Group Meeting

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Update

- Bachelor's students, Felix and Bastian are finishing up their theses
- Felix has finished
- Bastian in last stages of editing before submission to Allen
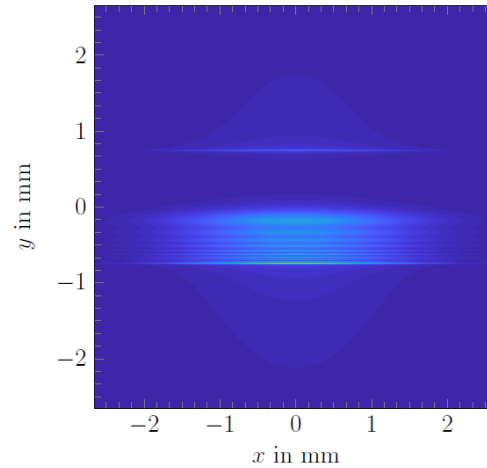
What were they doing?

- Both students studied schlieren signals
- Felix was assigned to do measurements at MPP on known targets and compare them to a numerical model:
  - Cylindrical Lenses
  - Glass capillaries
- Bastian was assigned to look at time delayed profiles of the Schlieren data at AWAKE
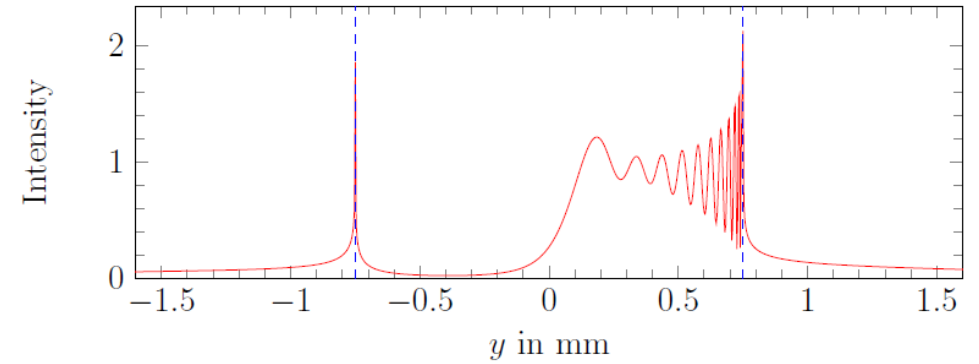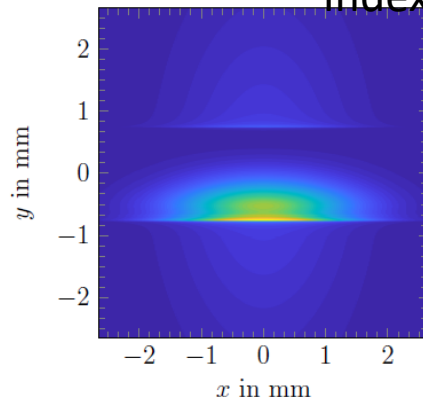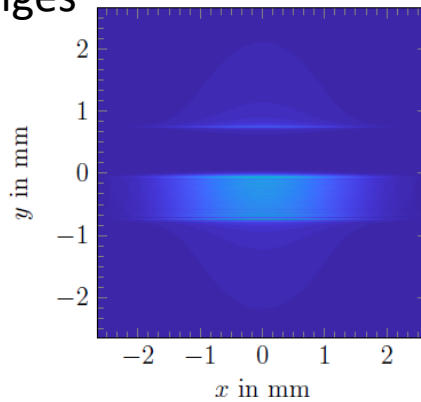
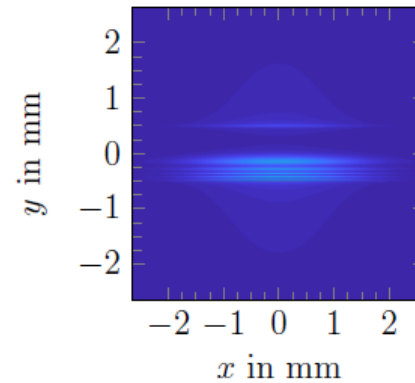# Felix Column Calculations

Hard Edged
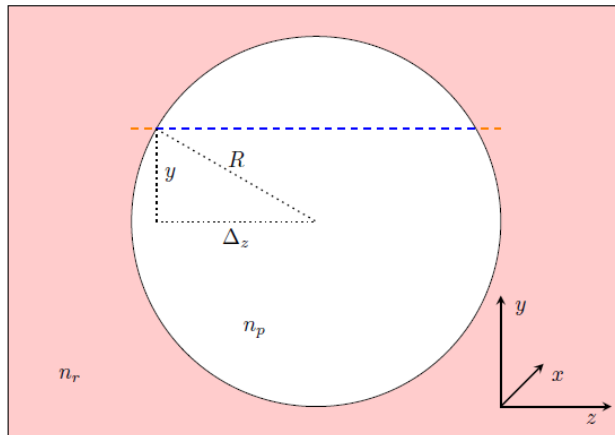
Typical

Lineout in y

Index Changes

(a) $n_r = 1.0006$

(b) $n_r = 1.06$

Radius Changes

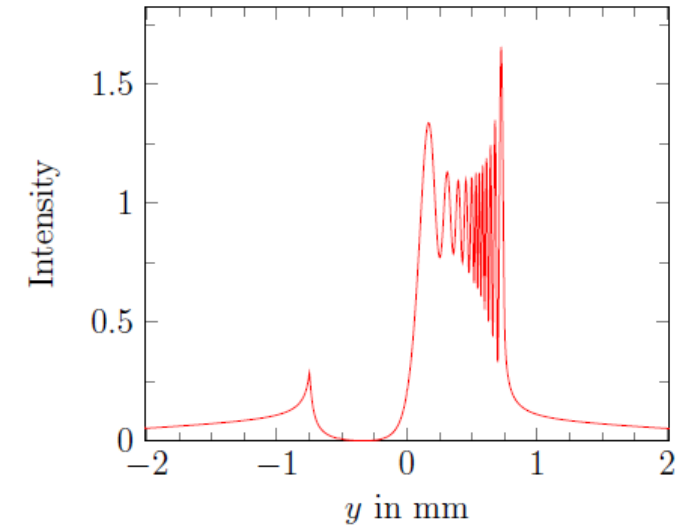(a) $R = 0.5\,\text{mm}$
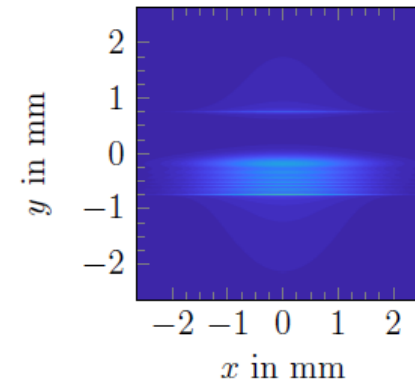
(b) $R = 0.75\,\text{mm}$
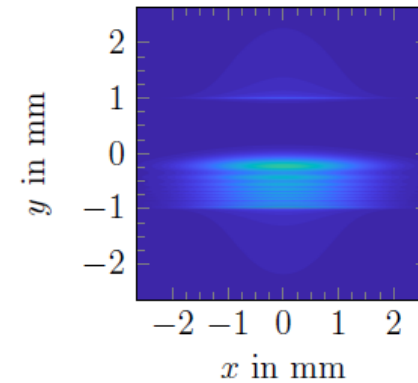
(c) $R = 1\,\text{mm}$

Fuzzy Edge
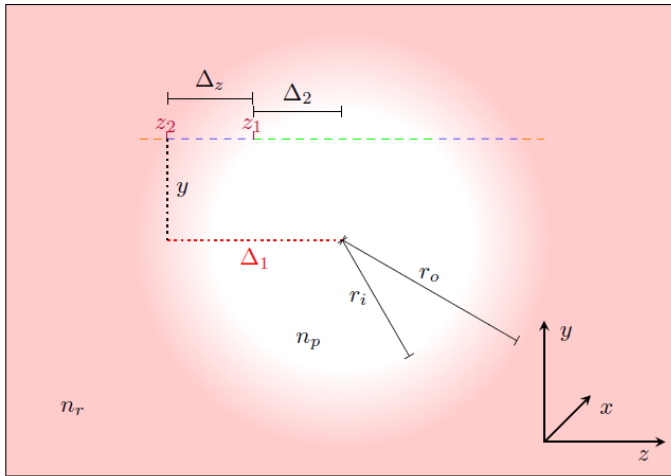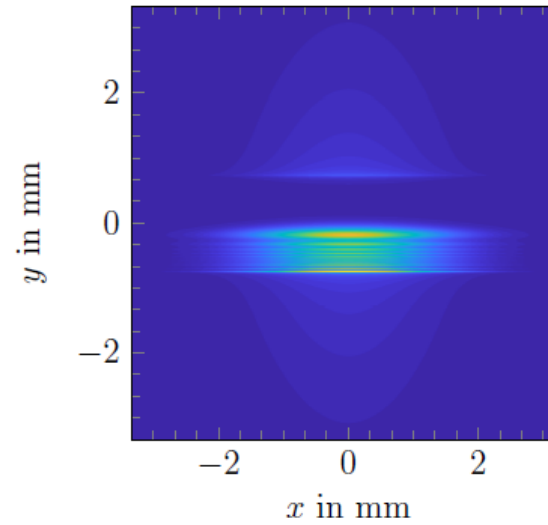

(a) Intensity distribution

(b) Lineout

- Diffraction peaks which are great indicators of the column width are significantly reduced
- Makes sense, this is like an apodizer in optics used to remove diffraction rings
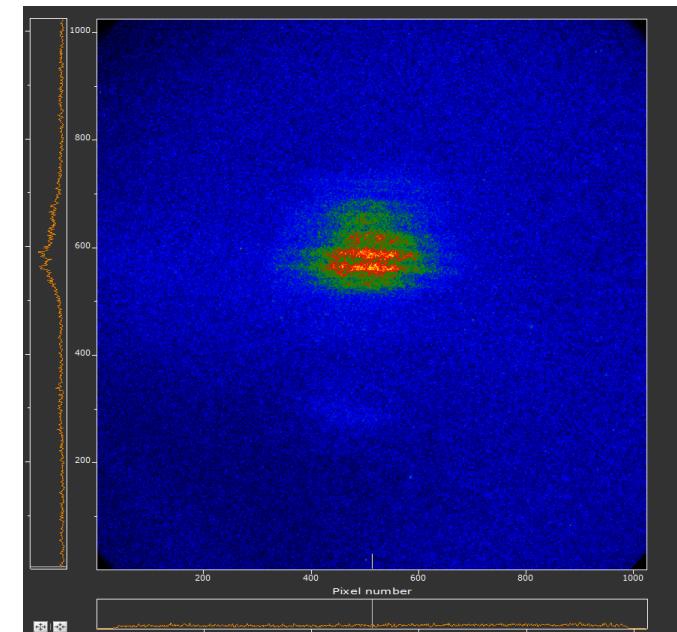
Bastian's Data

- Aperture limitations made us overfill the probe laser with the Schlieren

- We could only get nice signals at below 16 mJ but here we may have incomplete ionization

- At higher energies we have a lot of diffraction, this is likely an indicator of harder edges

"smooth signal"
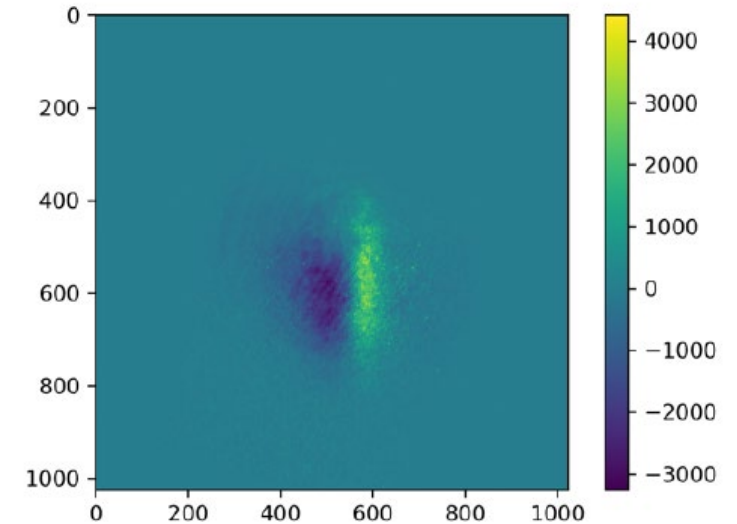
Diffracted Signal, raw image, rotated 90 degrees

110 mJ Overfill with diffraction

Some Conclusions

- We always will have some sort of diffraction appearing even if we are in the imagine plane with schlieren

- This diffraction is a combination of the index change at the object and the razor blade

- It can be a decent 'edge' indicator IF we can see it.

- The diffraction can also be an indicator of whether we have a hard edge or a soft edge.

- Width of schlieren signal is still a indicator of relative size, but difficult to get absolute measurement. Need to be careful of diffraction