1. Global Shift = Beam Fluctuation?

2. Auto-Focus metrics

3. Reconstruction Issues

Global Shift = Beam Fluctuation?

Quick answer:

Global Shift = Beam Fluctuation?

Quick answer: **no!**

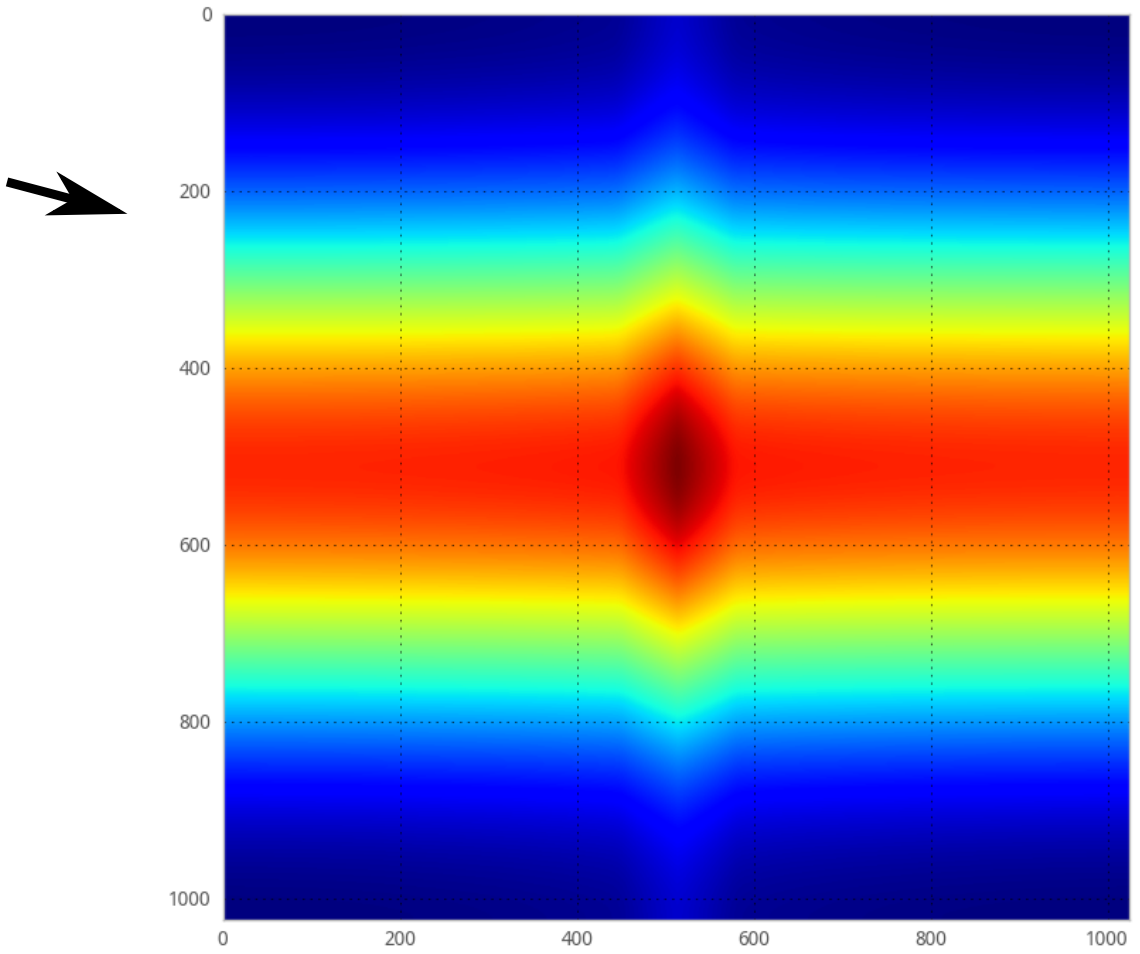
Flatfield with strong beam

extremely small vertical changes

huge area with clipped pixels

Applying Global Shift using Image Correlation

Convolution map with hotter colors being larger values

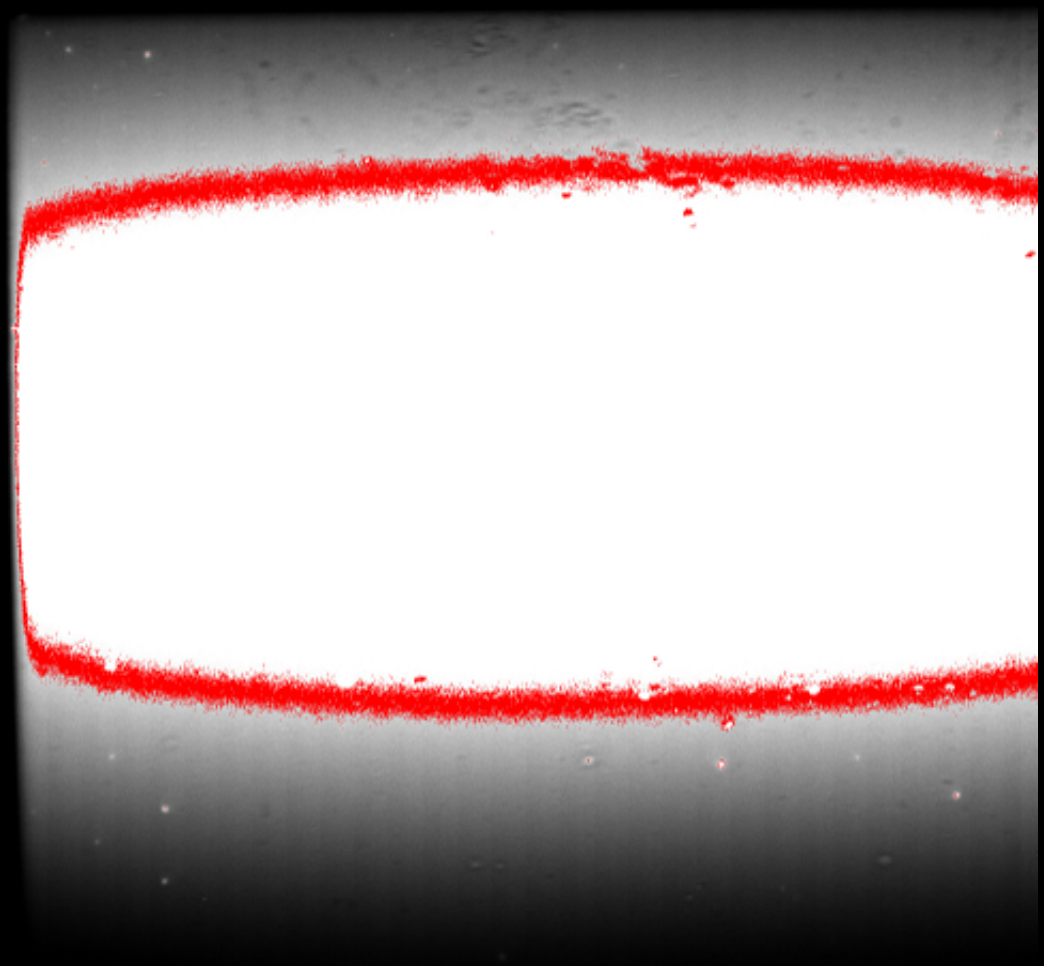


Notices vertical shifts **but**

- in both directions
- max shift is still at (0, 0)

A better approach

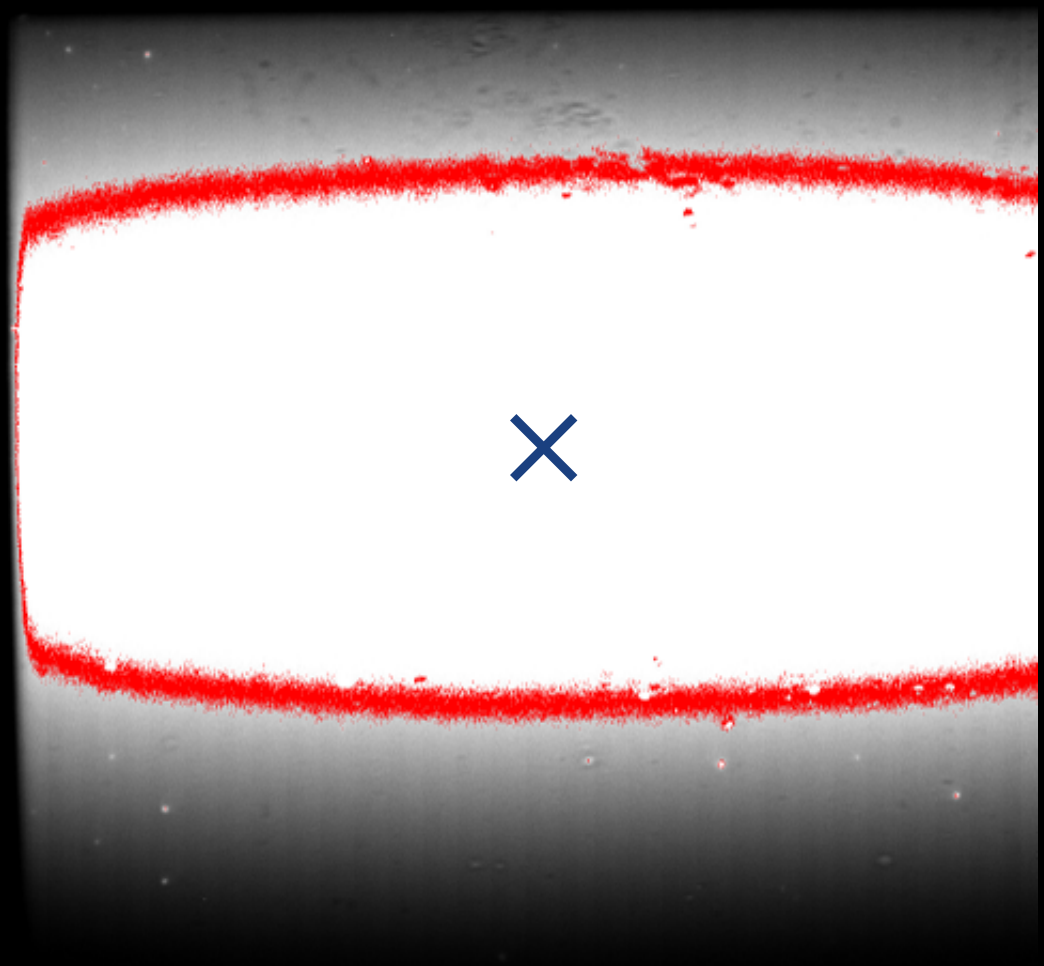
Calculate the edge of the beam using thresholds



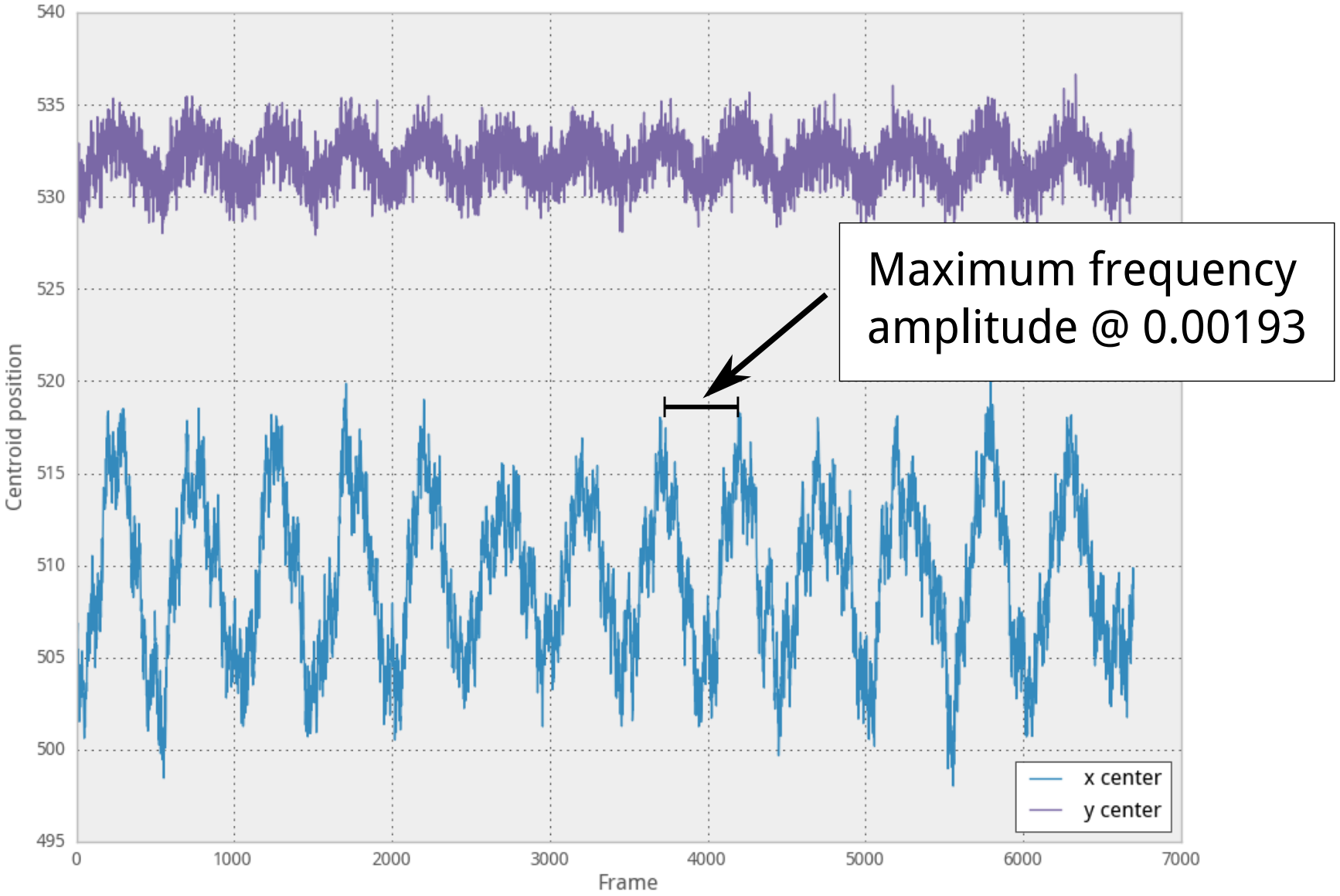
A better approach

Calculate the edge of the beam using thresholds

Determine the centroid of the edges



Results


Maximum frequency amplitude @ 0.00193
Centroid position
Frame
x center
y center
540
535
530
525
520
515
510
505
500
495
0
1000
2000
3000
4000
5000
6000
7000

Auto-Focus metrics

Motivation

How to determine the best focus position?

General solution

Calculate a metric that describes the „sharpness“ of an image region within certain quality ranges (unimodality, large peaks etc.), e.g.

- based on 1st and 2nd order derivatives
- based on thresholds
- based on image contrasts/variances

(see Groen et al.: „A Comparison of Different Focus Functions for Use in Autofocus Algorithms“)

Auto-Focus Results

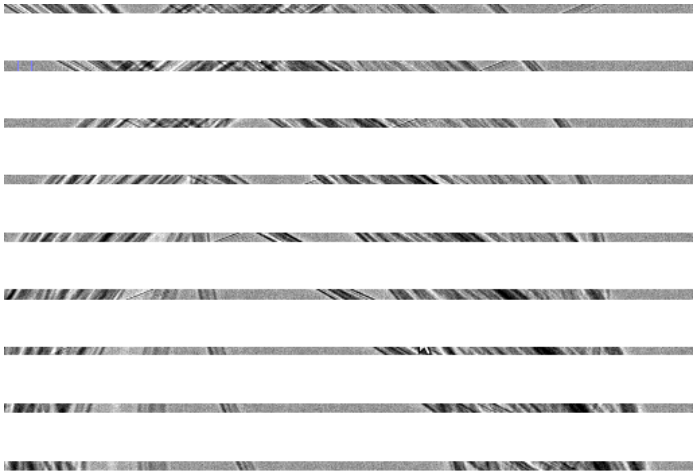
Groen came to the conclusion that for the **majority** of problems, **gradient**-based metrics are working good.

→ Quick feasibility demonstration

Reconstruction Issues

Non-continous data acquisition

- Fill missing angles with 0s



Unknown parameters, such as center of rotation c and angle speed ω

- Estimate c by eye and parameter sweep
- Estimate ω from known frames/s and estimated sinogram

Reconstruction

Nevertheless, we have at least **something**.