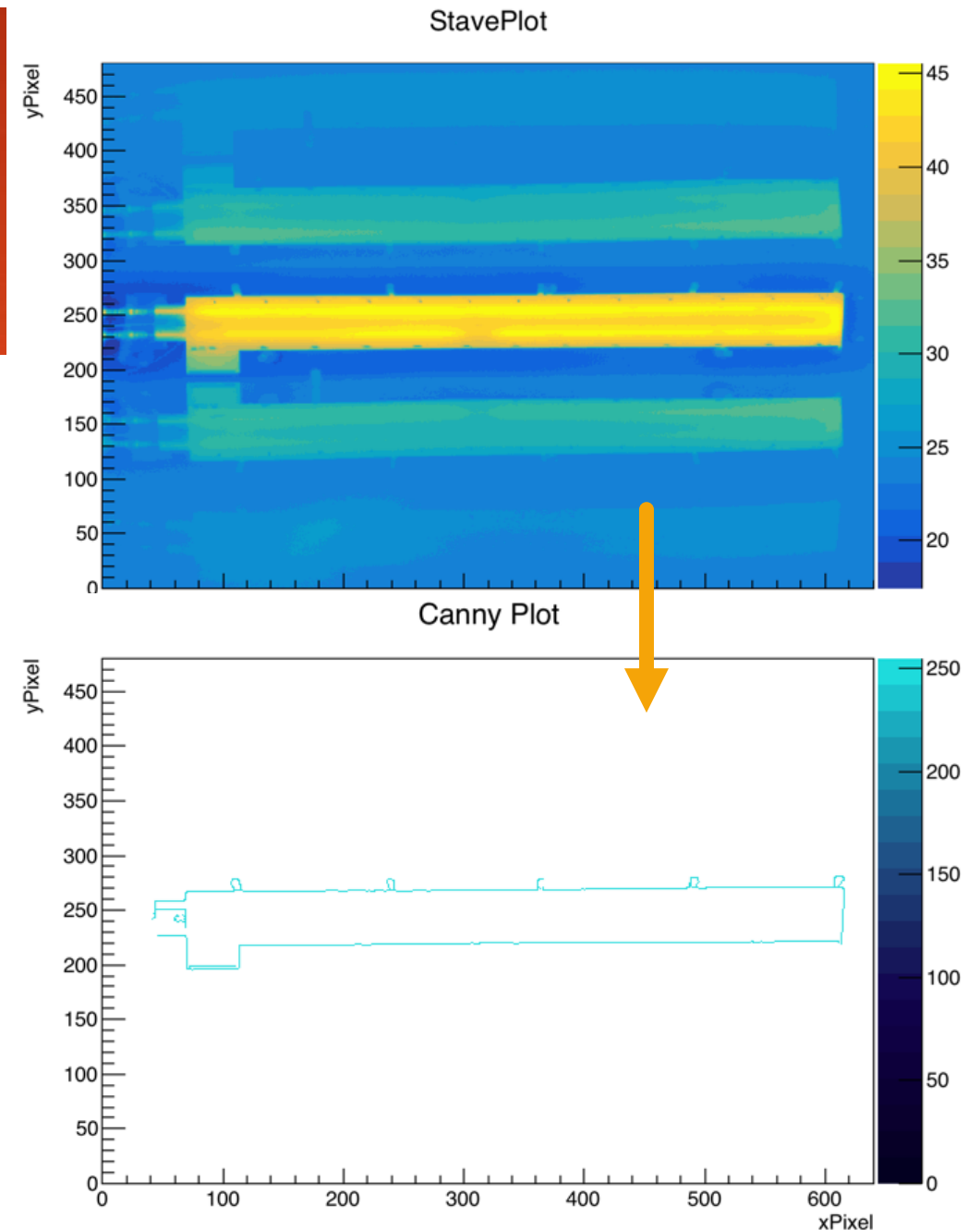
Canny Plot

Find Lines with Hough Transform

- For more information on the Hough Transform…
  - https://en.wikipedia.org/wiki/Hough_transform
- Using this function, lines can be found in the Canny Plot.
  - First long horizontal lines are found(Green)
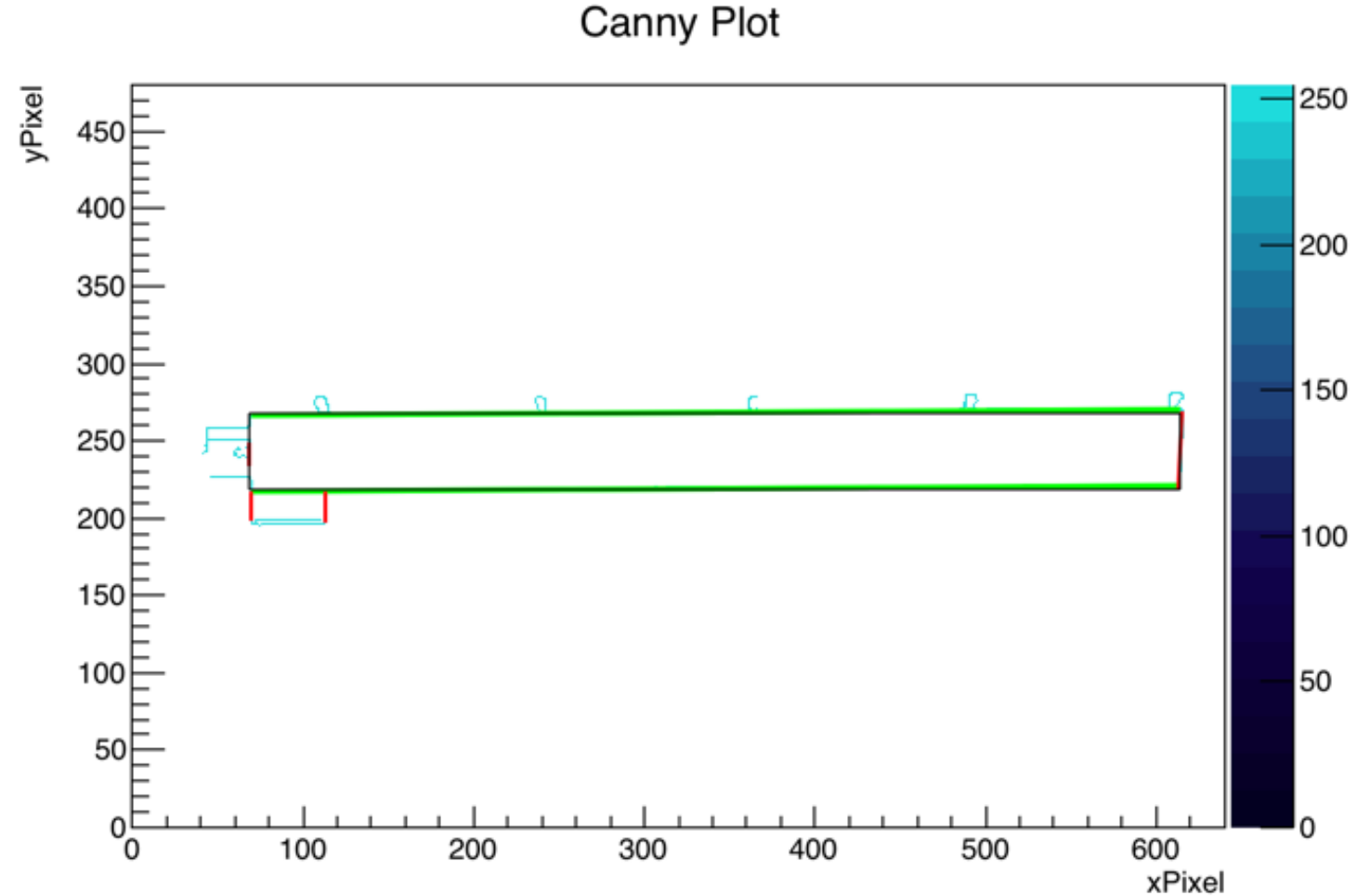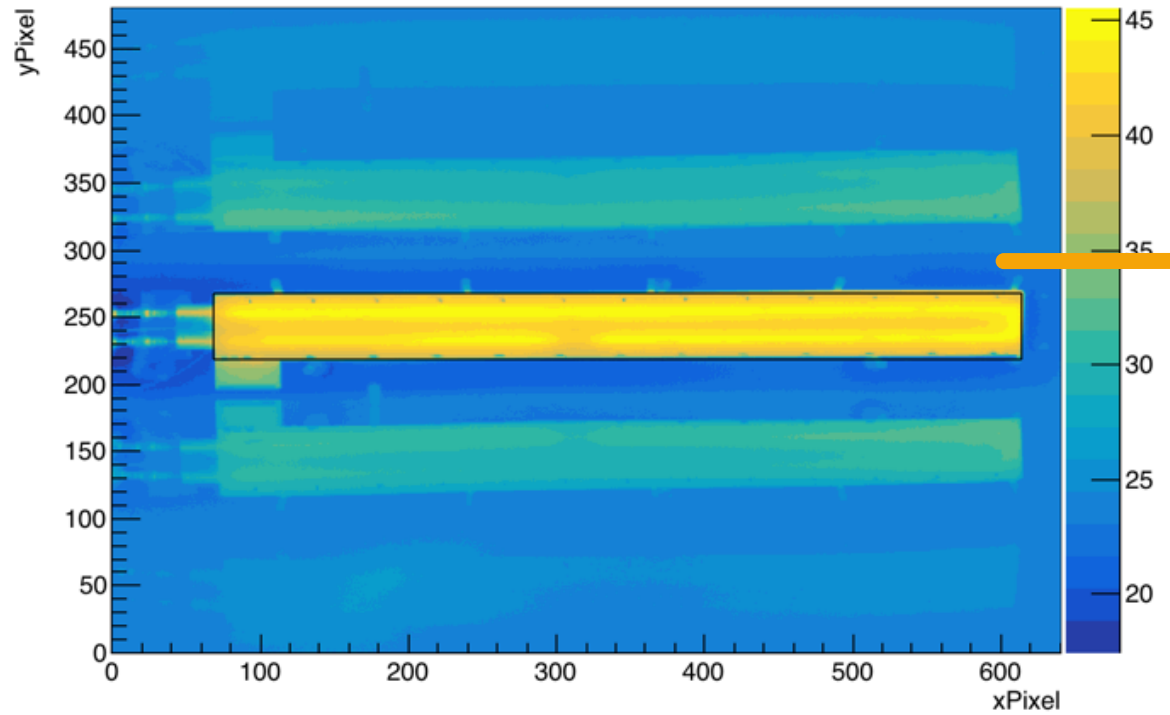 - Second short vertical lines are found(Red)
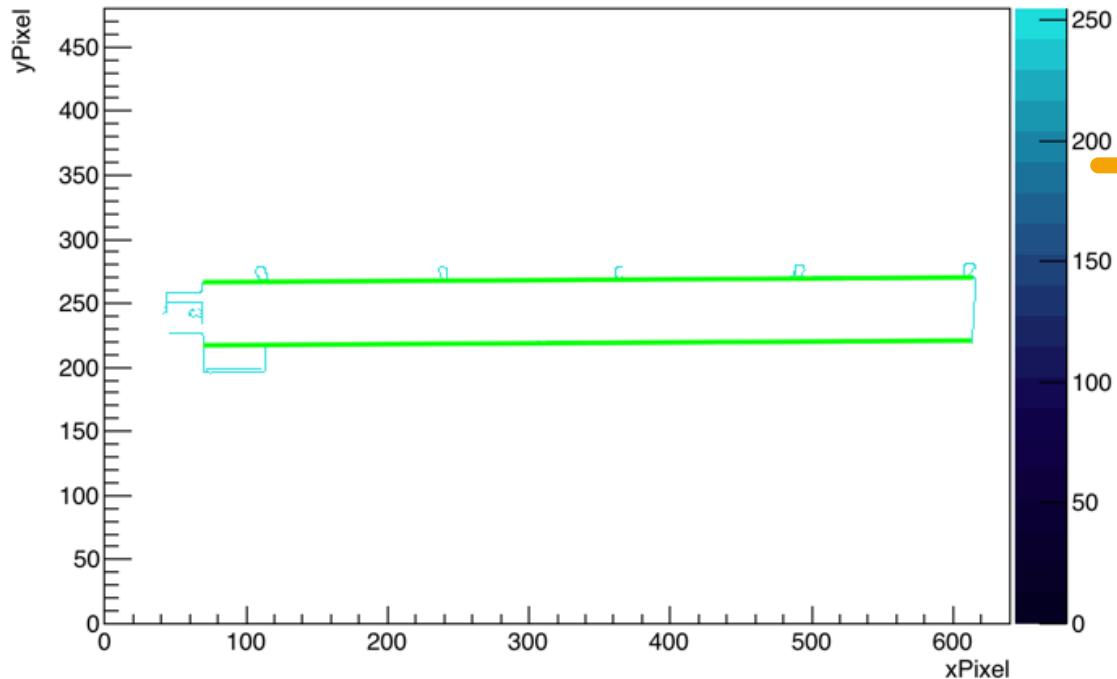
Four Corners

- From the lines, a projection onto the x and y axis allows us to find a box that fits our stave!
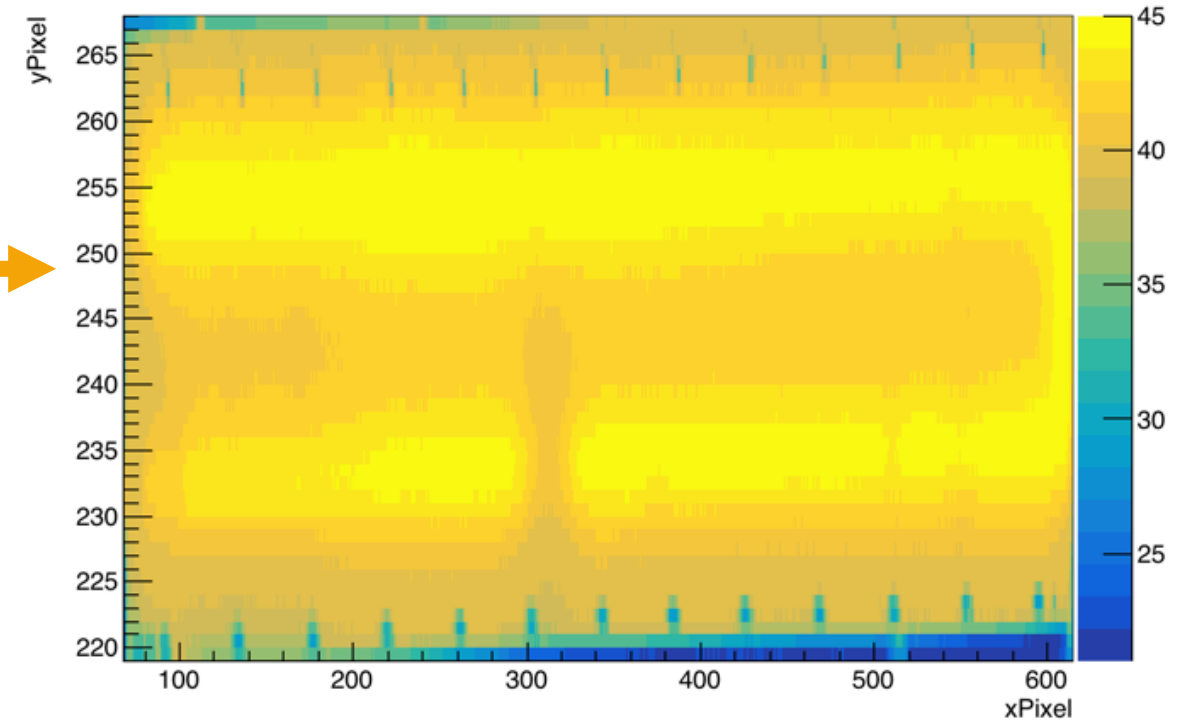
- A new cut can then be implemented

Canny Plot

Initial Zoom
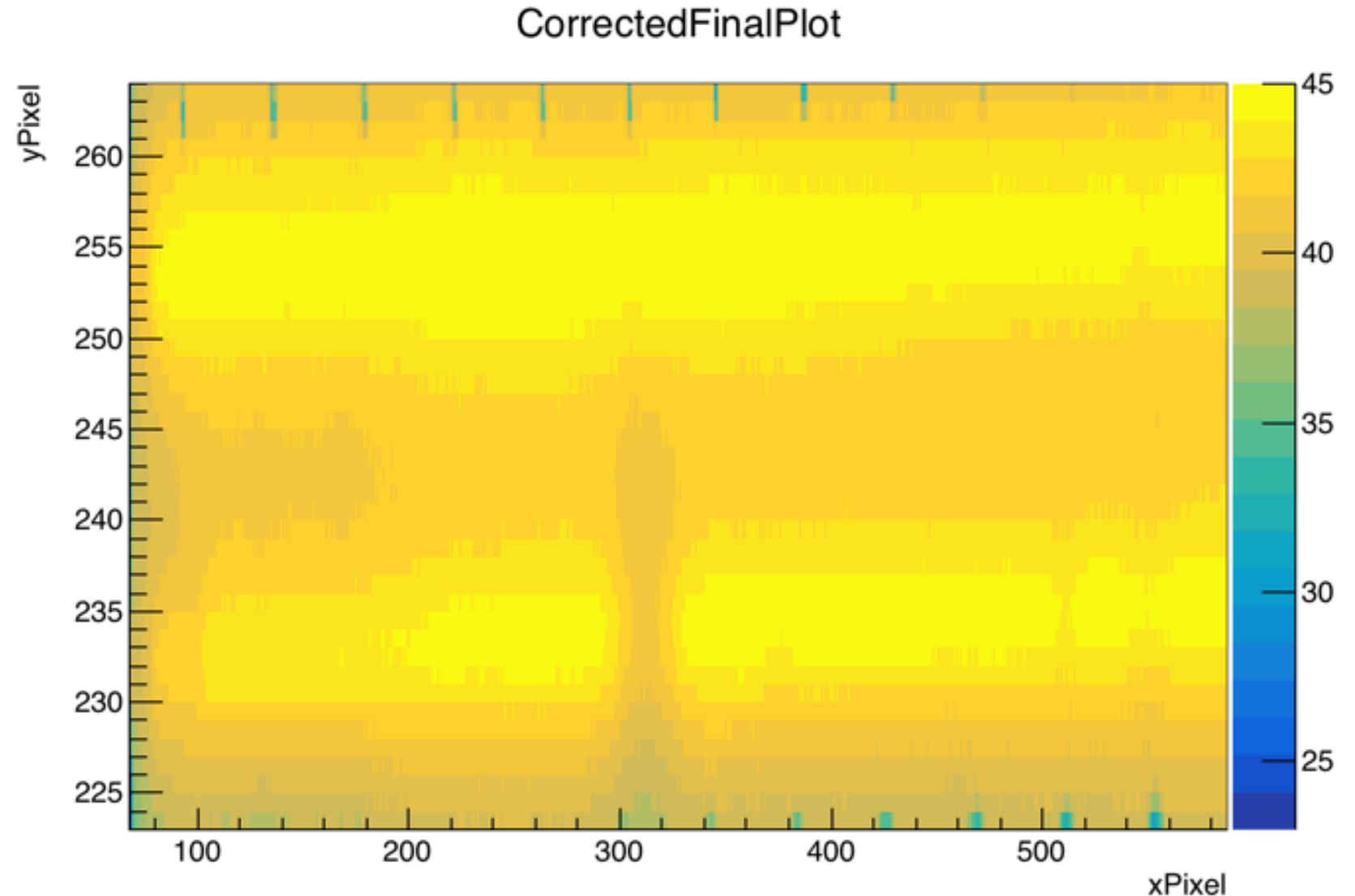
Final Zoom

▶ The stave image can then be cut to the dimensions necessary to perform final pipe line analysis.

   ▶ Remove U bend ~10% length

   ▶ Remove edges ~ 10% on each side

CorrectedFinalPlot

Next Steps

▶ Incorporate this script into the current code

Backup Slides