

# Analysis meeting #1

BPMs, Halos and electron bunches

In October/April reproducibility was relatively low => checked electron BPMS for variations that hint towards charge capture or not; i.e. do we have an accelerated beam on the spectrometer?

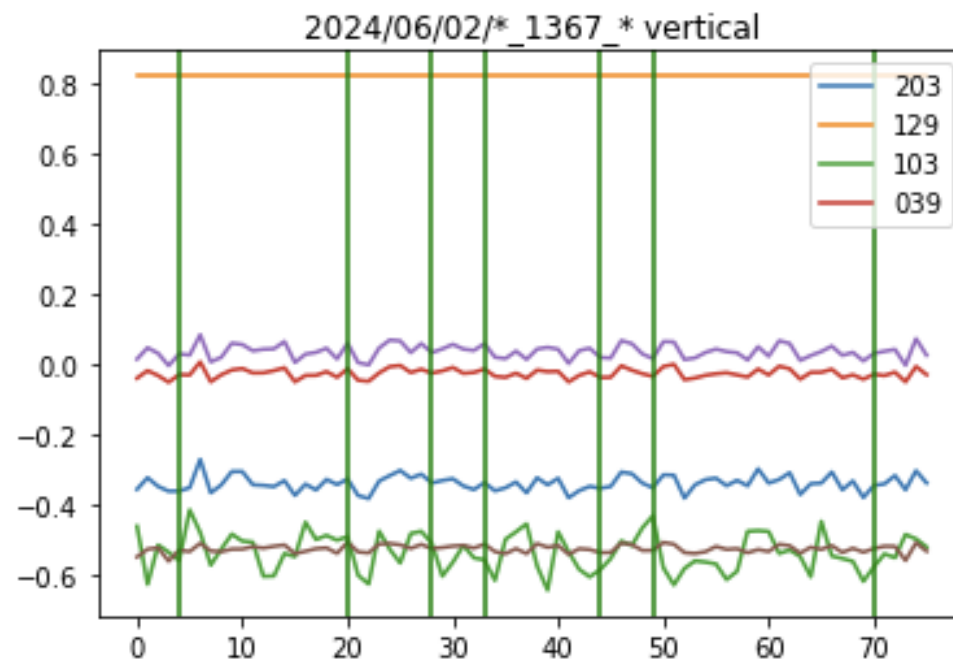
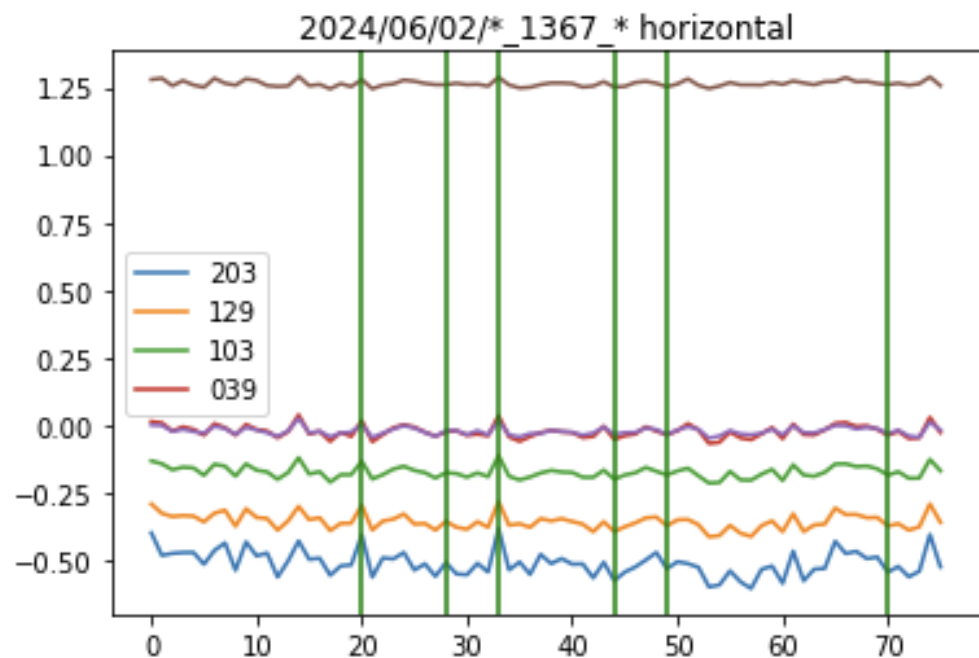
Looked at and compared:

- consecutive shots where we had an accelerated beam (variation within): BPMS//Halos//Laser energy//proton bunch intensity
- consecutive shots where we did not have an accelerated beam (variation within): BPMS//Halos//Laser energy//proton bunch intensity
- potential drifts during the day of data taking, delay stage movement and/or Modulator fault

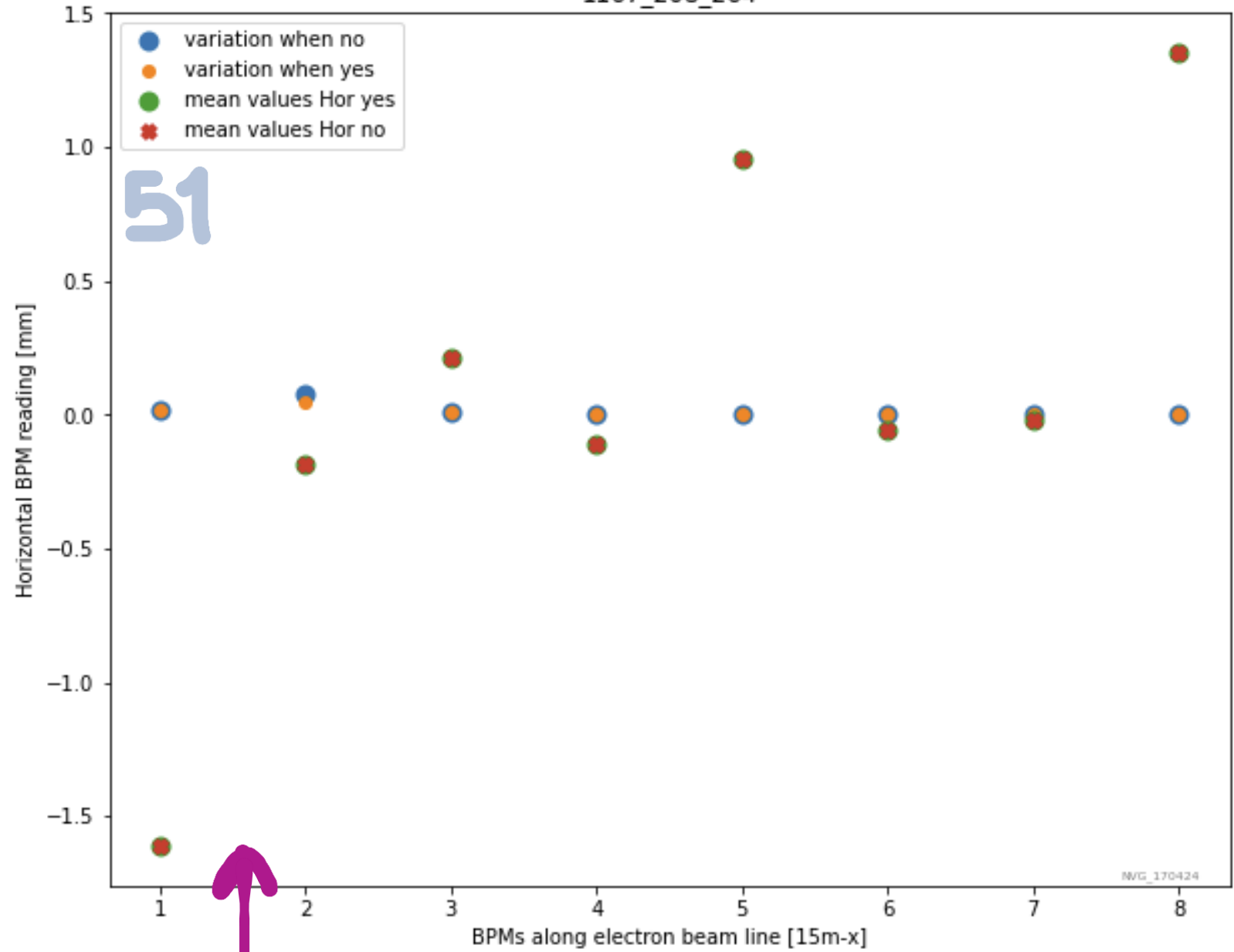
- Is there a clear indication that the electron line setup/behaviour determines whether there is an accelerated beam or not?
- Is there a clear indication that the laser energy (Emeter04) determines whether there is an accelerated beam or not?
- Is there a clear indication that proton intensity (BCTF) determines whether there is an accelerated beam or not?
- Is there a clear indication that the halo shape determines whether there is an accelerated beam or not?

=> Note: higher reproducibility on the 6.02.24 along with delay scans and repeated accelerated events without realignment of the electron beam

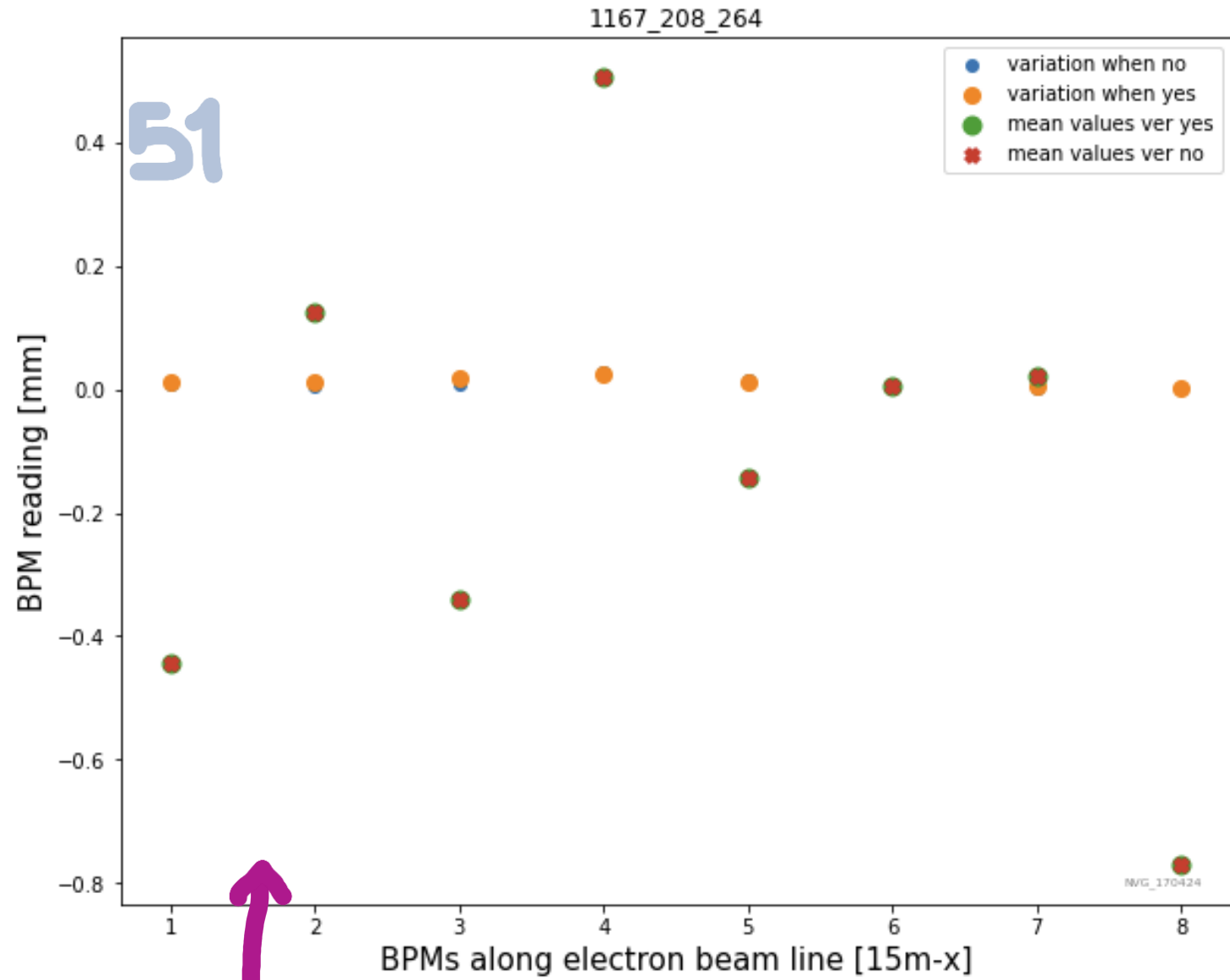
# Any clear indication of yes/no?

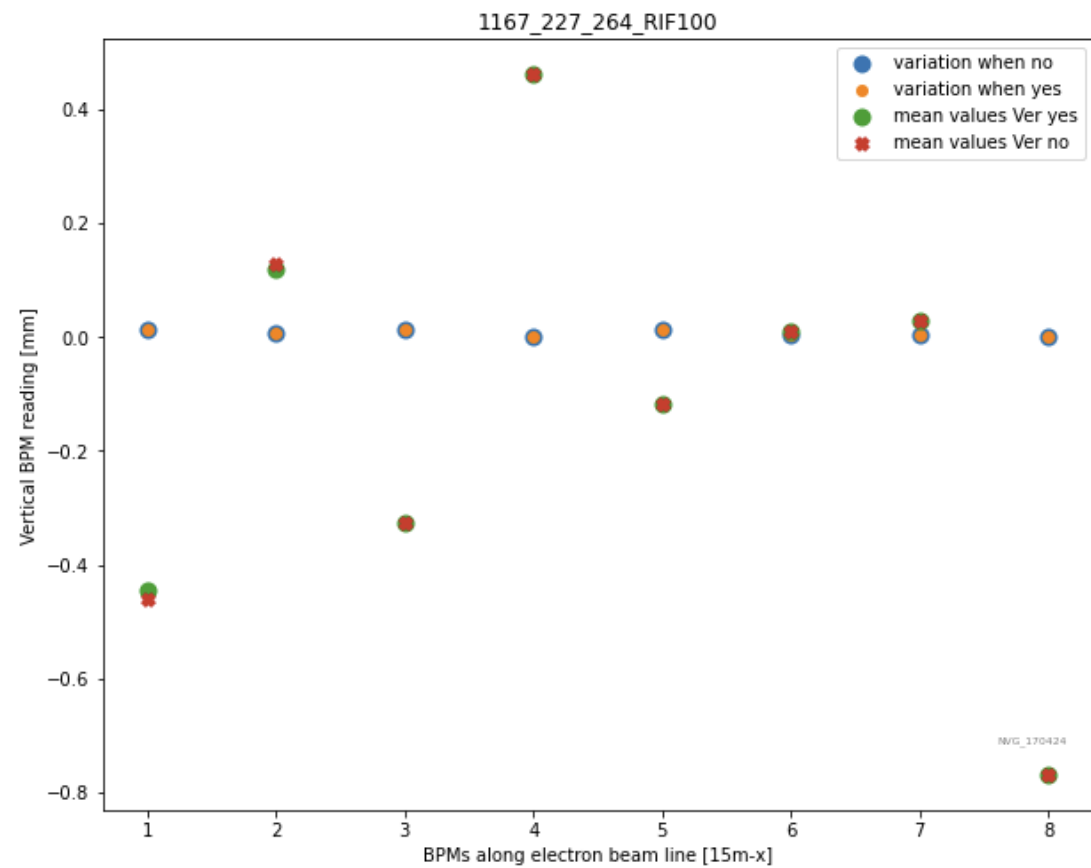
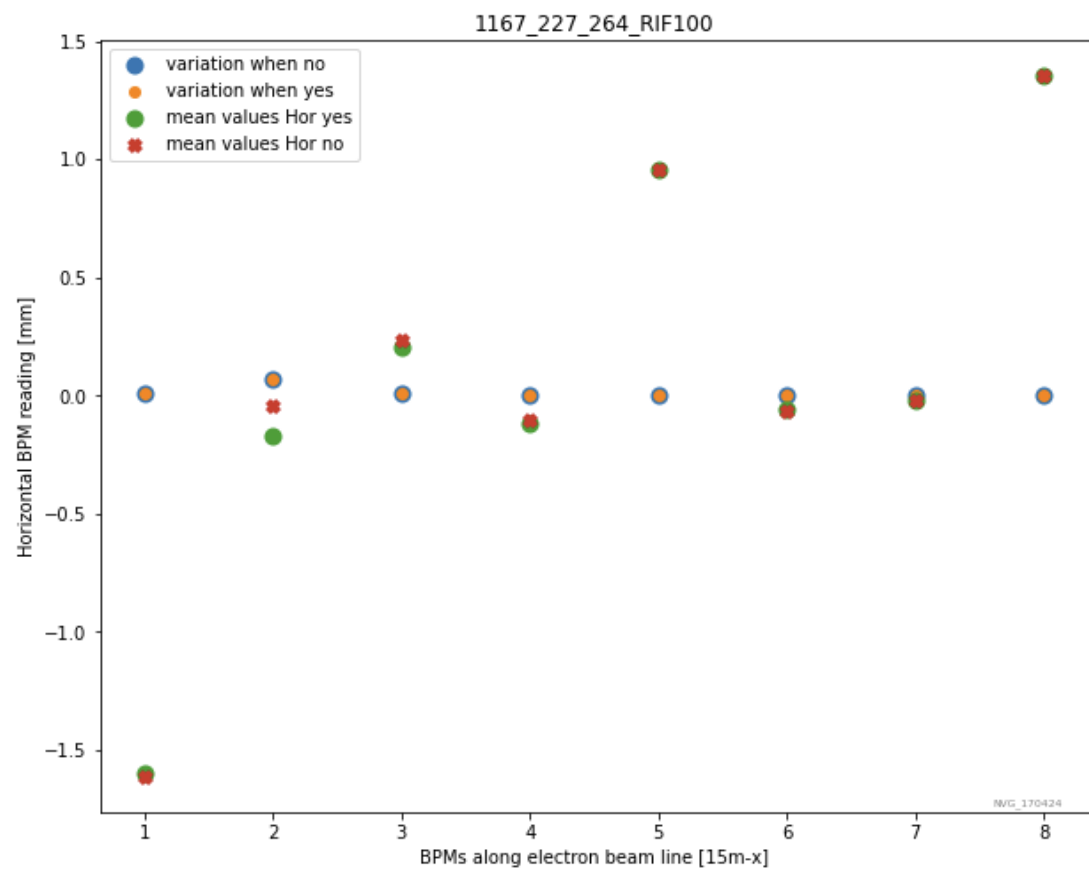


# eBPMs Horizontal



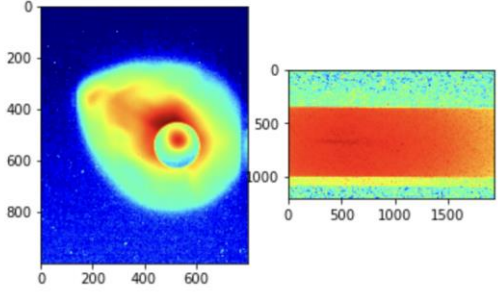
# eBPMs Vertical



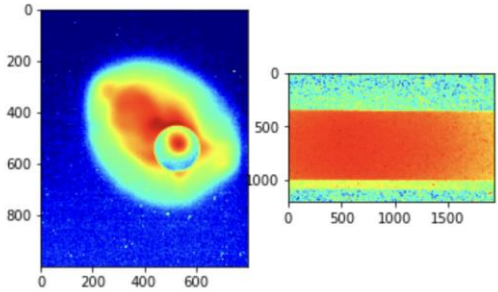


# Good Halo => Accelerated beam?

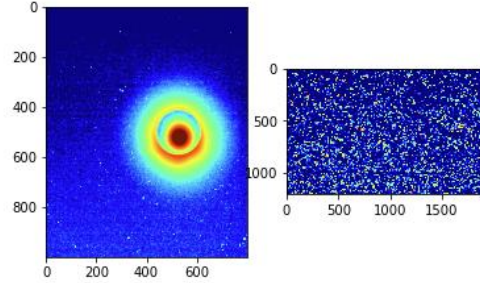
There are electrons  
There is laser  
There are protons  
<HDF5 file "1714214601735000000\_Type0\_1170\_9.h5" (mode r)>  
RIF= 200.0



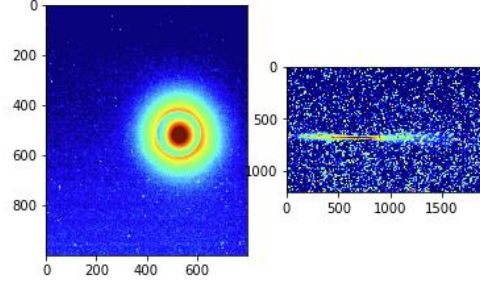
There are electrons  
There is laser  
There are protons  
<HDF5 file "1714214623335000000\_Type0\_1170\_10.h5" (mode r)>  
RIF= 200.0



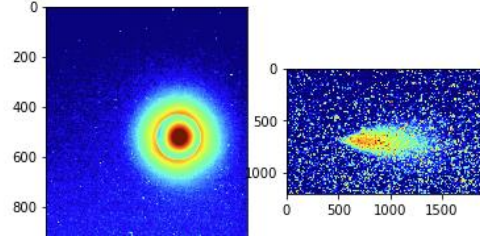
<HDF5 file "1714209439335000000\_Type0\_1167\_262.h5" (mode r)>  
RIF= -100.0



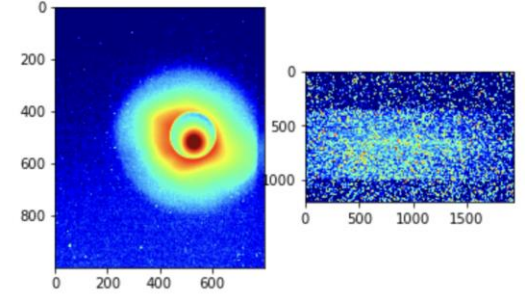
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There is laser  
There are protons  
<HDF5 file "1714209460935000000\_Type0\_1167\_263.h5" (mode r)>  
RIF= -100.0



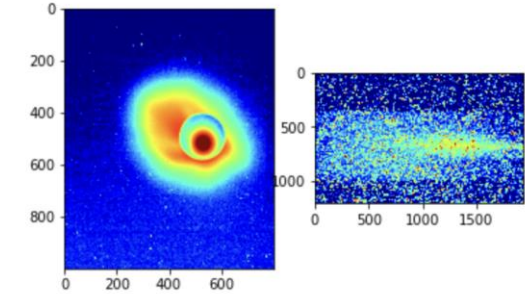
There are electrons  
There is laser  
There are protons  
<HDF5 file "1714209482535000000\_Type0\_1167\_264.h5" (mode r)>  
RIF= -100.0



There are electrons  
There is laser  
There are protons  
<HDF5 file "1714208640135000000\_Type0\_1167\_225.h5" (mode r)>  
RIF= 0.0

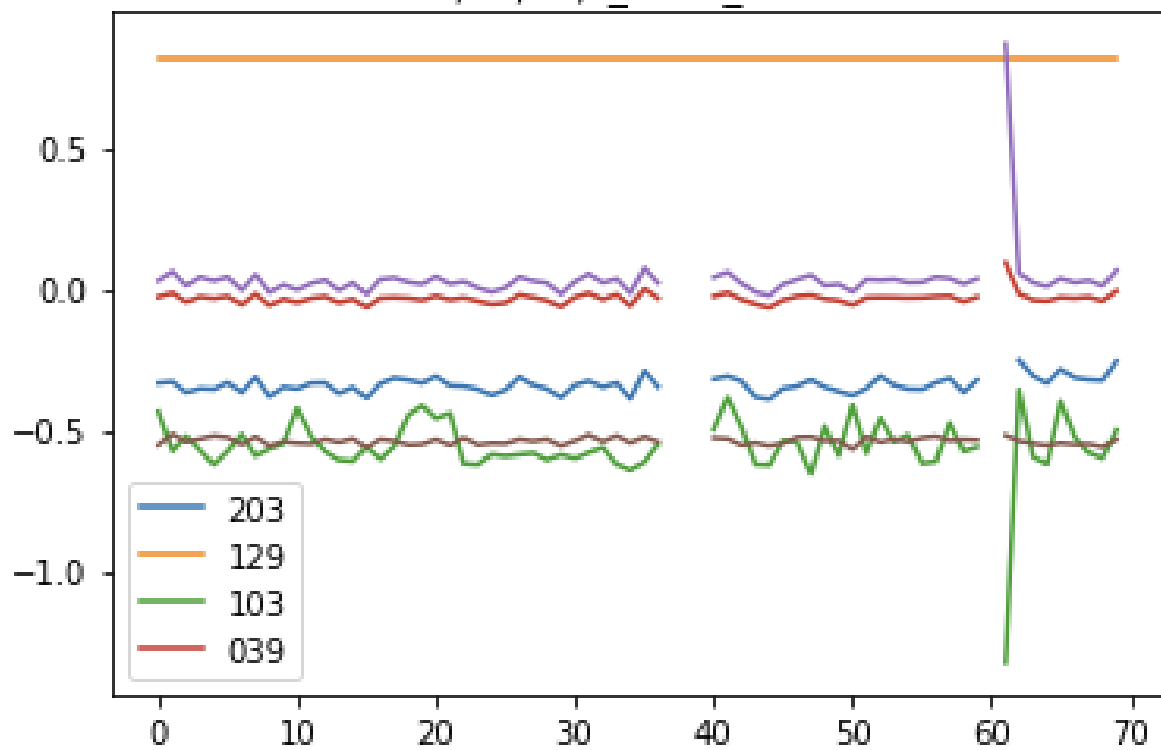


There are electrons  
There is laser  
There are protons  
<HDF5 file "1714208661735000000\_Type0\_1167\_226.h5" (mode r)>  
RIF= 0.0

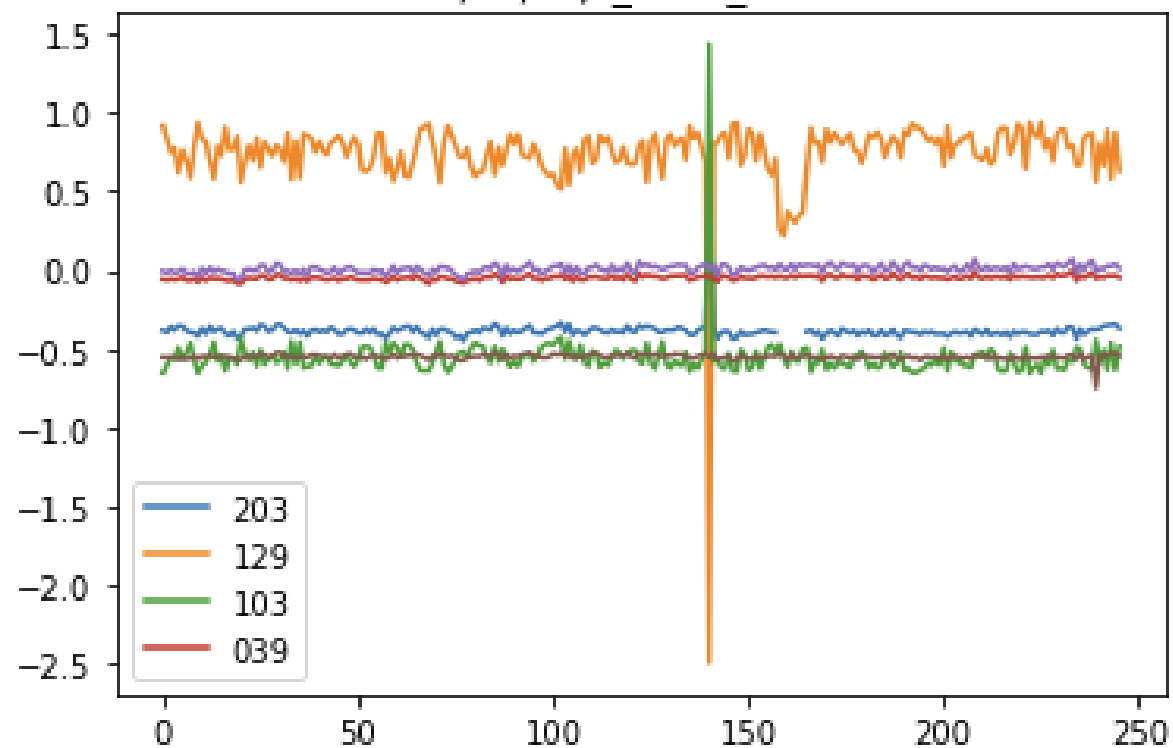


# Modulator fault and delay stage

2024/06/02/\*\_1366\_\* vertical



2024/06/02/\*\_1365\_\* vertical





# Summary

## Cross checked:

- BPMs for drift, and variations along the line for beam/no beam, variations for beam/no beam
- Laser energy variations beam/no beam
- Proton intensity variations beam/no beam
- Halo shapes (assumed nice halo=> accelerated beam)?
- Saw increased reproducibility in May 2024 (vs previous days) => throughout whole day no significant drift of variation between beam/no beam (nothing above jitter), saw accelerated beam after repeated manipulation of the delay stage (and RF phase) and modulator faults
- Next steps.. check correlations between energy jitter values for given configurations and BPMs//Halos//Laser Energy//Proton intensity