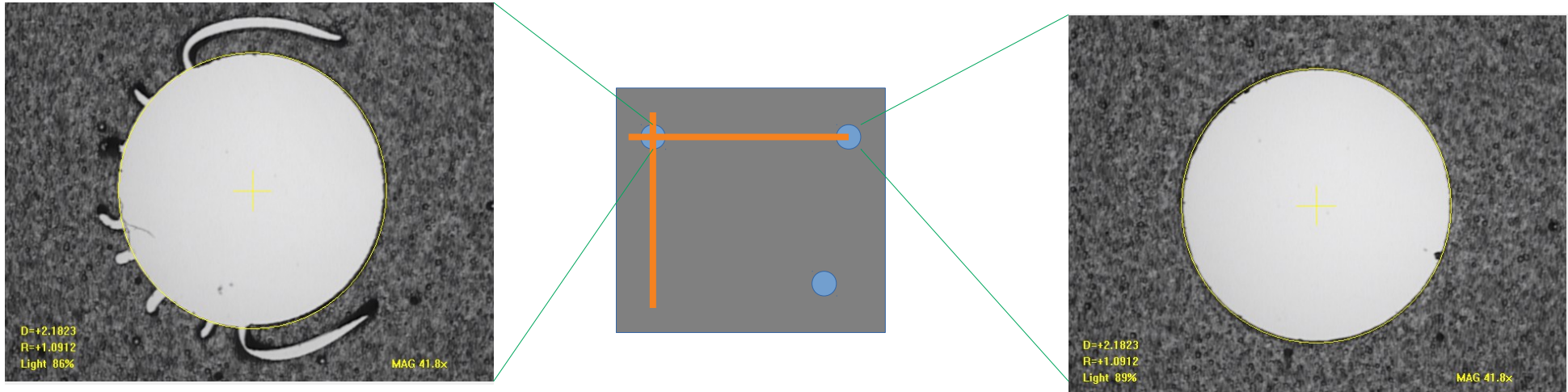# Stack Imaging update

7th Feb 2020
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Contents

- Alignment in the stack

  - Datum defined via alignment holes

- Imaging of rotational channels

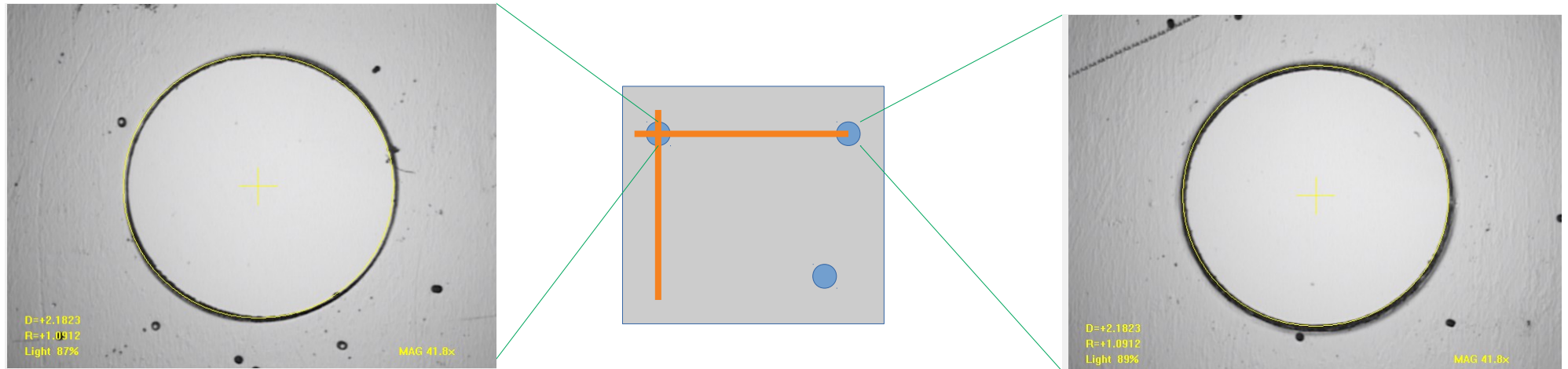- Automatic ID of etch-pits in clean foils

Foil Alignment

- Define coordinate system within stack via alignment holes
  - Want approx position of track to be consistent for all foils

  - Inverse coordinate system for reverse imaging of foil

- Automate scanning in X,Y;
  Eg, 4mm x 3mm strides
  At each location get a set of
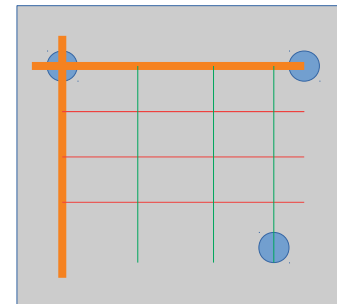 'matching' images for each foil
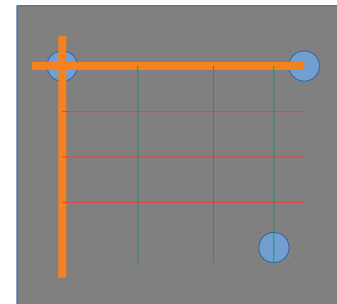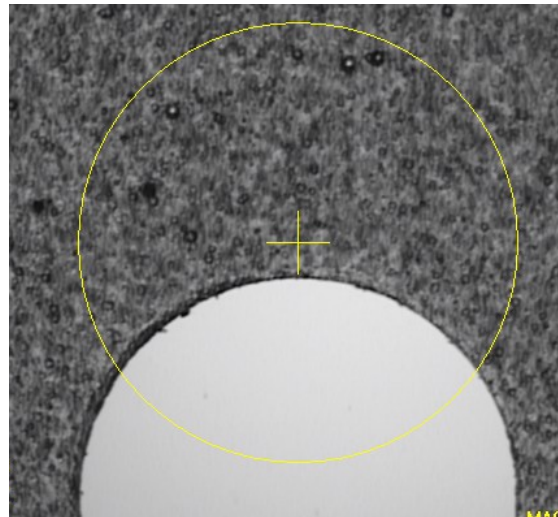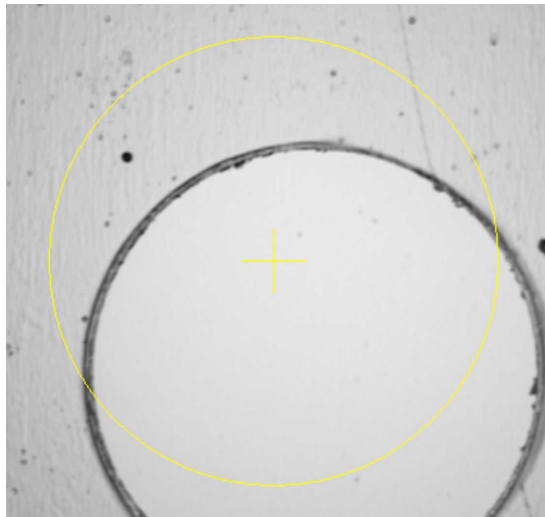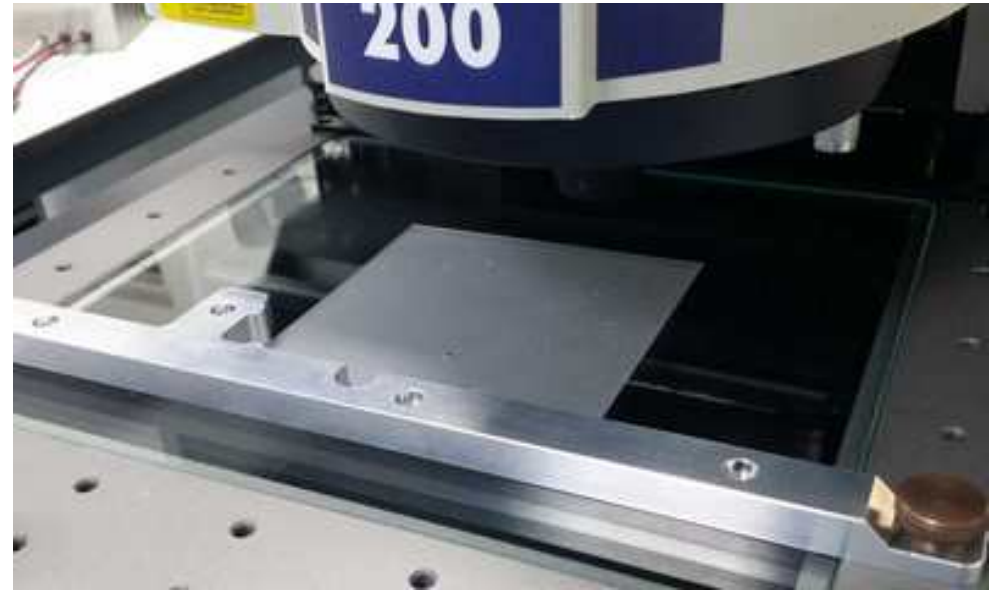
Foil Alignment

- Define coordinate system within stack via alignment holes
  - Want approx position of track to be consistent for all foils
  - Inverse coordinate system for reverse imaging of foil
- Automate scanning in X,Y;
  Eg, 4mm x 3mm strides
  At each location get a set of
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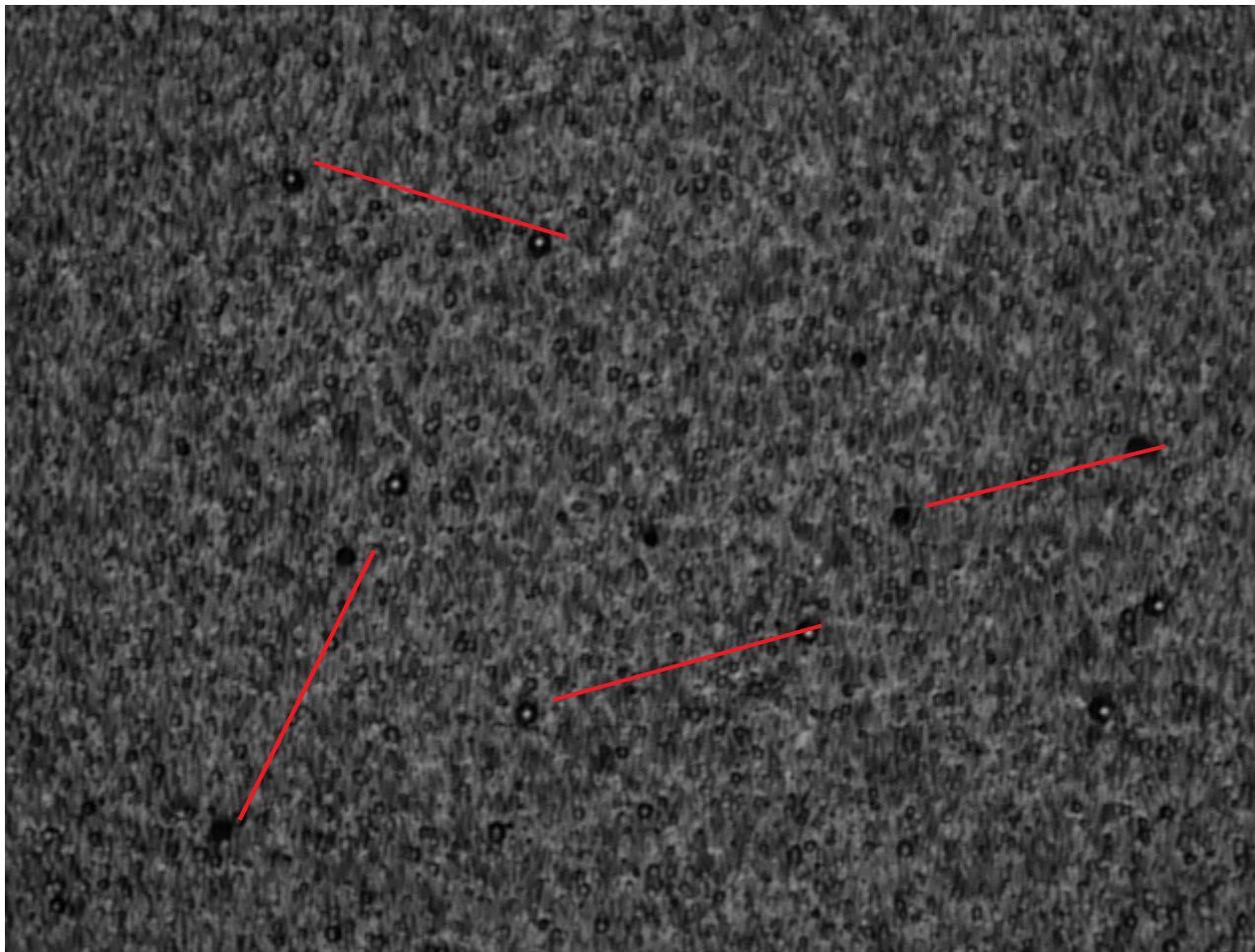
Alignment Errors

- Approx alignment via Jig

- Error alligning circle due to width of hole edge ~ 1 pit

- Rotation constraint
  ~ 1pit / 57mm axis ~ 0

- Orientation of image FOV Uncorrectable ~0.5mm/57mm
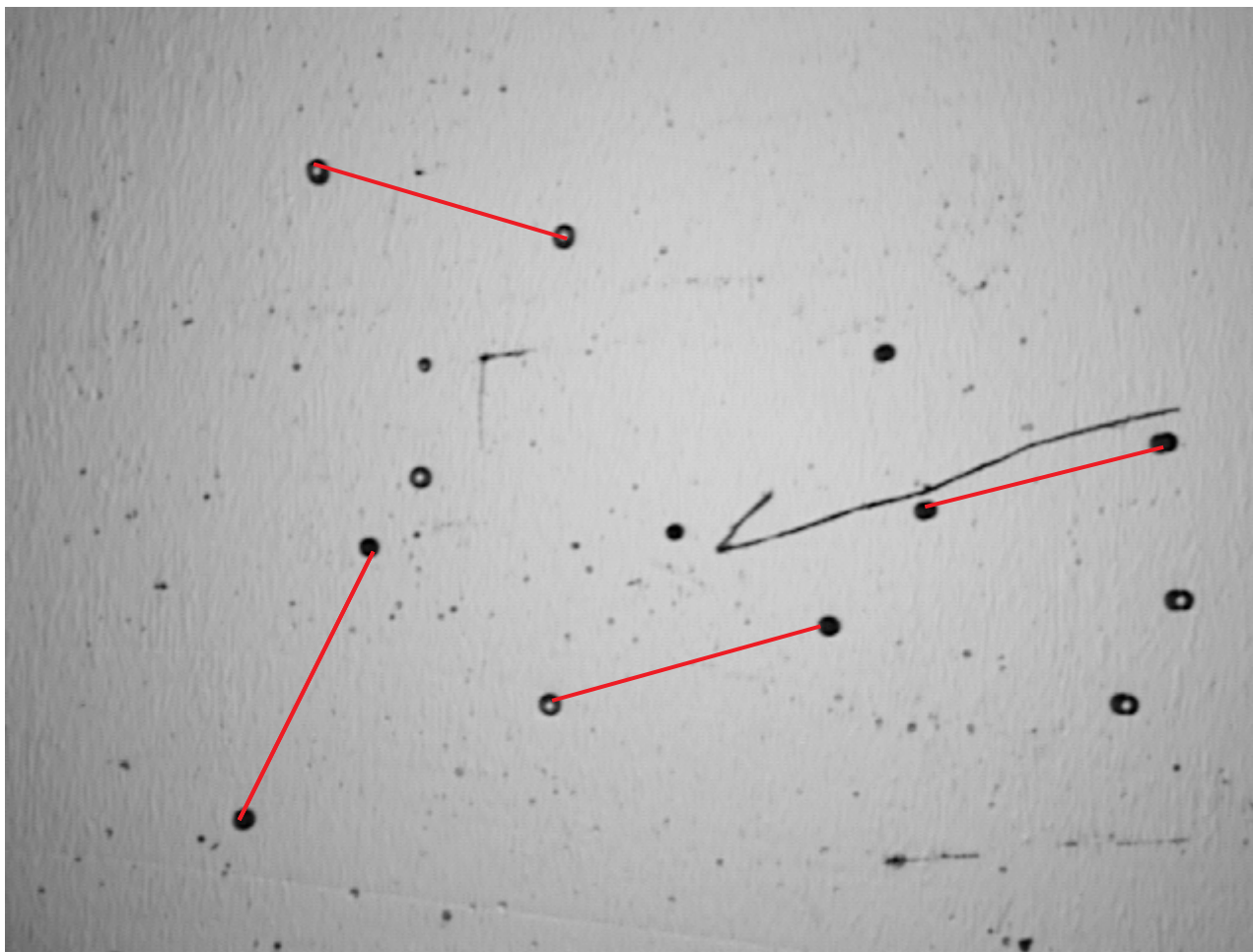 1 or 2 pixel shift, negligble
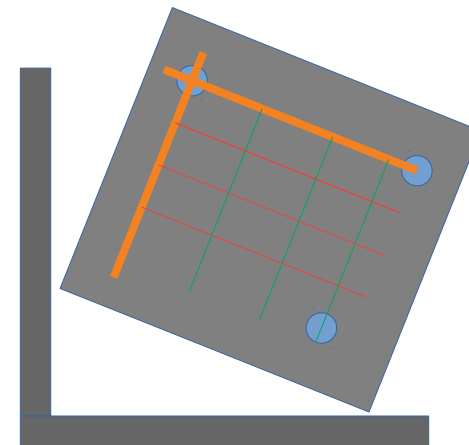
Eg, In practice

1st foil – Midway position – Pb + LHC

Lines added shows position orientation of some pits

Eg, In practice

2nd foil – Midway position - Pb only

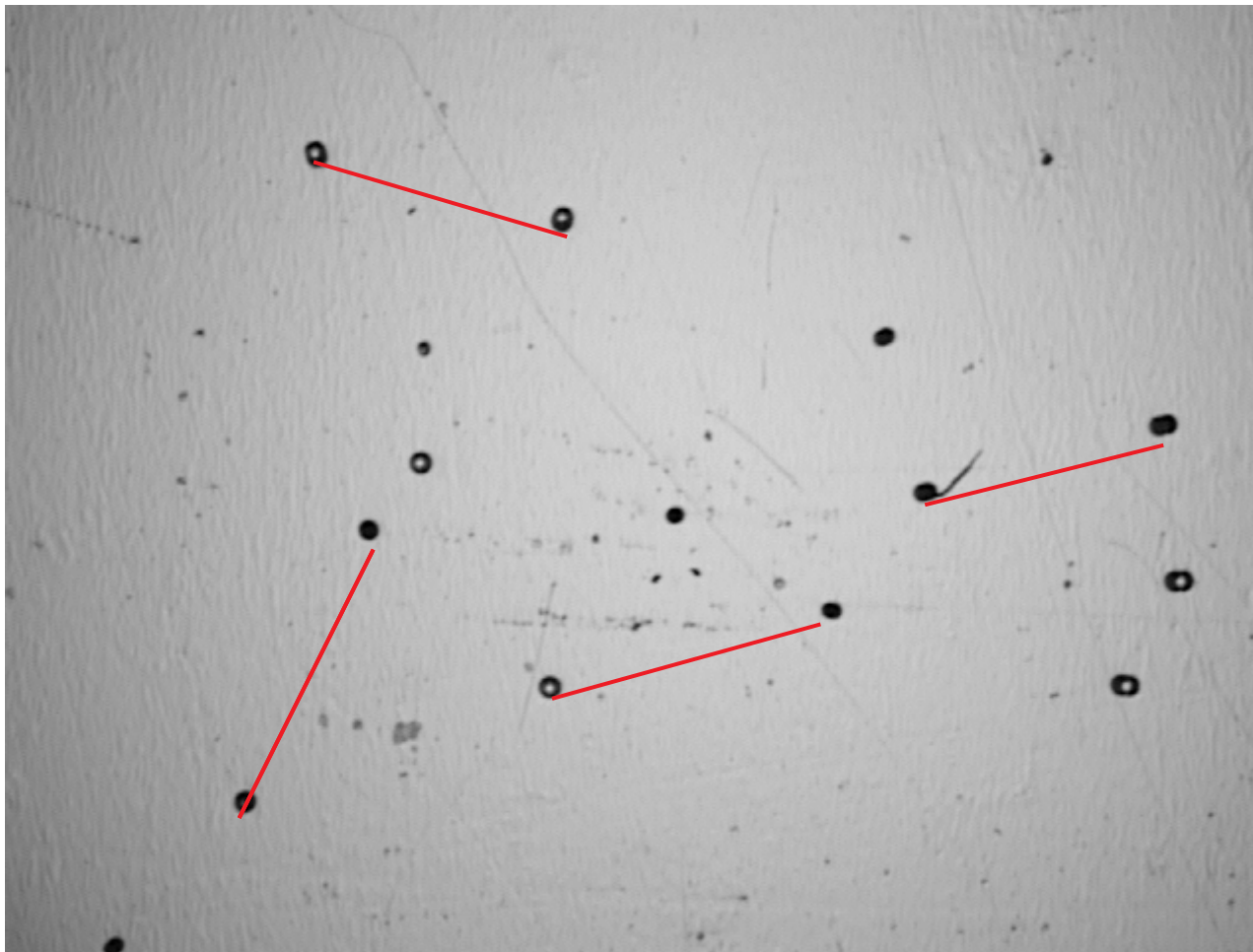

Lines added shows position orientation of some pits

Shift due to;
Track Ө angle
        +
Alignment Error

Both of order
    ~ 1 pit

Eg, In practice

Last foil – Midway position - Pb only

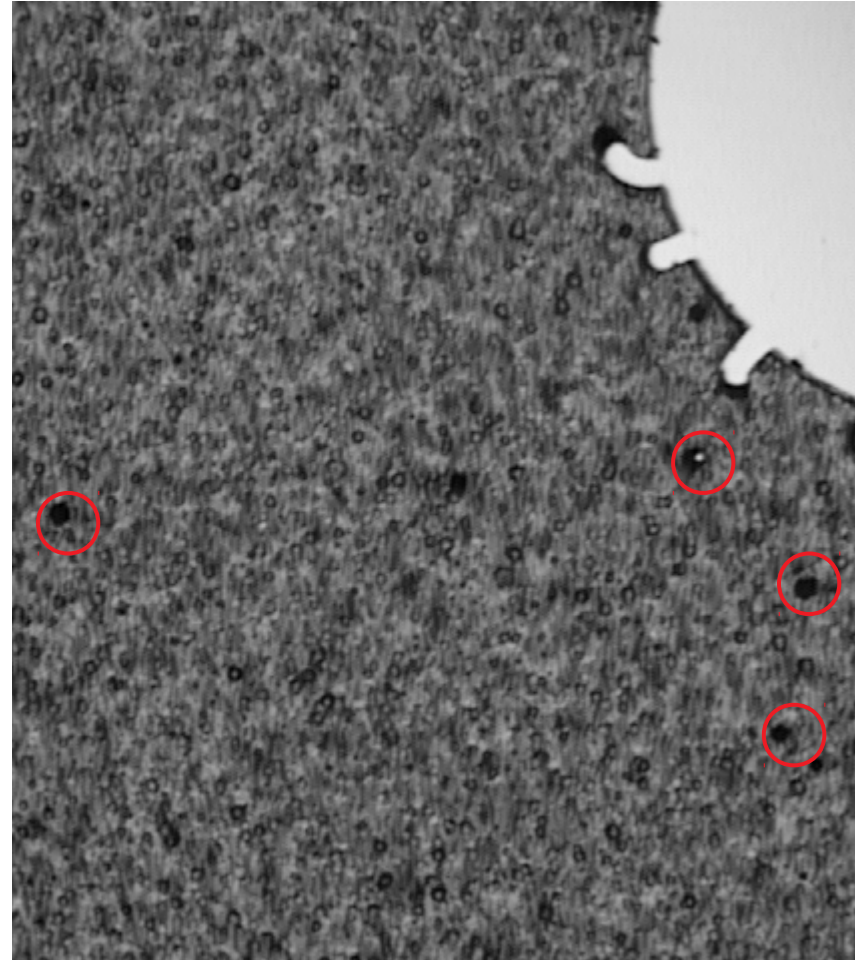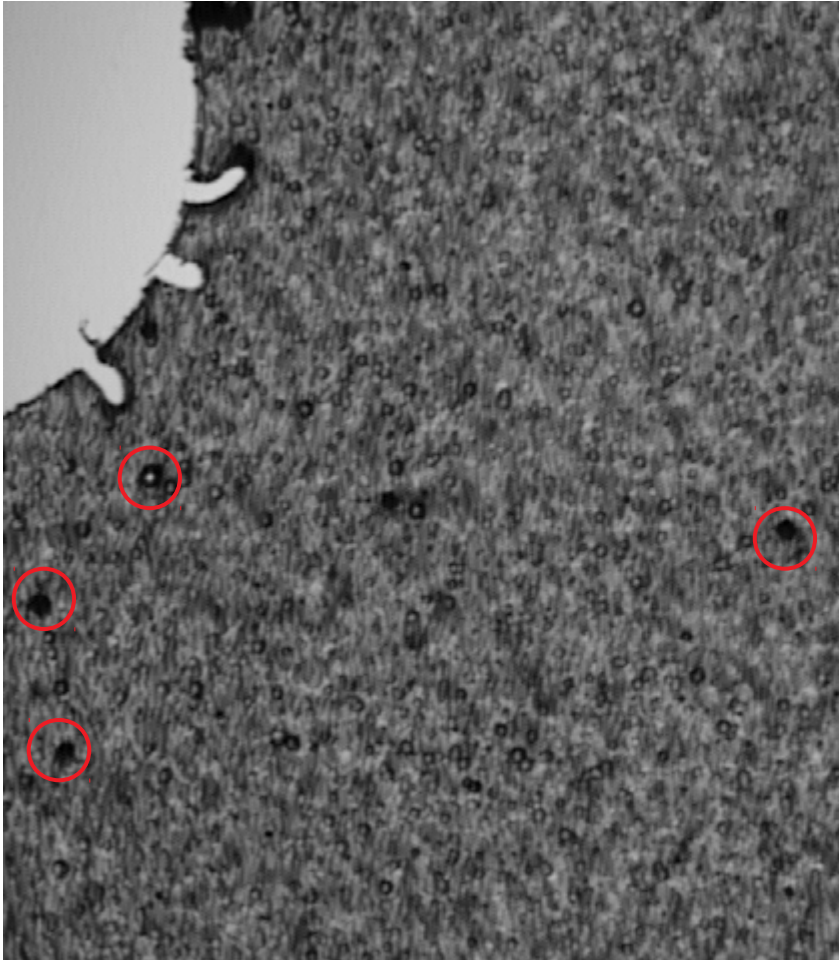Lines added shows position orientation of some pits

Shift due to;
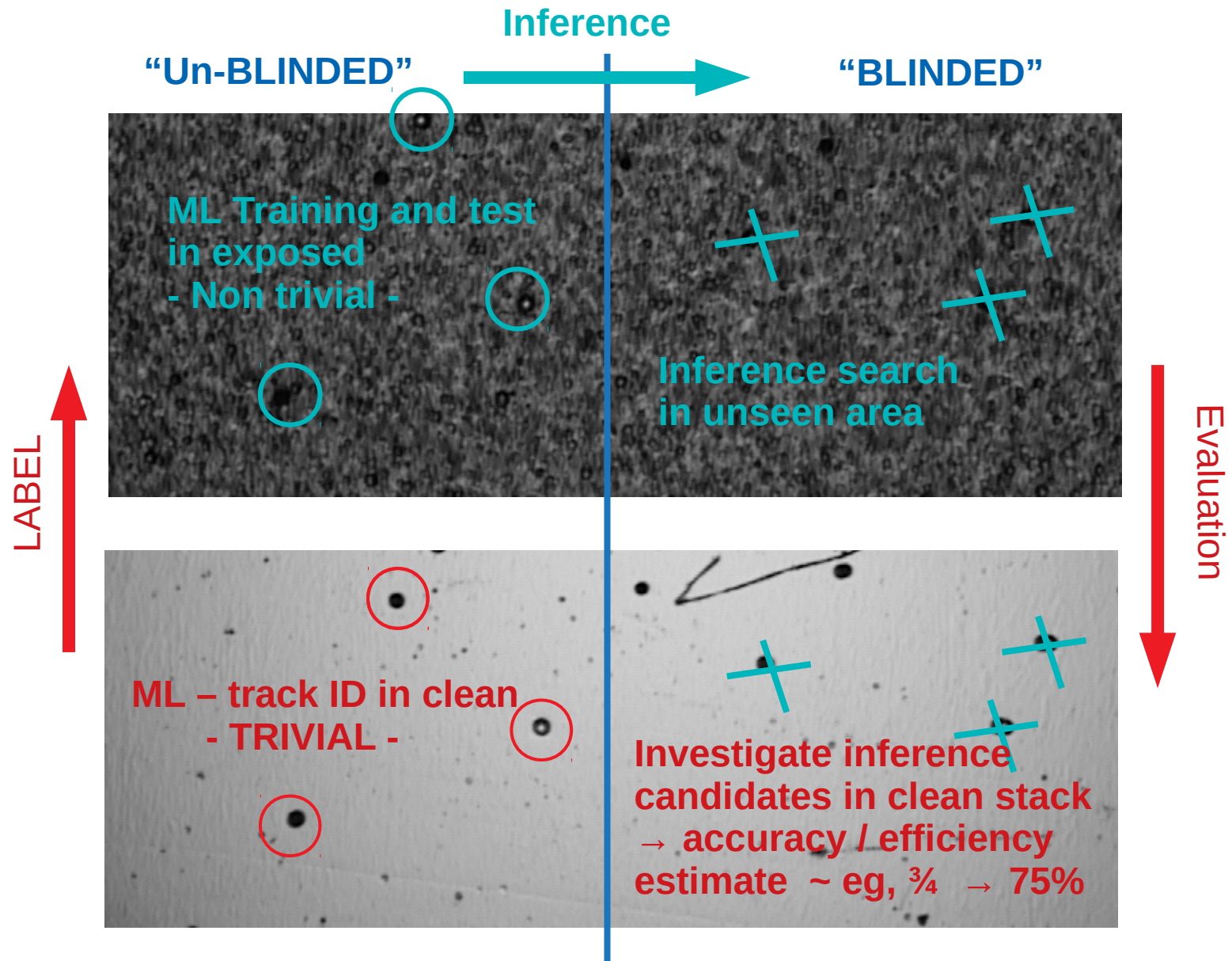Track Ө angle
+
Alignment Error

Both of order
~ 1 pit

Implication;
Clean tracks can accurately locate 'dirty' pits

Implication; 'Clean' tracks can accurately locate 'Dirty' pits + Vice Versa!
Also both sides of foil can be 'viewed' side by side

Foil vs foil reverse

Reminder

Inference

"Un-BLINDED" → **"BLINDED"**

LABEL

Evaluation

ML Training and test
in exposed
- Non trivial -

Inference search
in unseen area

ML – track ID in clean
- TRIVIAL -

Investigate inference
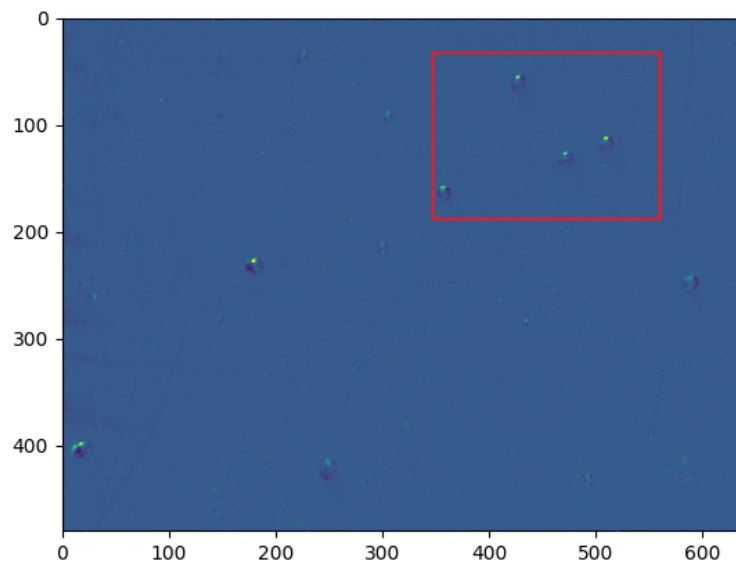candidates in clean stack
→ accuracy / efficiency
estimate ~ eg, ¾ → 75%

Rotational imaging

- Old image processing applied to Pb Stack

- Xe Foil rotational illumination used small backlighting element to suppress noise too. This wasnt used here

- Thus 2 pits on the left look faint
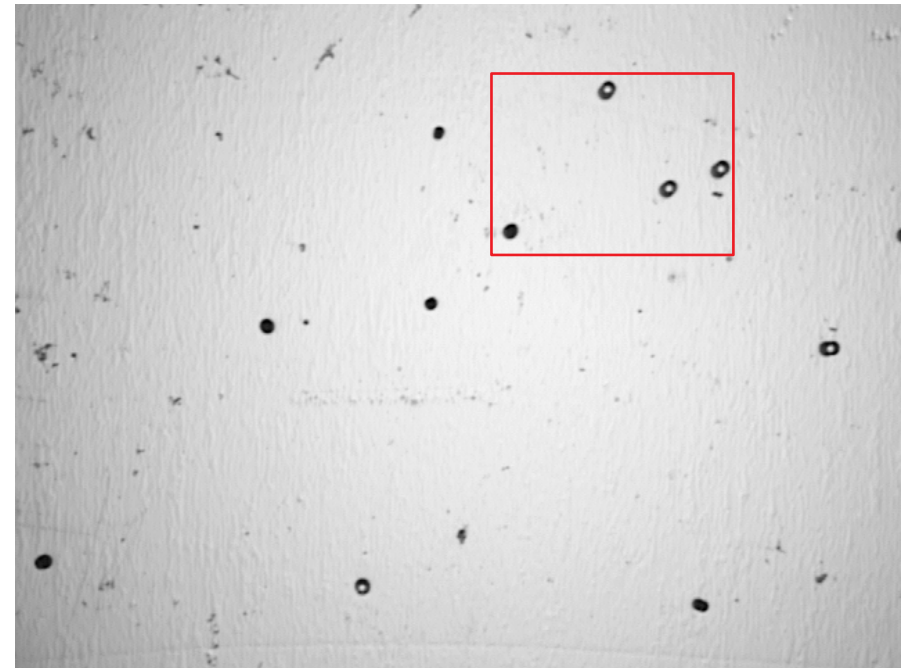
Rotational imaging

- Higher exposure → different opacity → Re-Tweak illumination

- CNN may still spot what we cant, but useful to give it a head-start
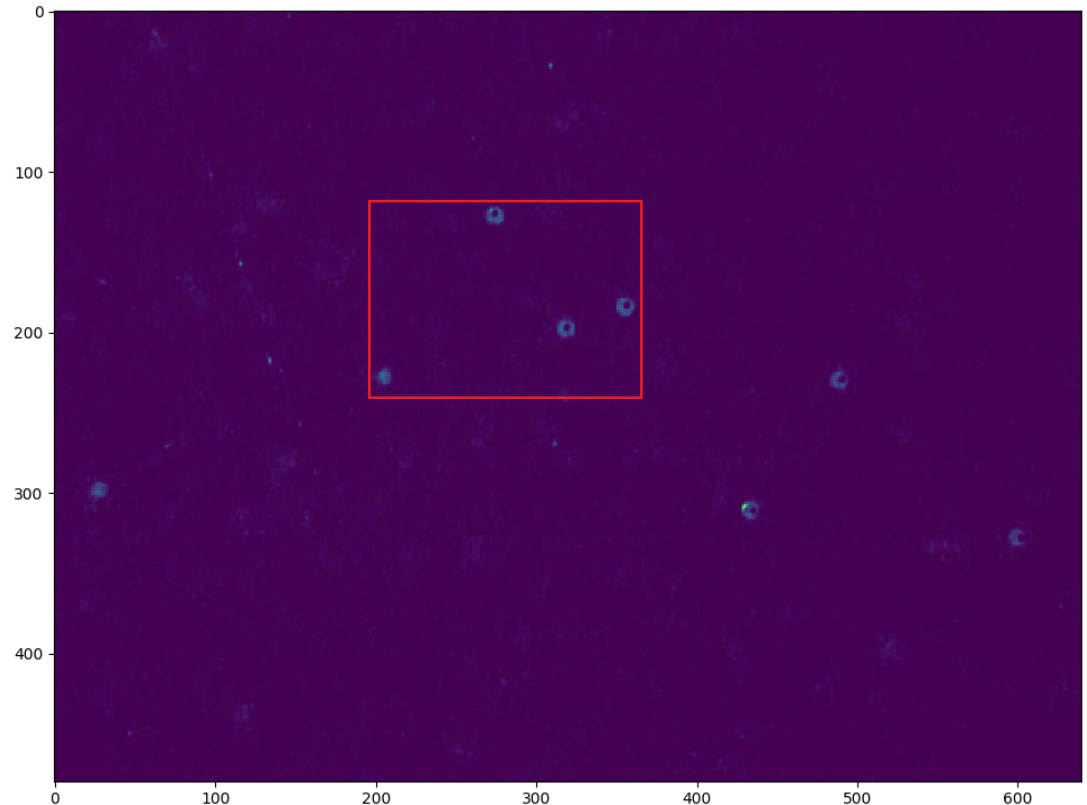
- Old local smoothing doent help
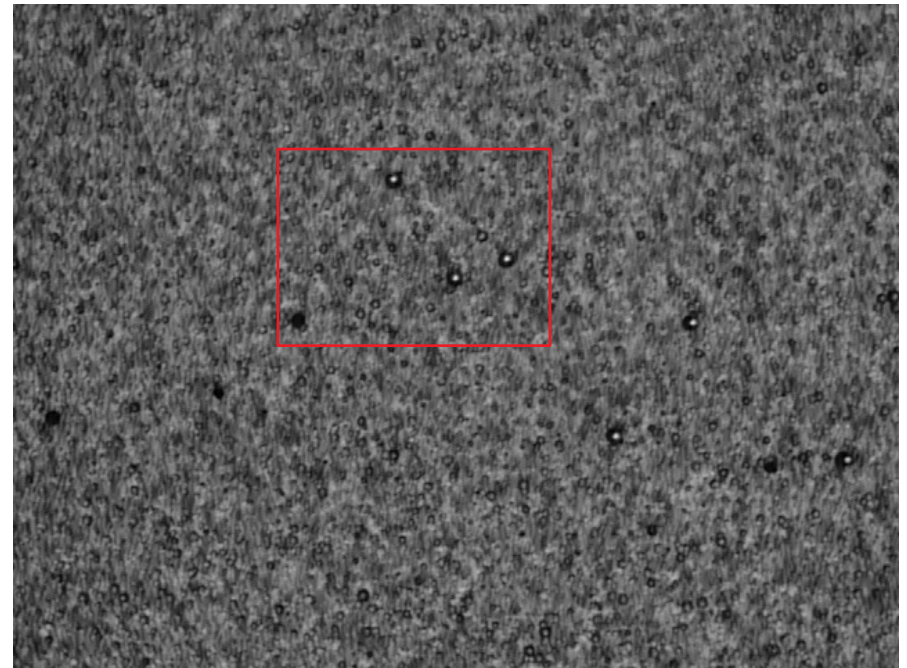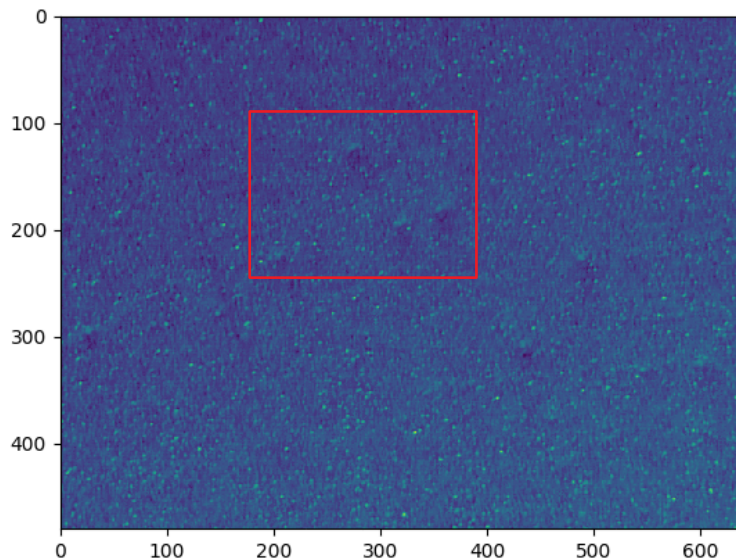
Issue isn't the visibility of the pits in red (trivial), is the visibility of the two pits to the LEFT that we know from the stack exists

Note: Coordinates not aligned in these images

Image processing

- Find new filters + illumination for Pb stack
  - Right time t try is now -

- Eg, Image is from 'dirty' foil. Through-going etch pits show up clearly v no bkg

- Clear enough to possible estimate size

- - VE's (2 pits on left dont show up, though as earlier prob due to weak ionisation and poor illumination)

Backup