Dec Data Preparation
12/18/18
Valentina

Cam 1 Calibration

- Use MP5 to calibrate Cam1's pixel sizes. (Dia= 75e-3 m)
- Note: MP5 is has an angle, pi/4, to the imaging plane
- Cam1xpixel= 3.140e-5 (m);
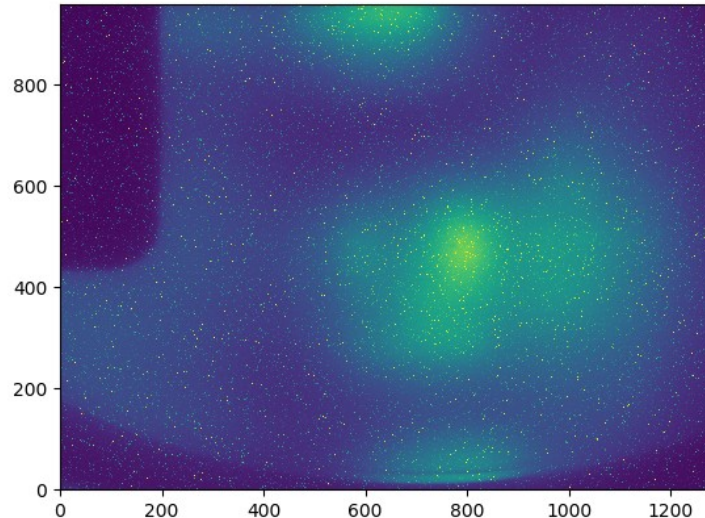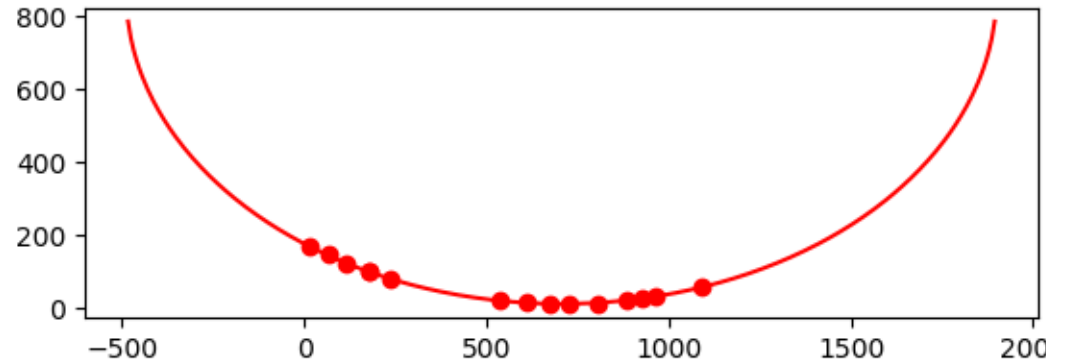- Cam1ypixel= 3.106e-5 (m);

Image of MP5 on Cam1

Elliptical fitting to the edge of MP5

Cam 7(NF) Calibration

- Use aperture to calibrate CamNF's pixel sizes. (Dia= 20e-3 m)
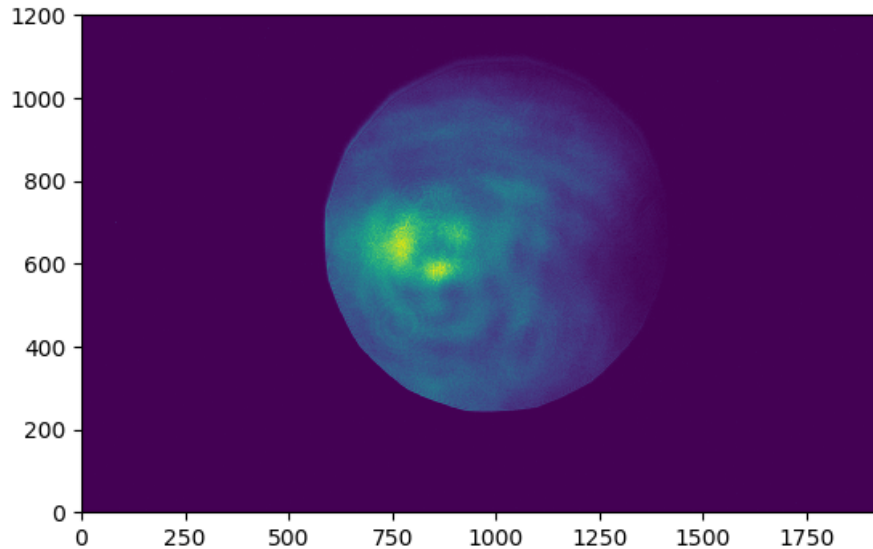- Cam1xpixel= 2.485e-5 (m);
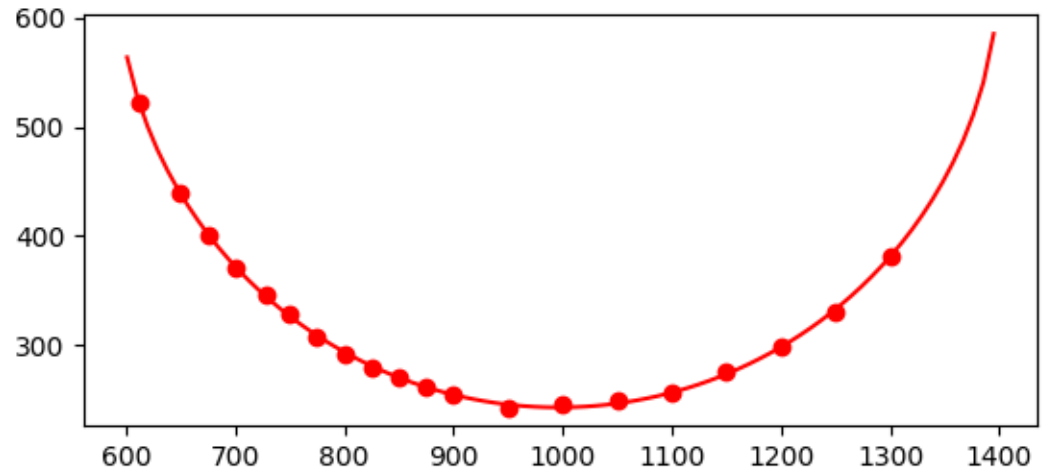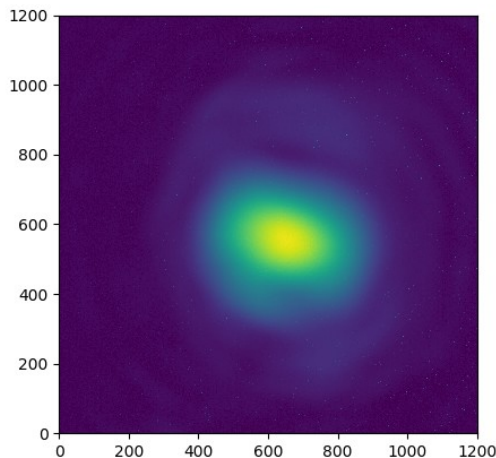- Cam1ypixel= 2.501e-5 (m);

Image of aperture on NFCam

Circular fitting to the edge of the aperture
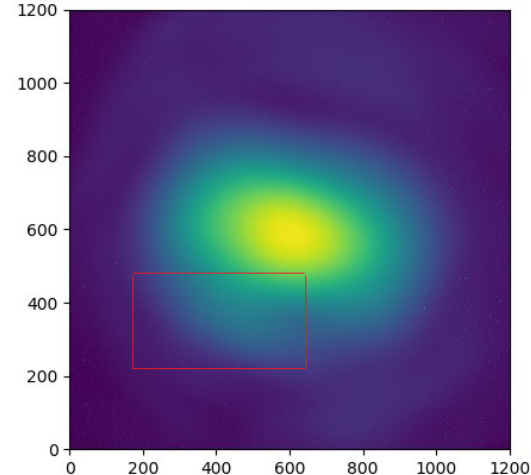
PickOff Calibration

- PickOff image and Cam5 should be the same when running in vacuum.

- Centering the Cam5 first, then do a 4 variable (Pickoff center x, center y, pickoff scale in x, scale in y) least square fitting by calculating the error between Cam5 and PickOff.
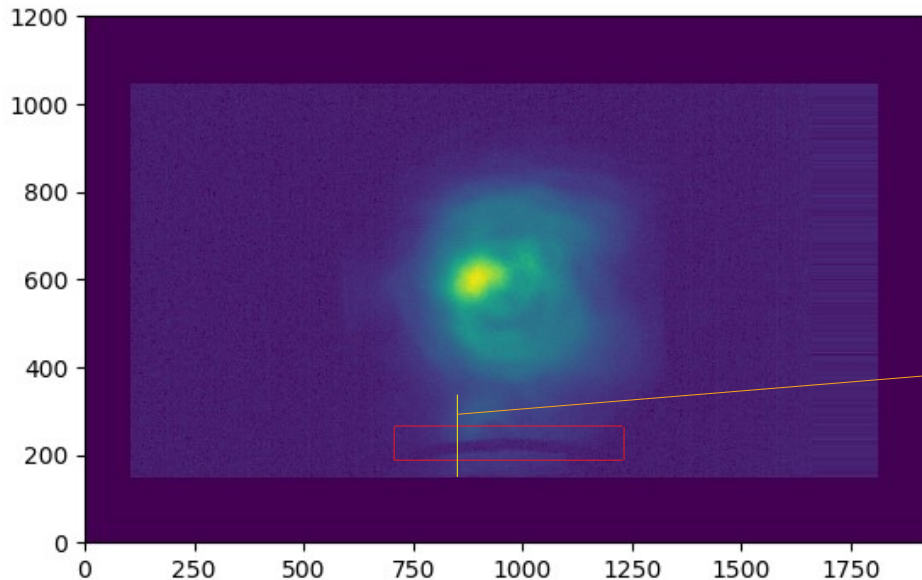

Original PickOff
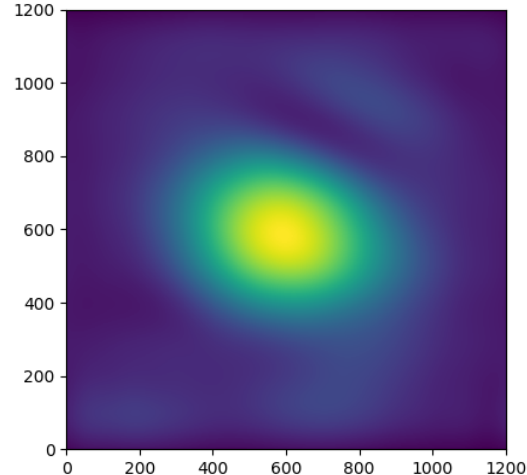
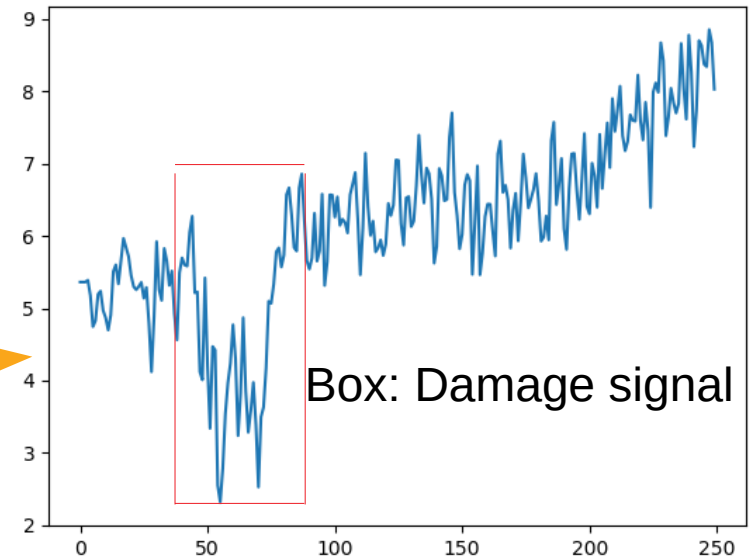Cam5

PickOff after Calibration

Red box is the reflection artifact

Cam 1 Image Wire Repairing

- A part of image in Cam 1 is blocked by a wire
- Filter will not work well because the damage structure is way faster than the image structure


Cam1 and the damage structure

Box: Damage signal

Line out the damage signal

Repairing

- In 1D, identify the center pixel of the damage signal
  - Use the average of 5 neighbor pixels to present the value at each pixel (to overcome the noise, *cannot use low pass because it lowers the accuracy)
  - Find all the pixels that are within the damage region
  - Identify the center pixel of the damage region
- Set a width from the center of the damage region and cut the damage region out
- Replace it by the signal nearby and adjust the slope based on the difference of the two edges of the damage region and shift it in y
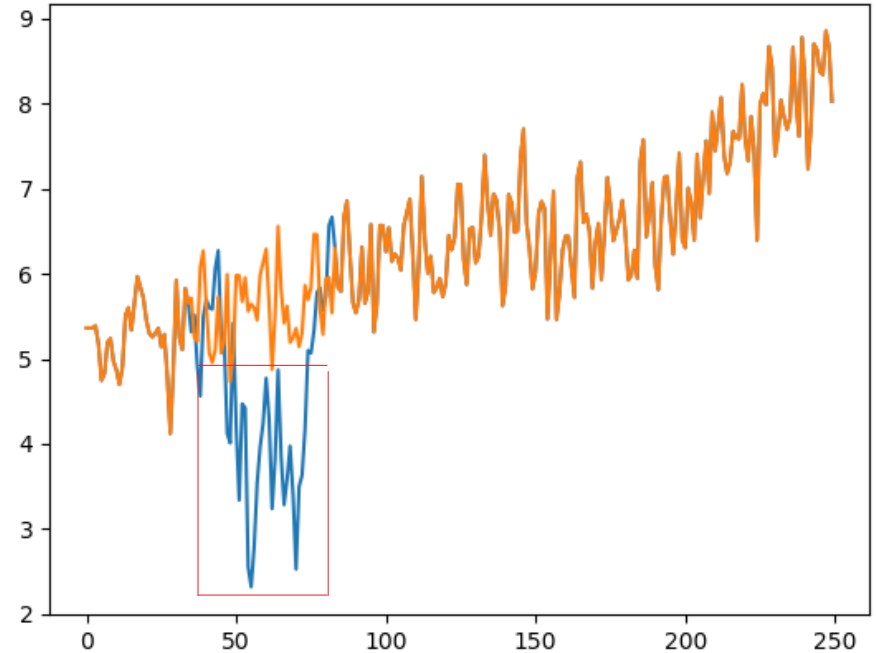
Blue is the original signal with damage; Orange is the repaired signal

Repairing

- Repair each lineout and fill it back to the image matrix
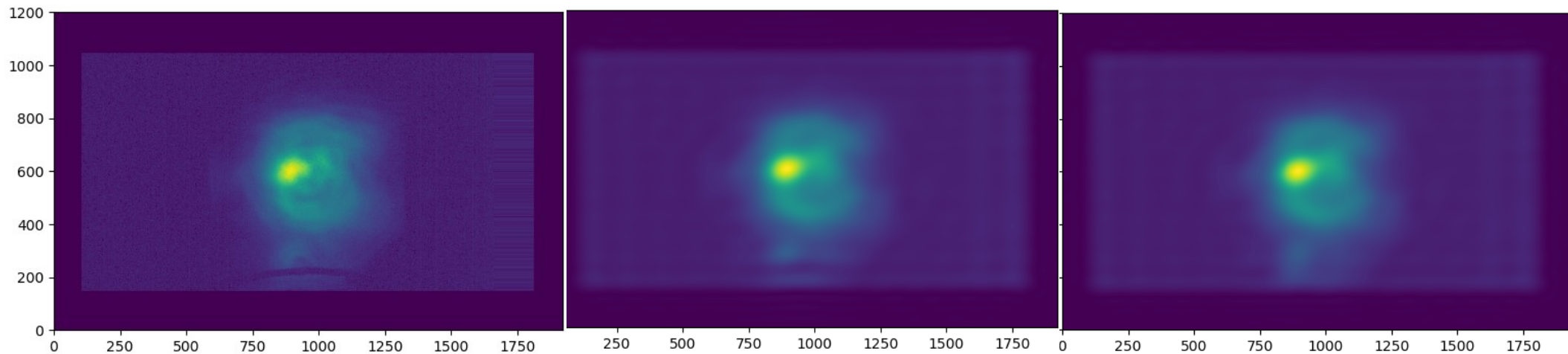
Before repaired
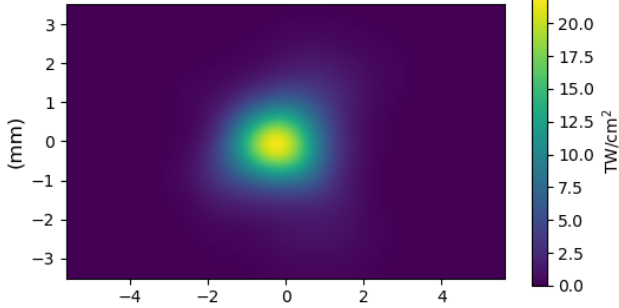Without lowpass

Before repaired
With lowpass

After repaired
With lowpass

Phase Reconstruction

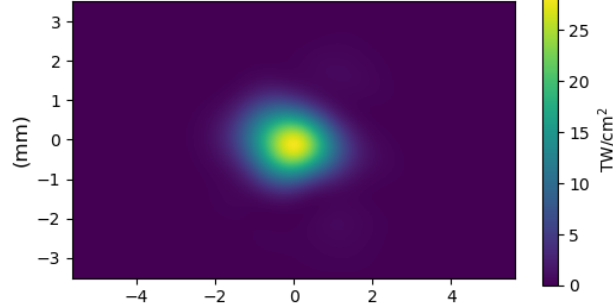- The algorithm using on last data is generally working. Only some minor adjustment was operated.

Errors