PSI

Investigation of RRL signal shift between IN and OUT scan

Beam Development debriefing

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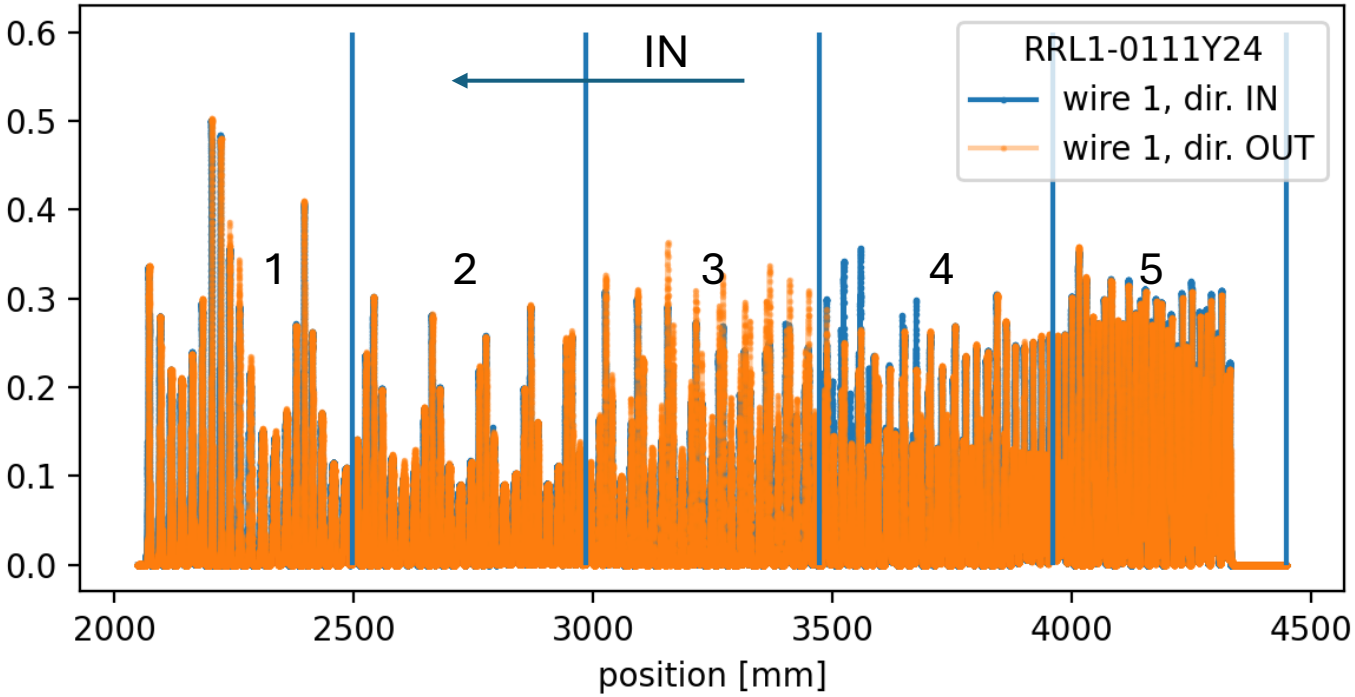
PSI

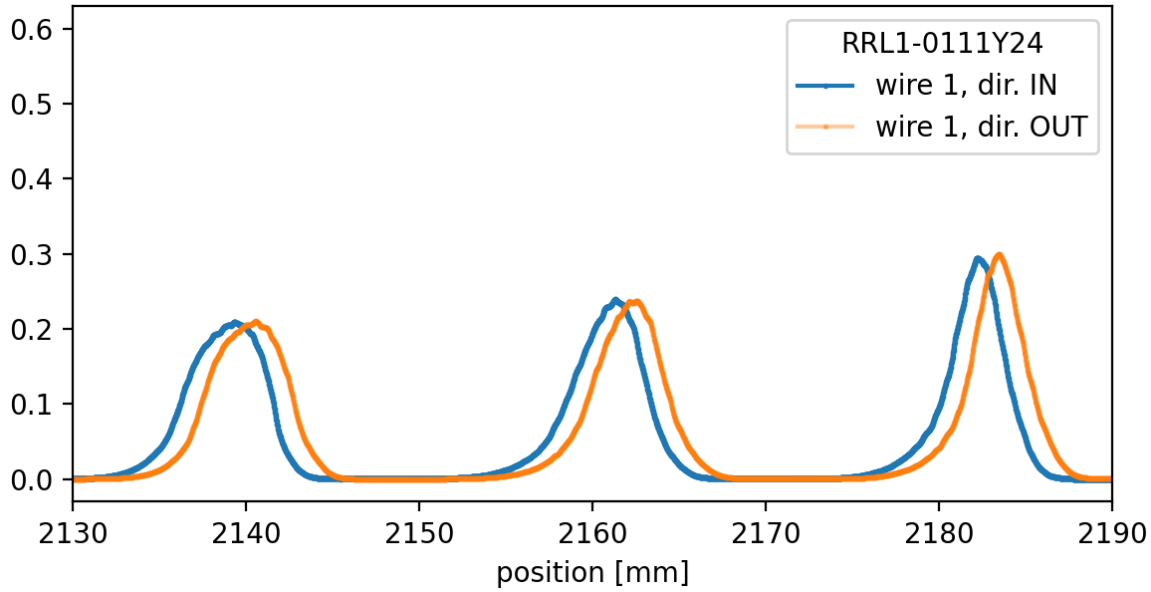
Context

- RRL scans orbits with 30 mm/s along MR radius of about 2.5 m.
- The measurements are performed during movement IN and OUT.
- Because of huge number of points wagon must stop 5 times in each direction to allow data transfer.
- Each stop lasts about 1.2 second.
- Time between stops (a segment): about 16.9 seconds.

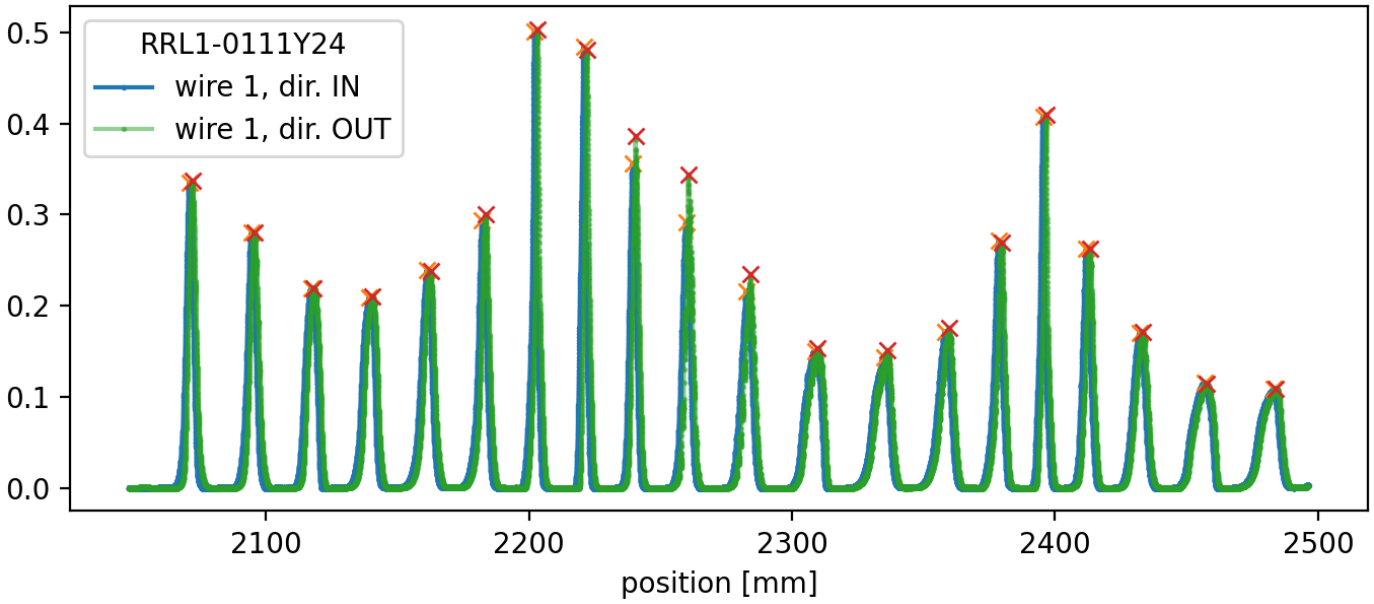


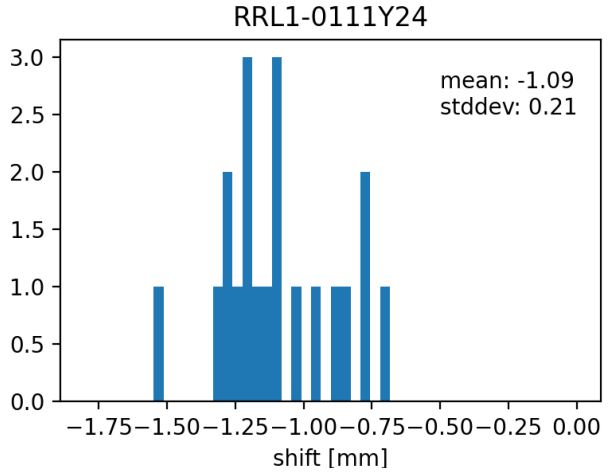
Context

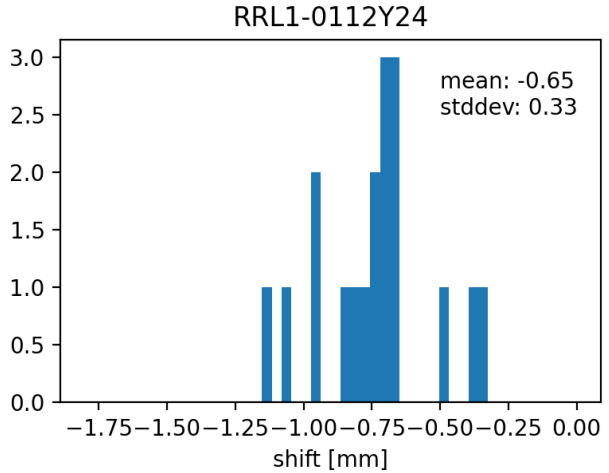
- The beam profiles of scan IN and OUT do not overlap.
- The shift seems to depend on the segment of the scan.
- We made 6 scans in a row with the same beam parameters (500 µA current) to investigate repetability of the phenomena.
- Unfortunately 4 scans generated interlocks during movement – data not complete.
- Only scans 111 and 113 have complete profiles. Here only wire 1 is analyzed.

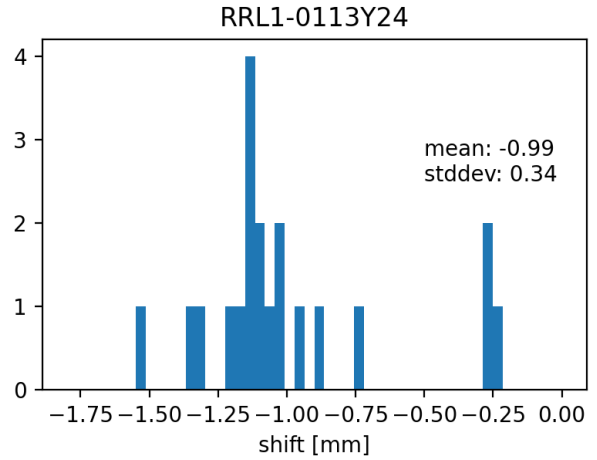


Segment 1



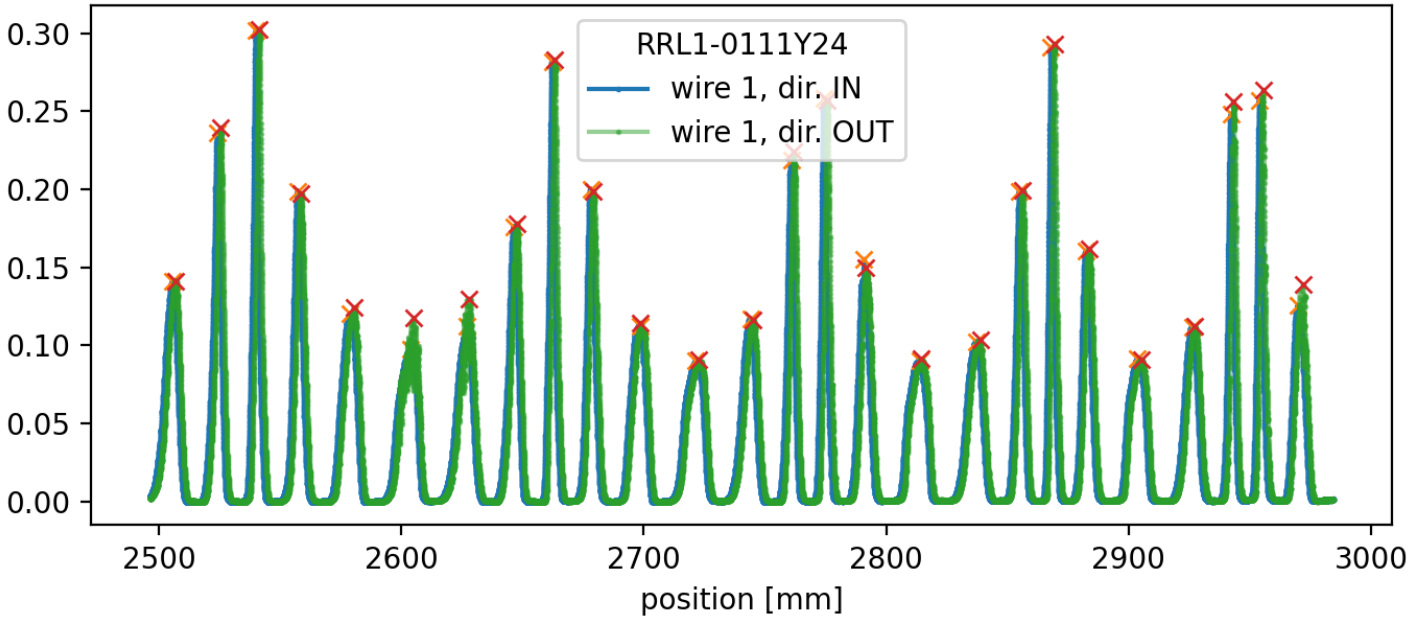




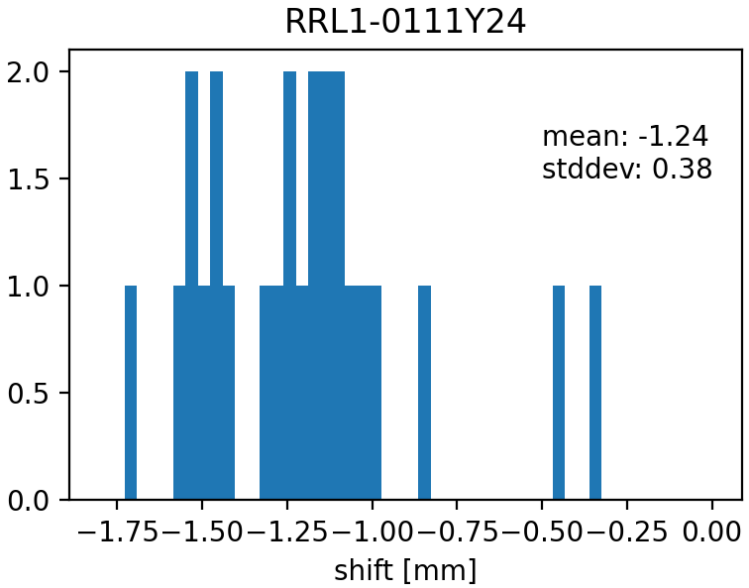


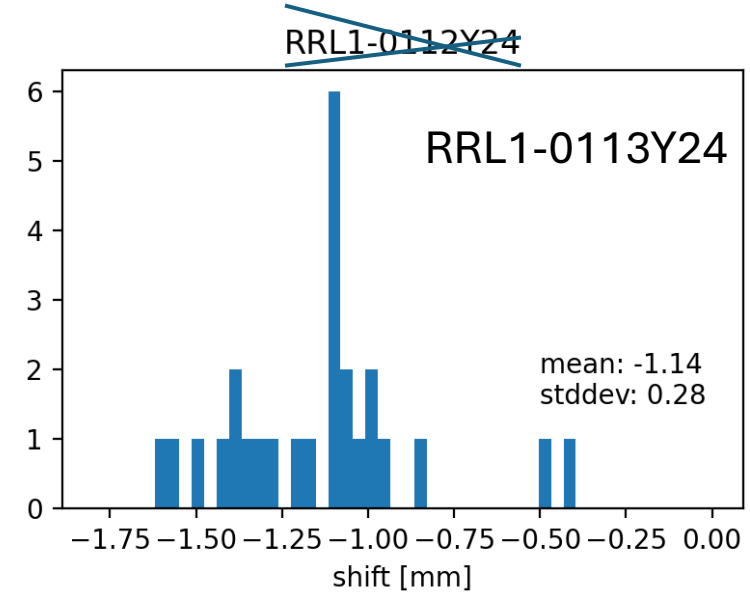
- Use of scipy.signal.find_peaks() function
- No need to find all peaks, important to find the same peaks!
- Segment 1: 20 orbits, IN shifted by ~1 mm towards ring center

Segment 2

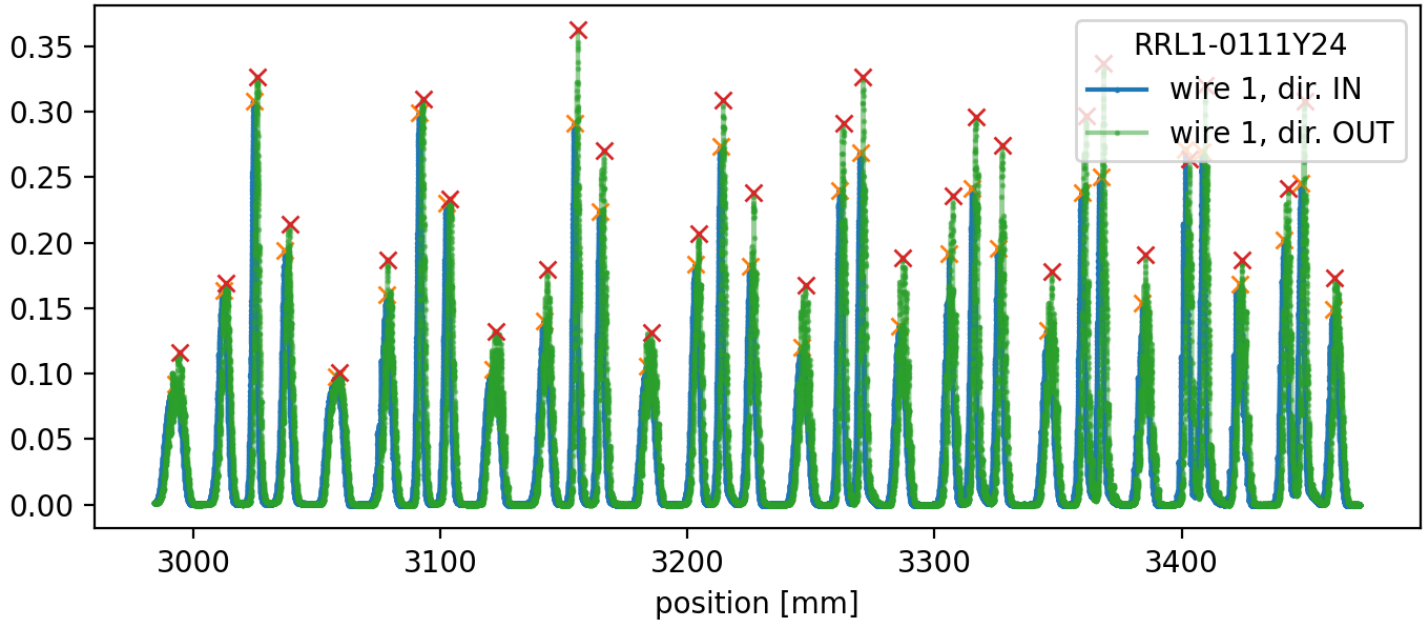


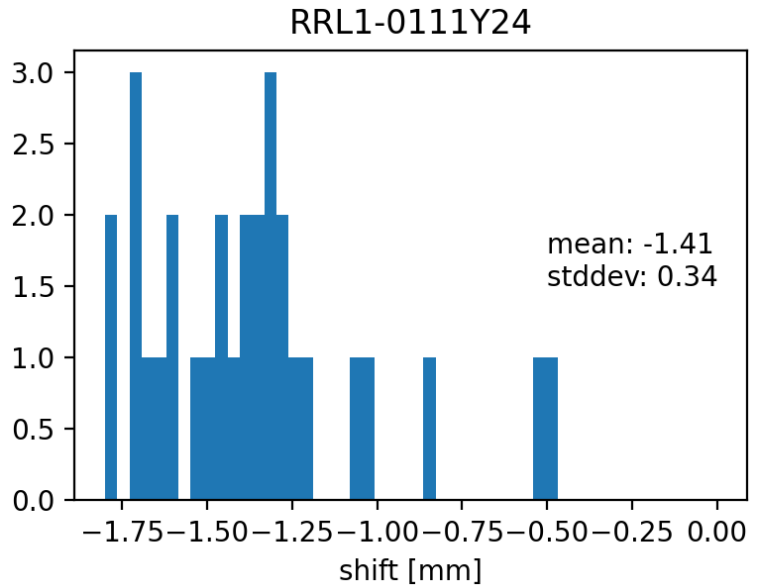
- 26 orbits found
- 1 mm=66 steps

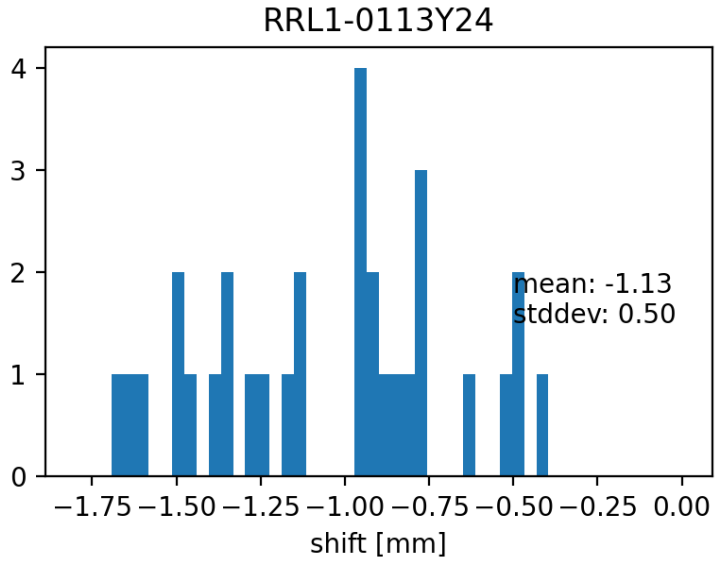




Segment 3

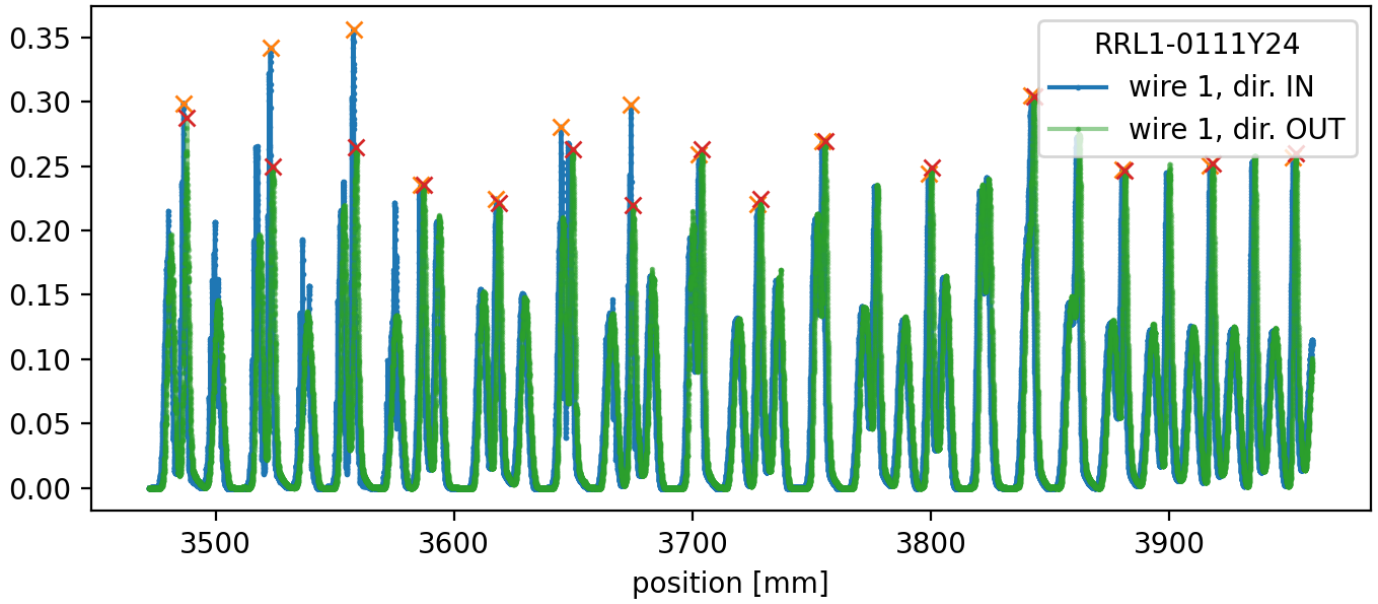


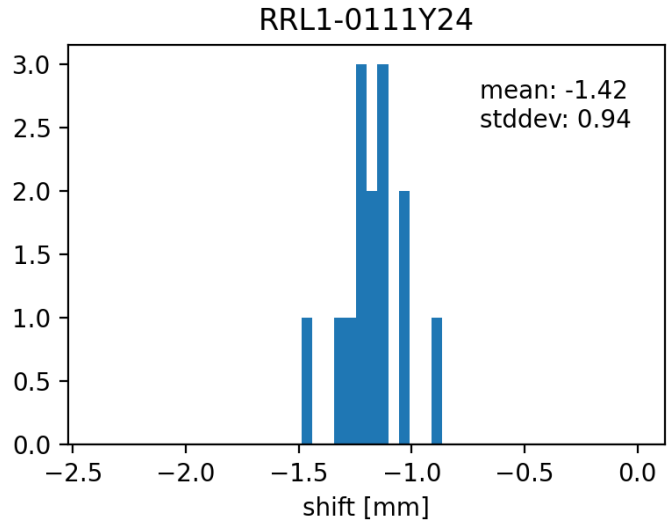


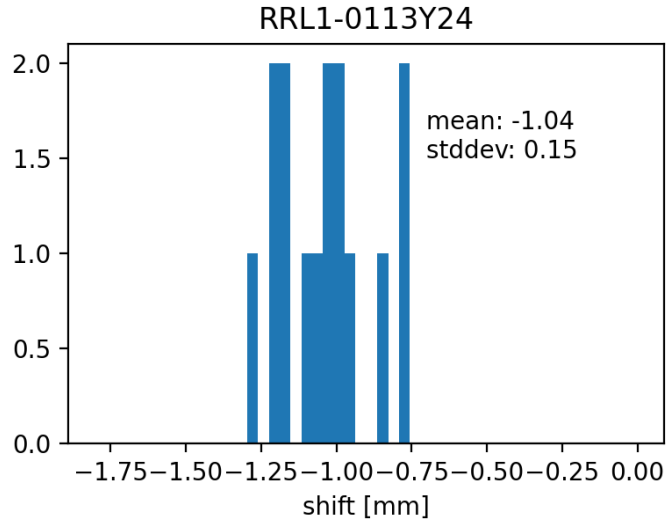


- 33 orbits found

Segment 4



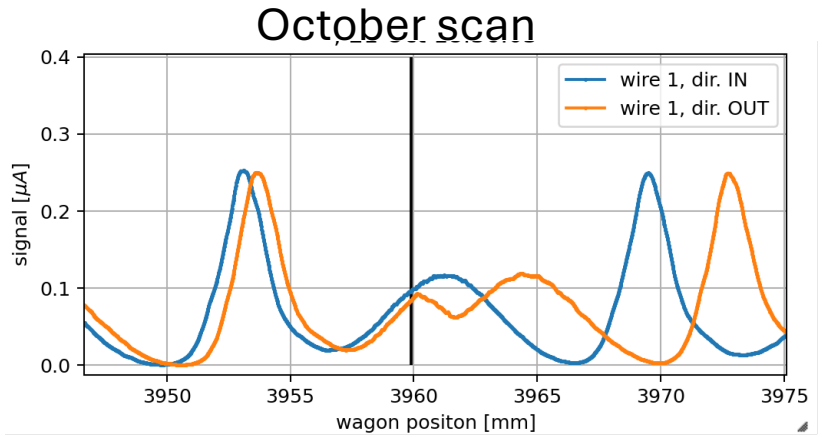


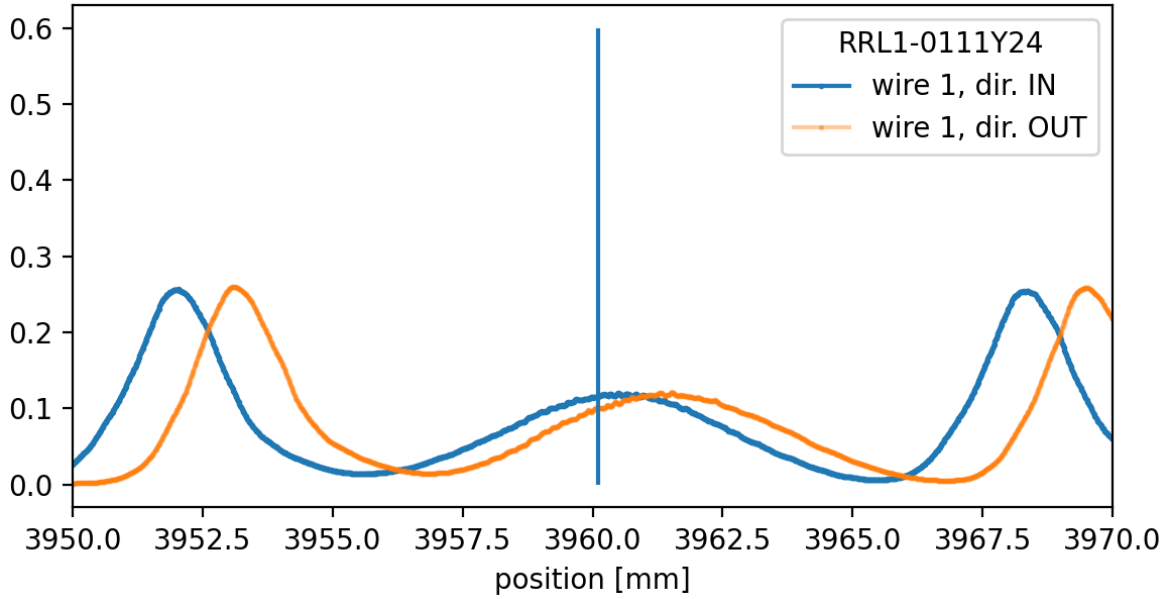


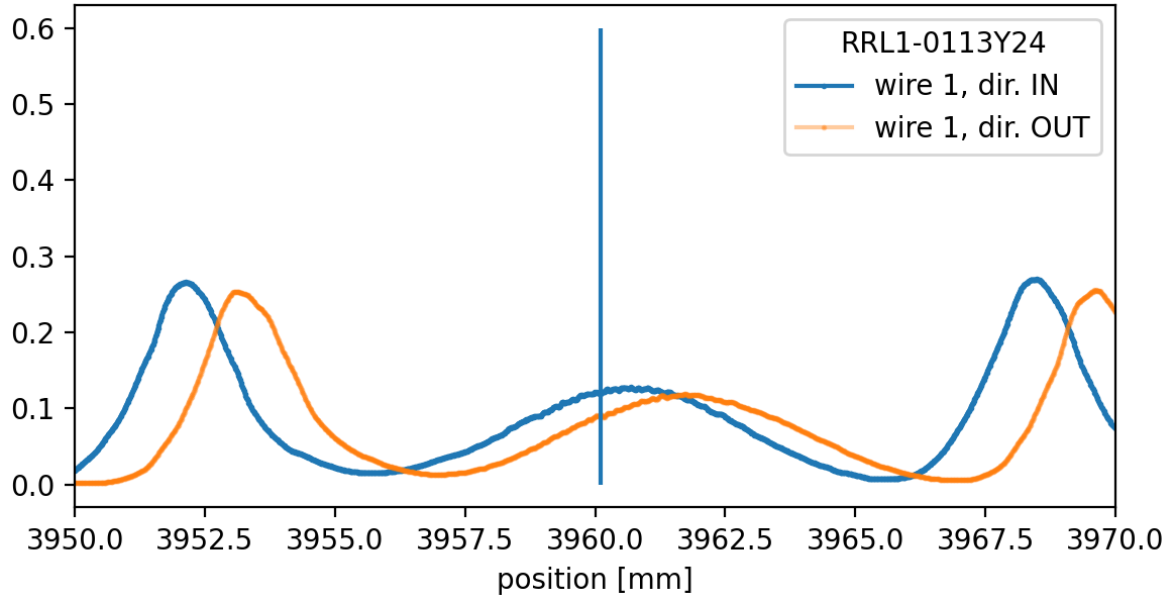
- 15 good orbits
- Scan 111, large stdev, recheck for outliers

Segment 4 – stop mid-beam

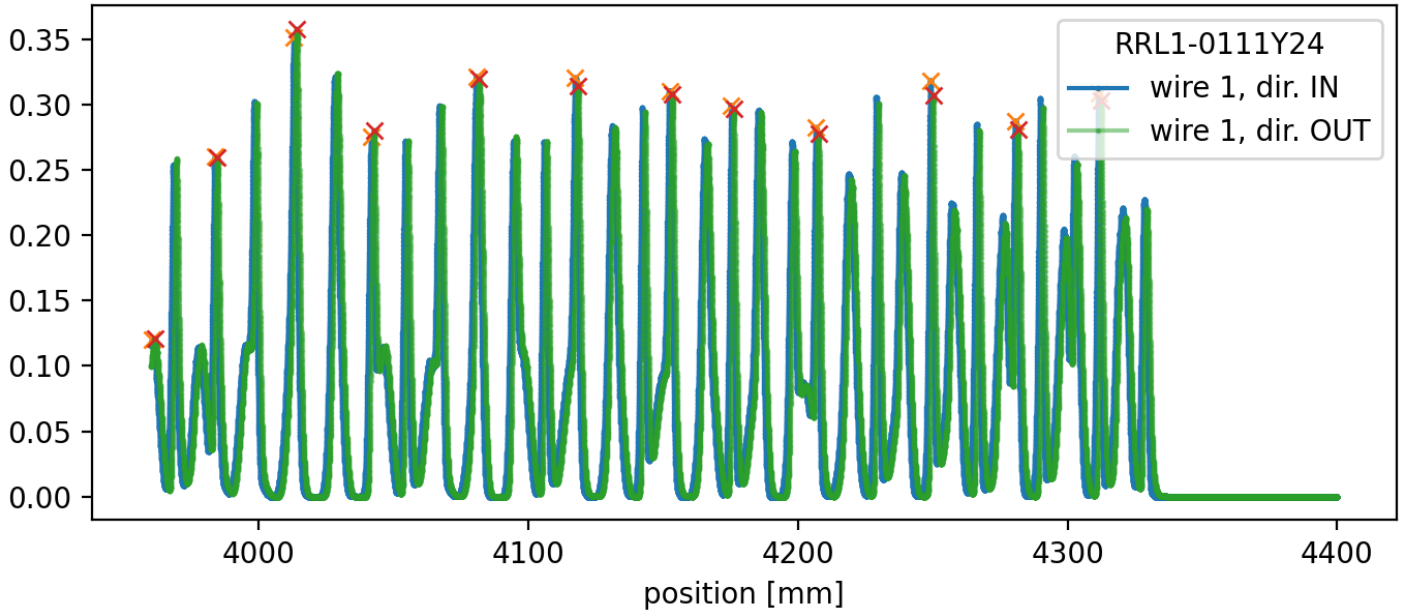
- We don’t see ”drift” of the signal

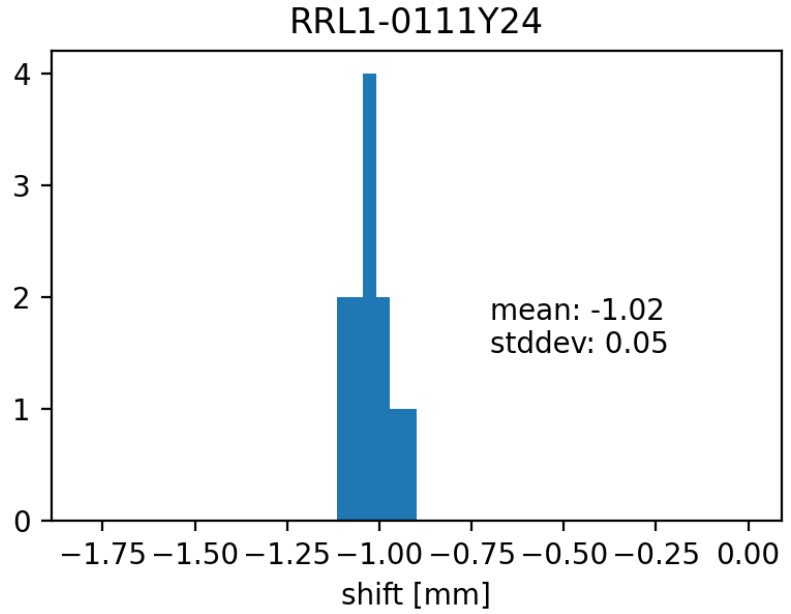


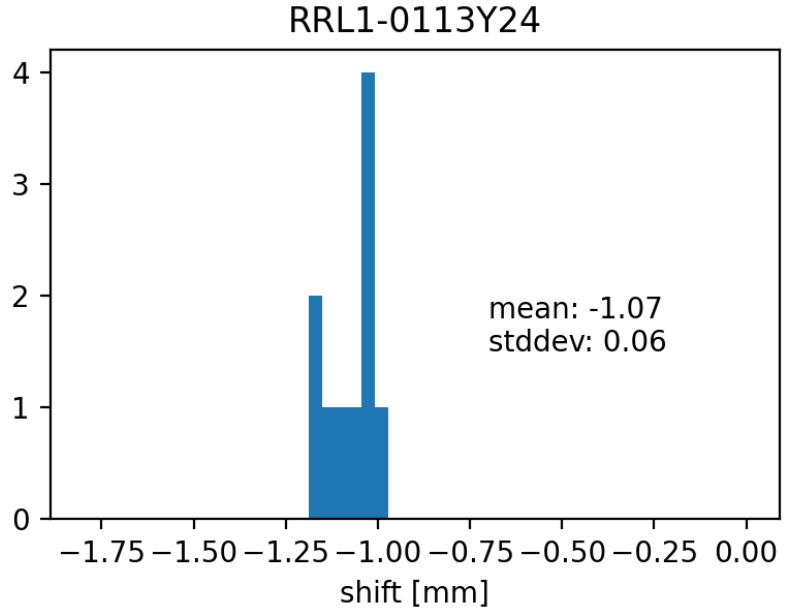




Segment 5







- 12 good orbits

Other measurements

- Using scope confirmed no motor current when stop for data transfer.

Conclusions

- Shift IN-OUT is about -1 mm along the whole scan and it seems to be generated at CW position.
- This finding is in contradiction to previous observations, where shift was observed to change at the stop points.
- Ideas:
  - Look at wire 2 and 3.
  - Do measurements with different beam parameters.