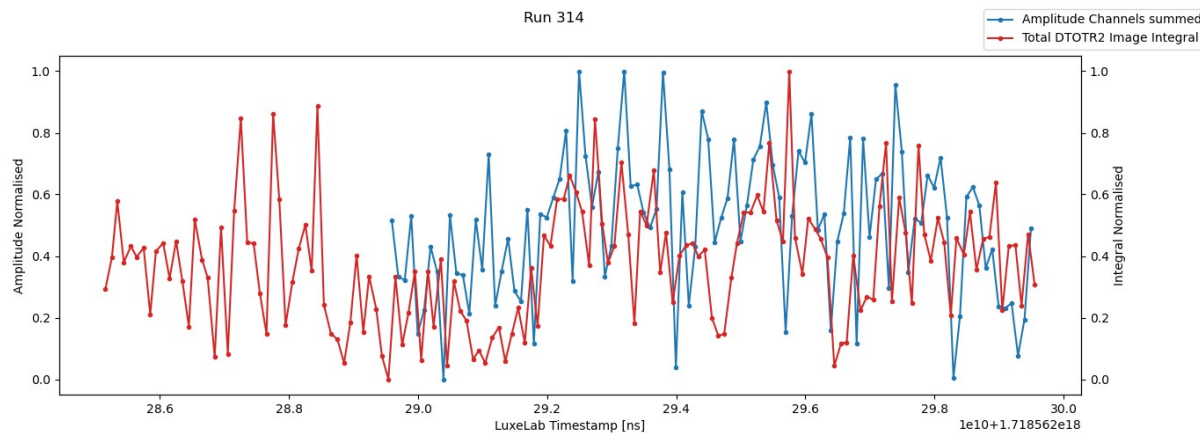
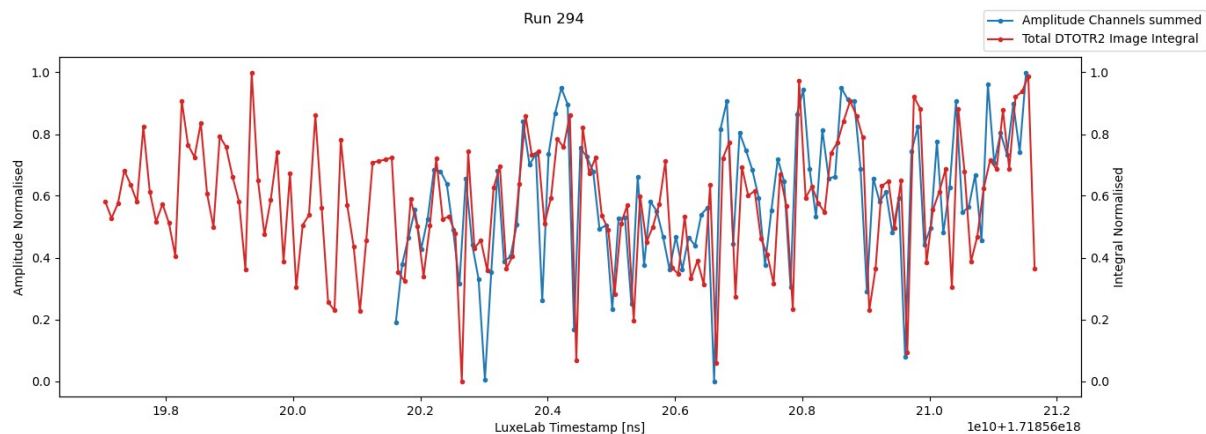


LUXE320 Time Synchronisation

Time sync between EPICS and Digitizer DAQ

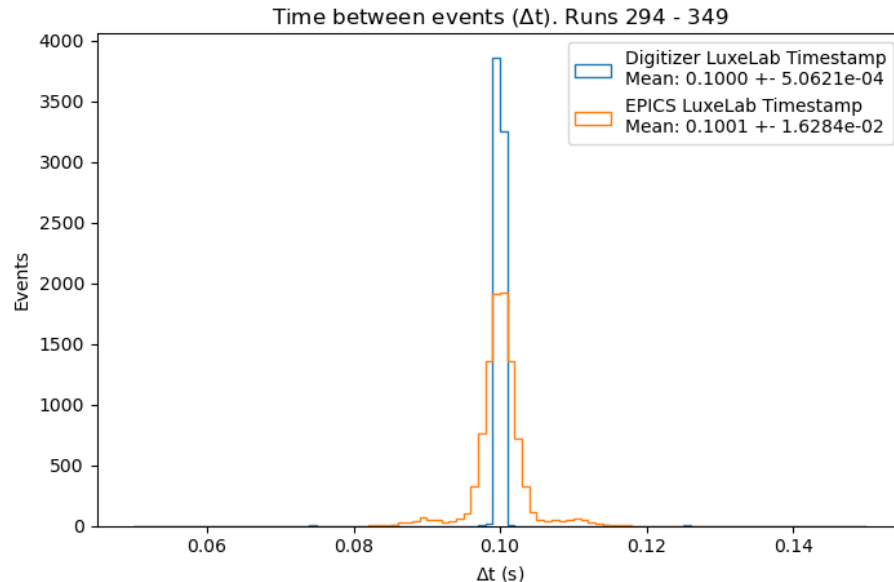
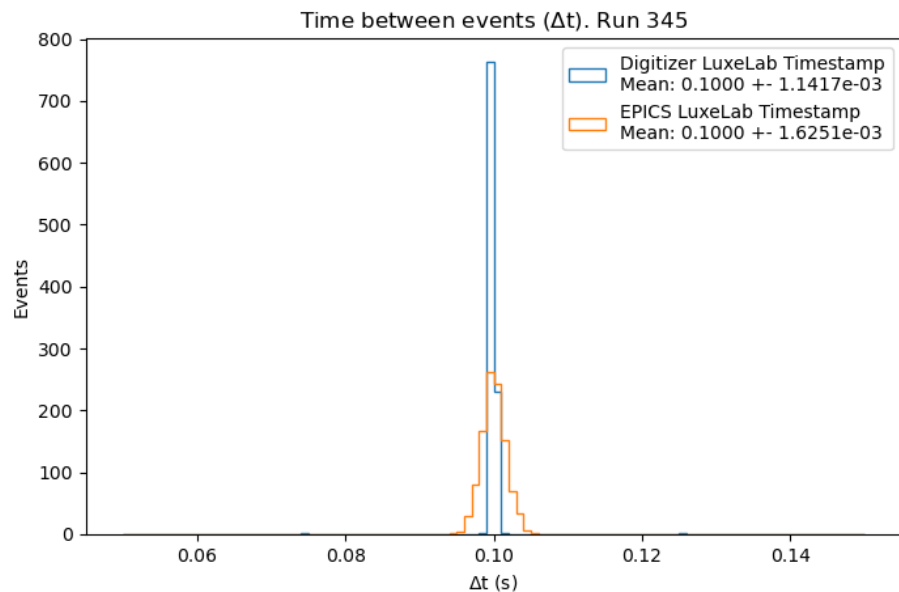
Time synchronisation

- Weak correlation between:
 - DTOTR2 image integral
 - Sum of straw amplitudes
- But depends on run
- No success



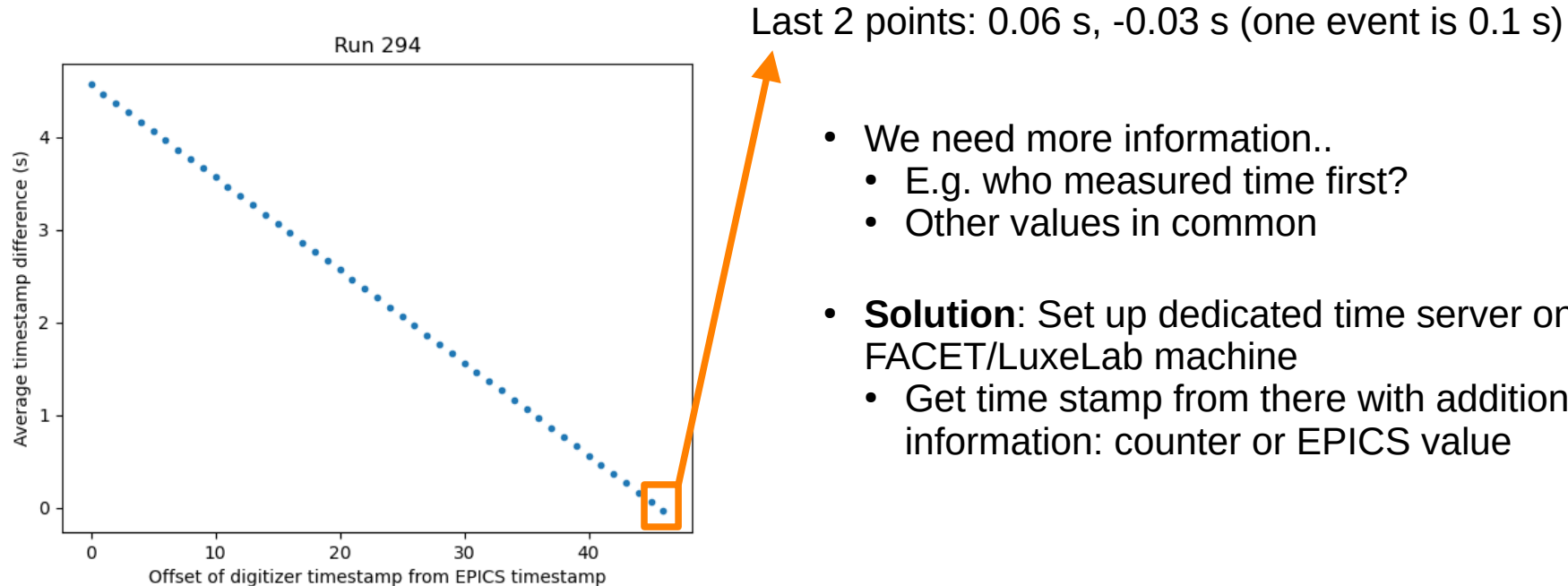
Time synchronisation

- Only considering LuxeLab timestamps here
- The events are:
 - From the same machine
 - Equally spaced
- We can find the offset where the digitizer and EPICS “LuxeLab timestamps” are the closest to each other



Time synchronisation

- No. of EPICS events > No. of digitizer events
- Move the digitizer events to minimise the difference in time stamp
- Synchronisation only works if both end on the same event, otherwise 2 possibilities

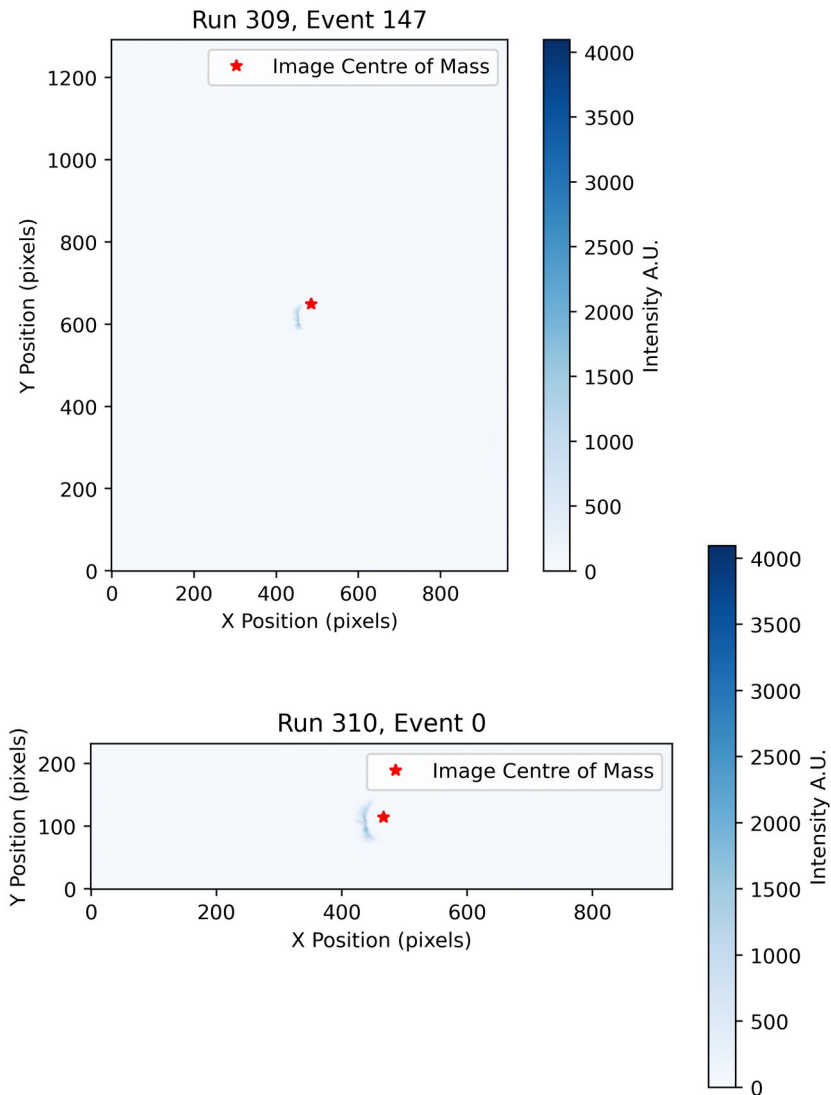


- We need more information..
 - E.g. who measured time first?
 - Other values in common
- **Solution:** Set up dedicated time server on FACET/LuxeLab machine
 - Get time stamp from there with additional information: counter or EPICS value

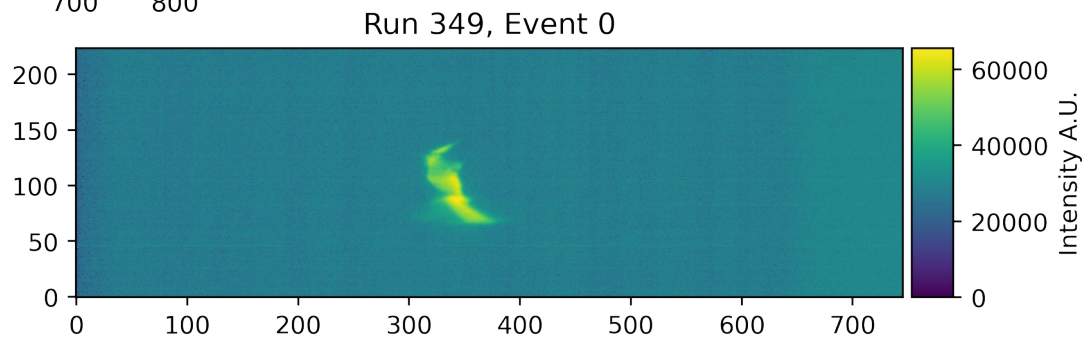
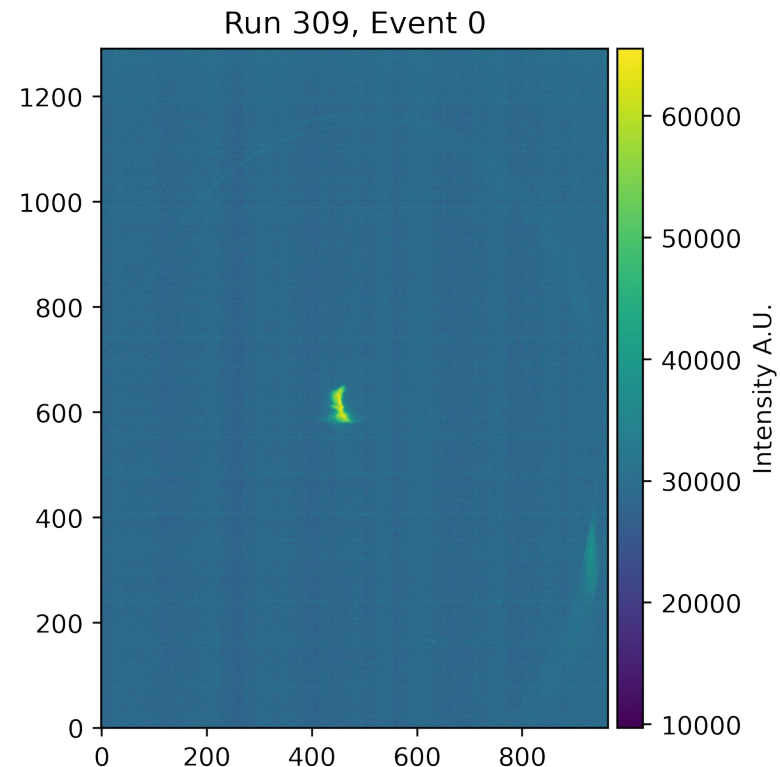
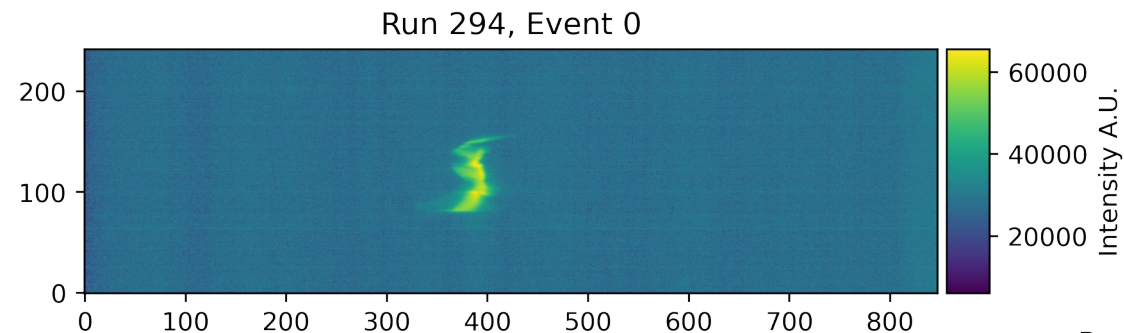
DTOTR2 Image Analysis

Analysis Calibration Data

- We want to compare straw data between runs
 - Need beam data
 - Problem is that ROI for DTOTR2 images changes between runs
 - This offset of images unknown
 - Can get it via EPICS next time
- There seems to be a possibility to still make it work

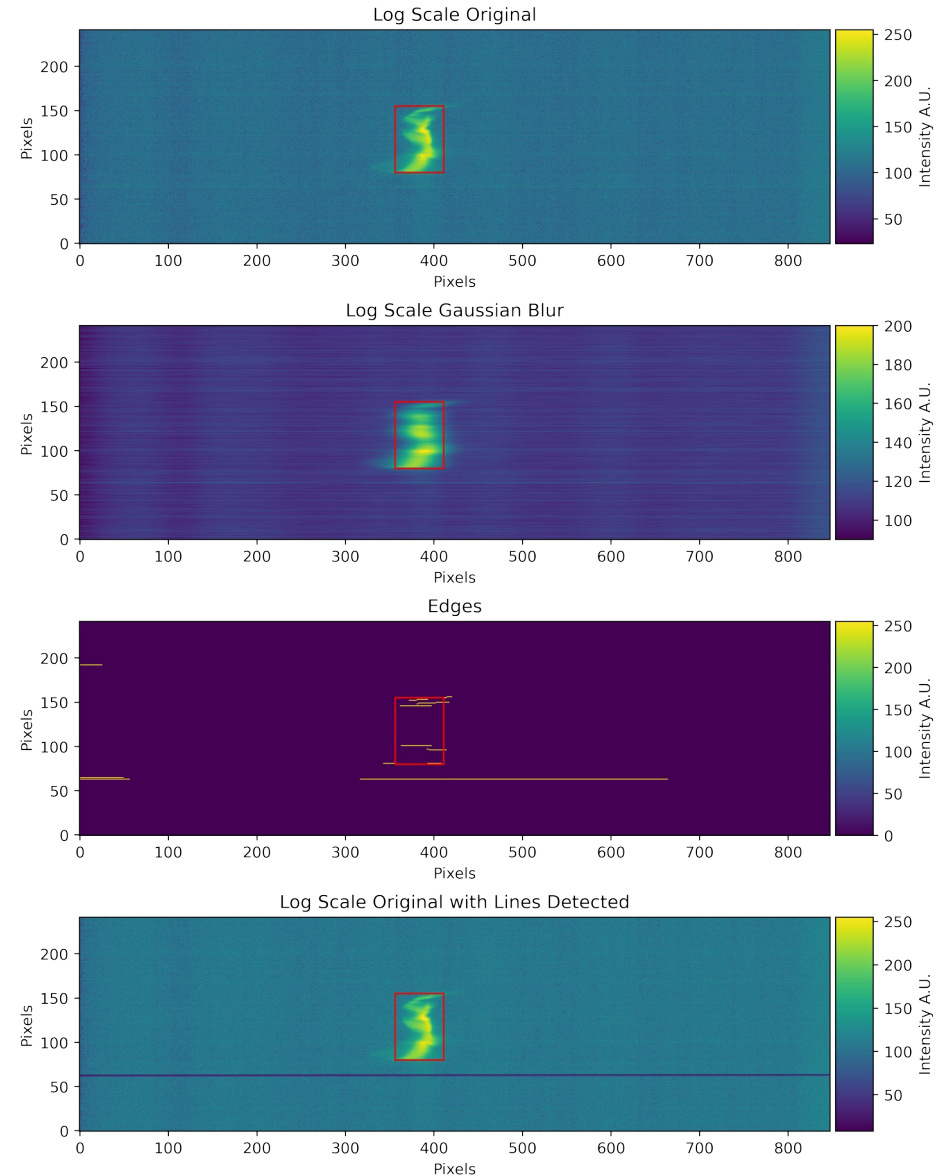


- We can see background lines at log scale
- They look constant across multiple events and runs
- Can use this to roughly find offset of ROI to full image



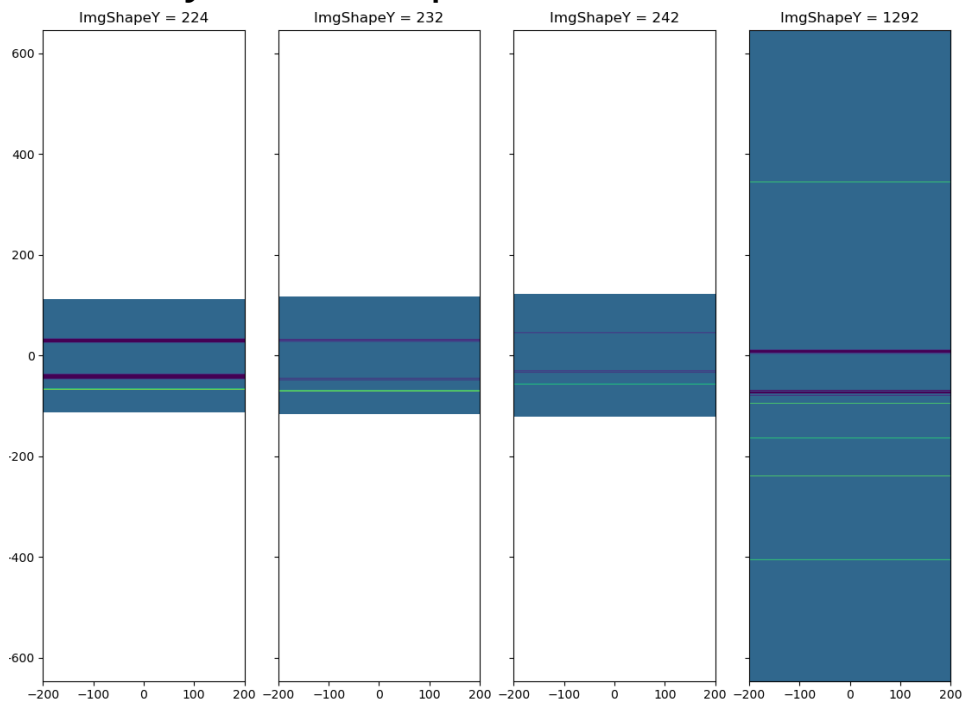
To quantify these lines I used the following process:

- 1) Take log of image values
- 2) Apply Gaussian blur in vertical/horizontal direction
- 3) Find lines through built in OpenCV functions using Hough transform algorithm for line detection
- 4) Find 'real' lines per run:
 - Requiring that the lines need to exist in at least $x\%^*$ of the images where lines have been detected. (* 40% for vertical lines, 60% for horizontal lines)



- Image sizes in runs: 224x746, 232x928, 242x848, 1292x964
- Purple lines: bounding box values for beam spot
- Yellow/Green lines: Background lines found

Horizontal lines found per image Y size
Beam y-size: ~75 pixels



Vertical lines found per image X size

