

Double Target Dipping (0.78Hz)

Goals:

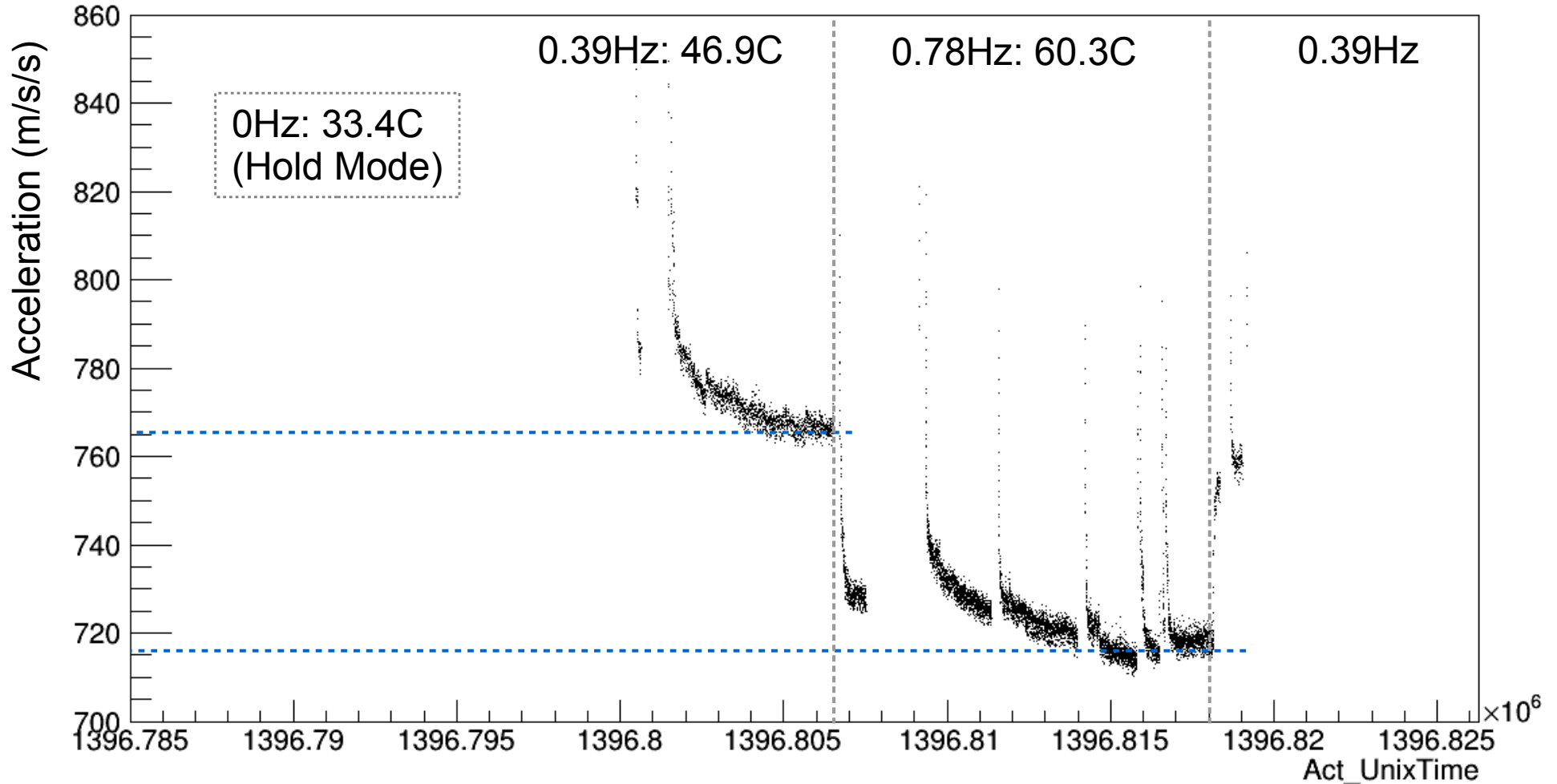
- Demonstrate that the Target can run at a higher dip rate, without:
 - Scaping the beam early on out pulse.
 - Causing additional loss on the next injection.
- Test the DAQ could operate at the 0.78Hz rate.
 - Note that the DS was not available so the data volume was reduced...

Double Target Dipping (0.78Hz)

Run Plan:

- Operate the target at 0.39Hz and find 2V, 4V beamloss levels.
- Switch to 0.78Hz and repeat the exercise
- Debug new trigger logic (Yordan did this mostly in parallel with target tests).
- Take data at 0.78Hz, maximum particle rate possible, to verify readout times.

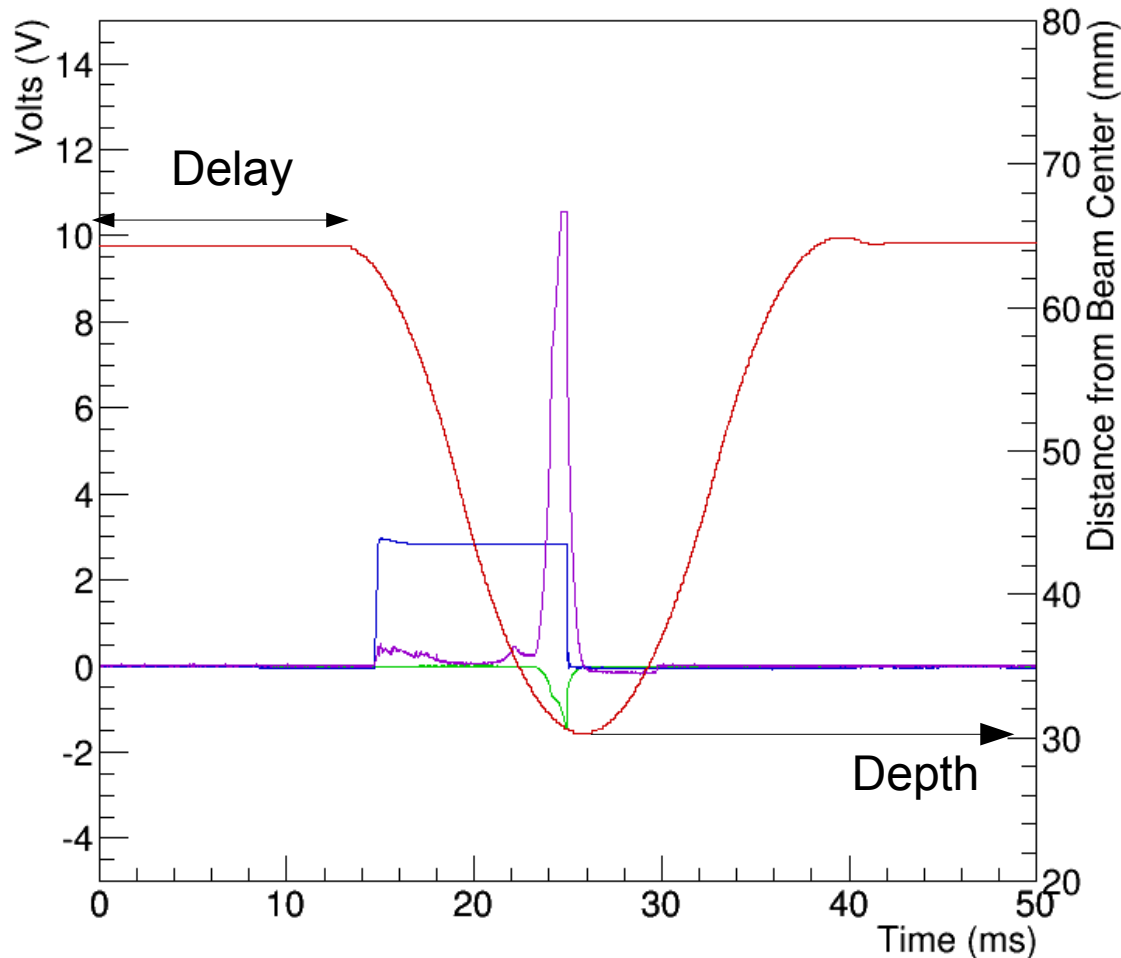
Target Acceleration



- Increased coil temperature reduces the acceleration of the mechanism by around 40m/s/s

Target Trajectory (early)

T2.9: Target Position and Beamloss



Initially started with previous settings from EMR run, optimised for:

Delay: 12.60ms

Depth: 33.35mm

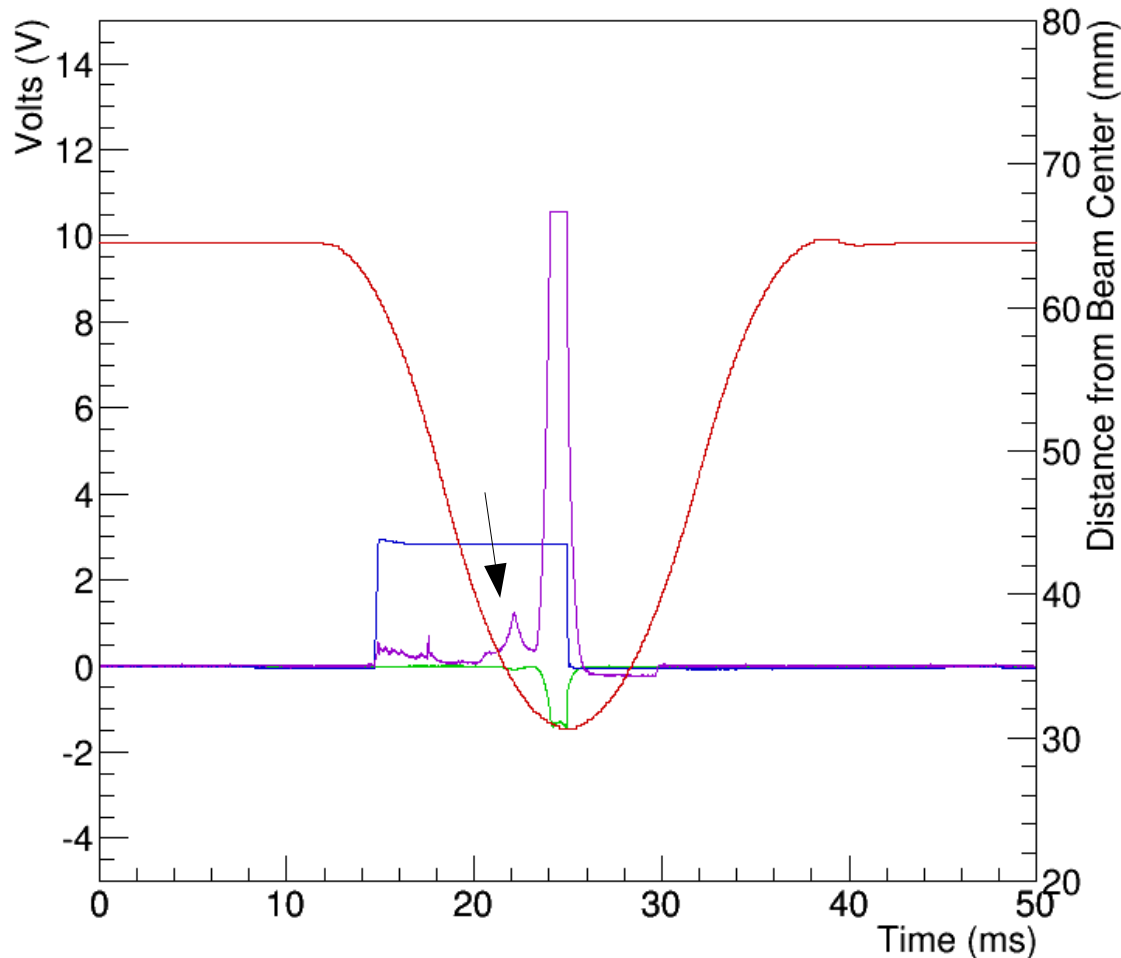
We decreased the depth to 31.55 and were arriving a little late.

This can be seen as a triangular sector 7 summed beam loss (green trace)

The beam intensity (blue) was noted to be slightly less than the EMR run.

Target Trajectory (4V@0.39Hz):

T2.9: Target Position and Beamloss



We found these settings gave us an average of 4Vms beam loss on the monitor screen:

Delay: 11.60ms
Depth: 31.55mm

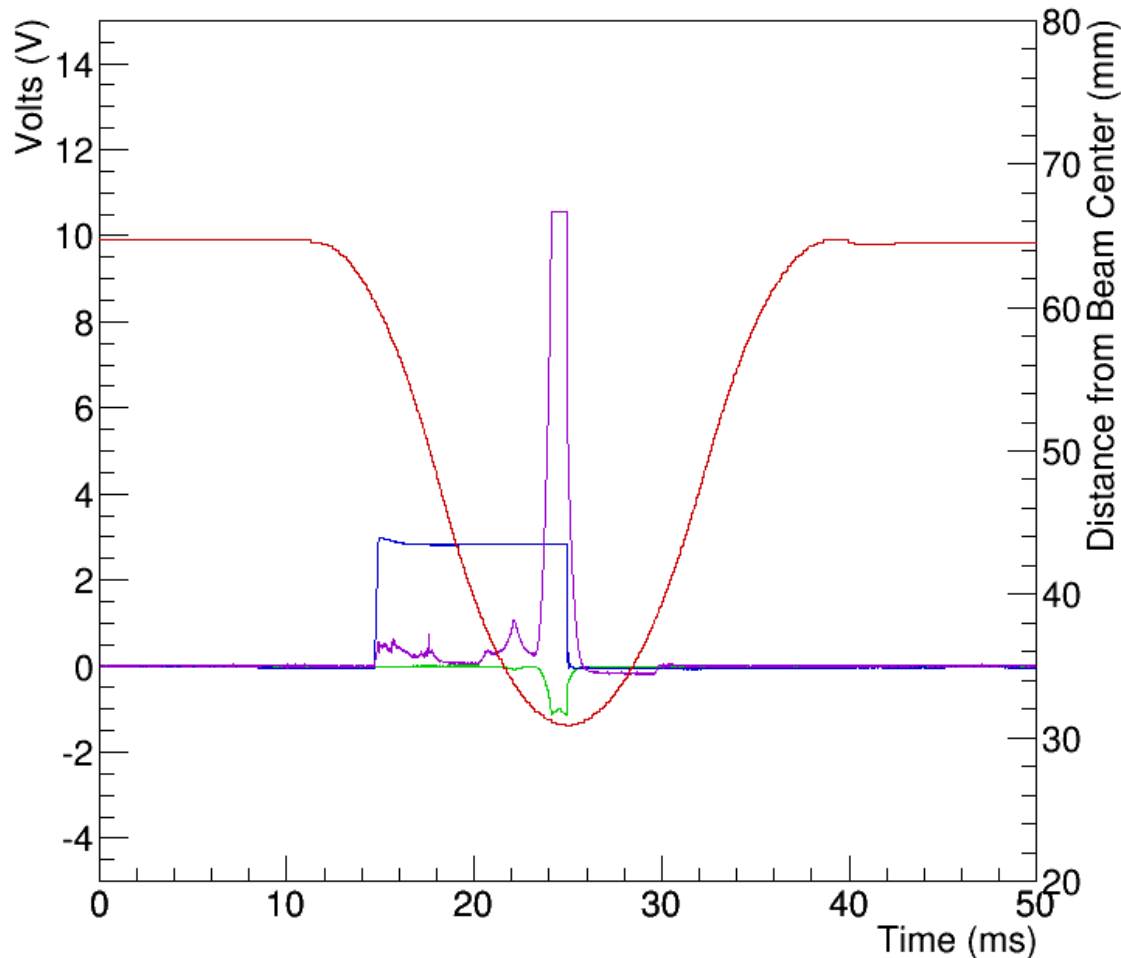
The green trace is fairly flat topped, indicating we have a steady particle rate during the final ~2ms of the ISIS spill.

The purple trace is a flat top for the wrong reasons - its clipping!

We observed a small amount of scraping on the way down, as indicated by the arrow.

Target Trajectory (4V@0.78Hz)

T2.9: Target Position and Beamloss



Moving to 0.78Hz, the reduced acceleration required an earlier entry again to centre the minimum on the final 2ms of the MICE spill.

The optimum settings we found were:

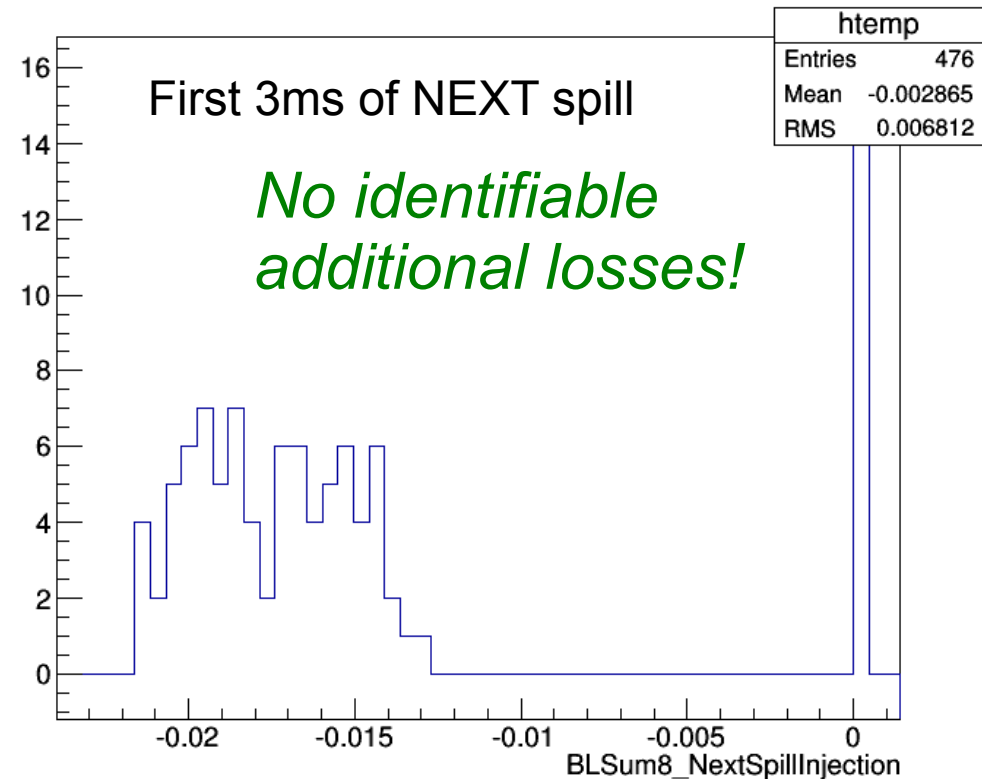
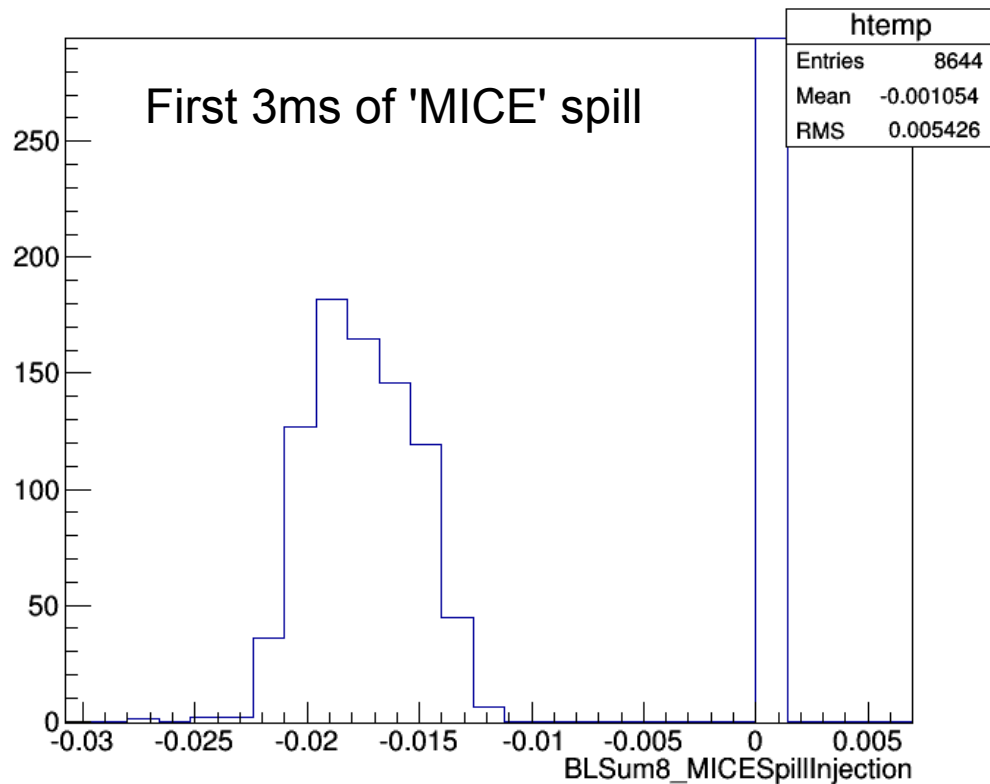
Delay: 11.40ms
Depth: 31.55mm

Rule of thumb for missing next spill:

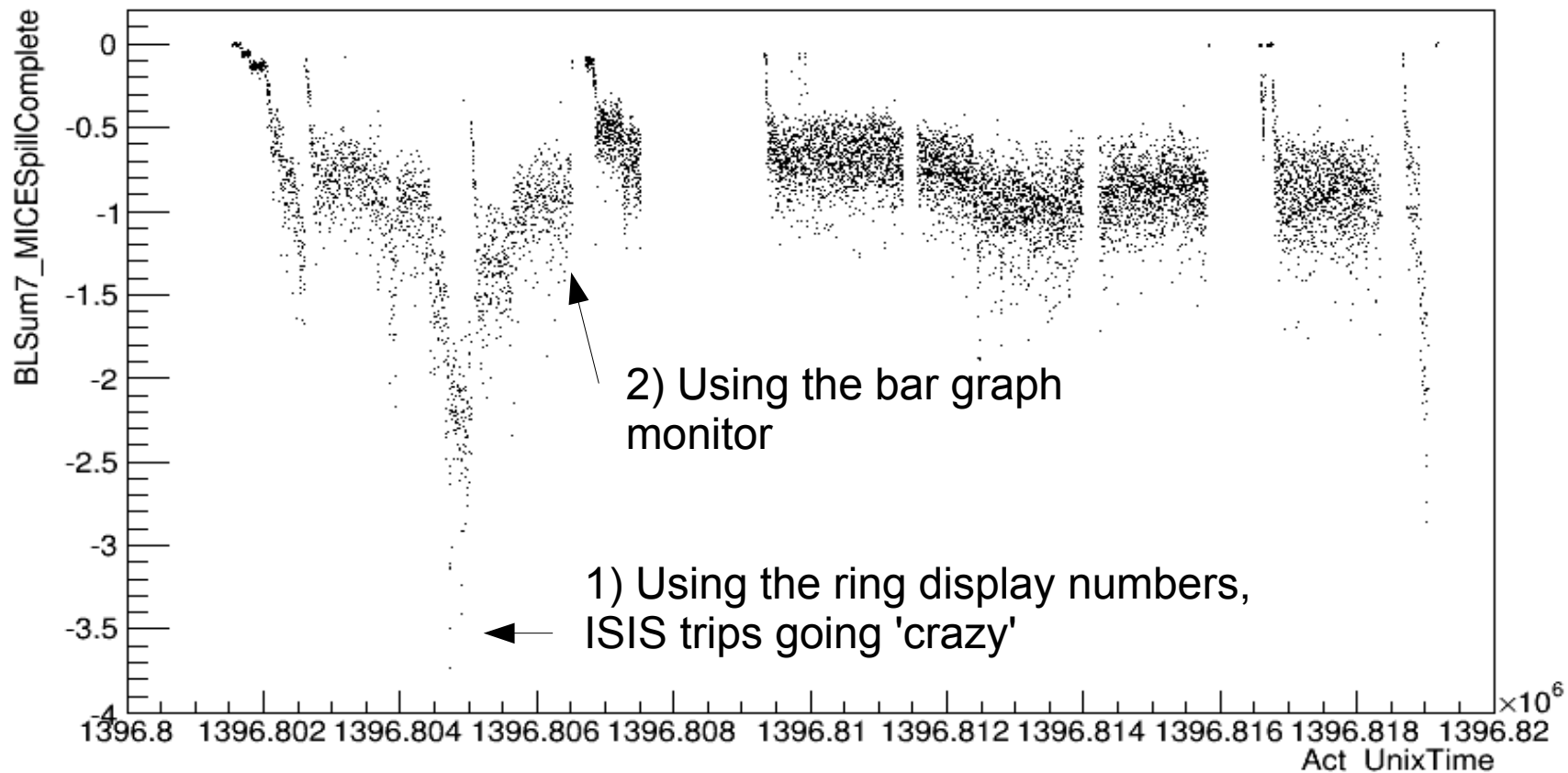
58 mm by 35ms
Seemed OK by eye.

“Injection” Losses

- I define this as everything during the first 3ms, since the target should not be touching beam here regardless of the spill.
- ISIS was operating at a low rate. We studied next spill injection losses by moving the target delay 20ms earlier:



Quick Beamloss Summary

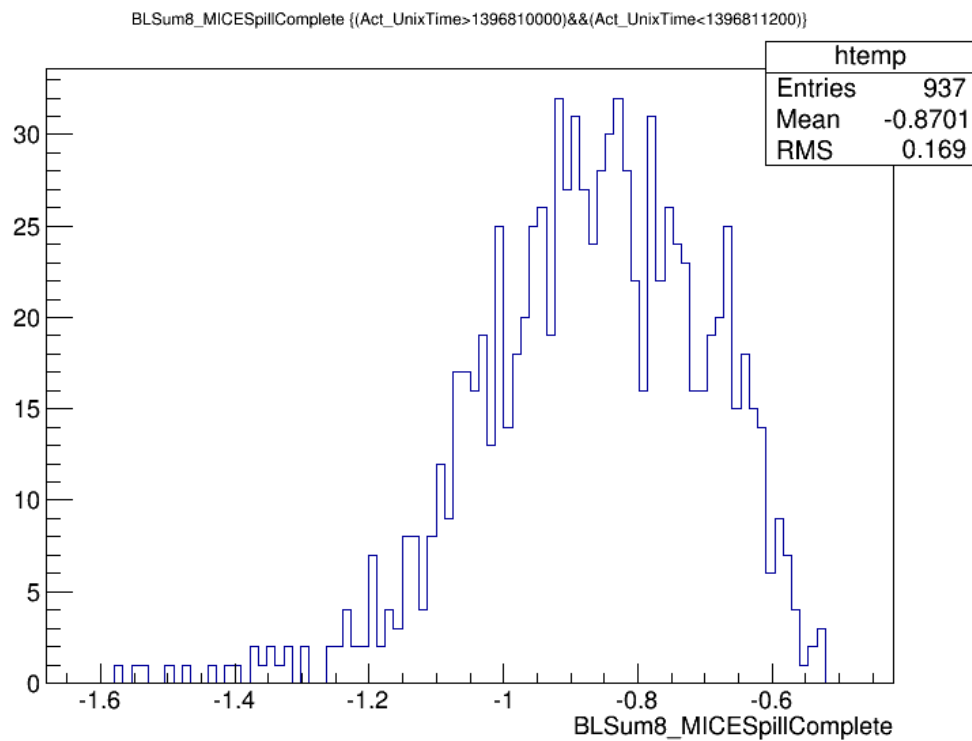


Originally not sure over which Beam loss numbers to use, the ISIS bar chart and strip chart has a discrepancy of a factor 2+. Values originate from different systems.

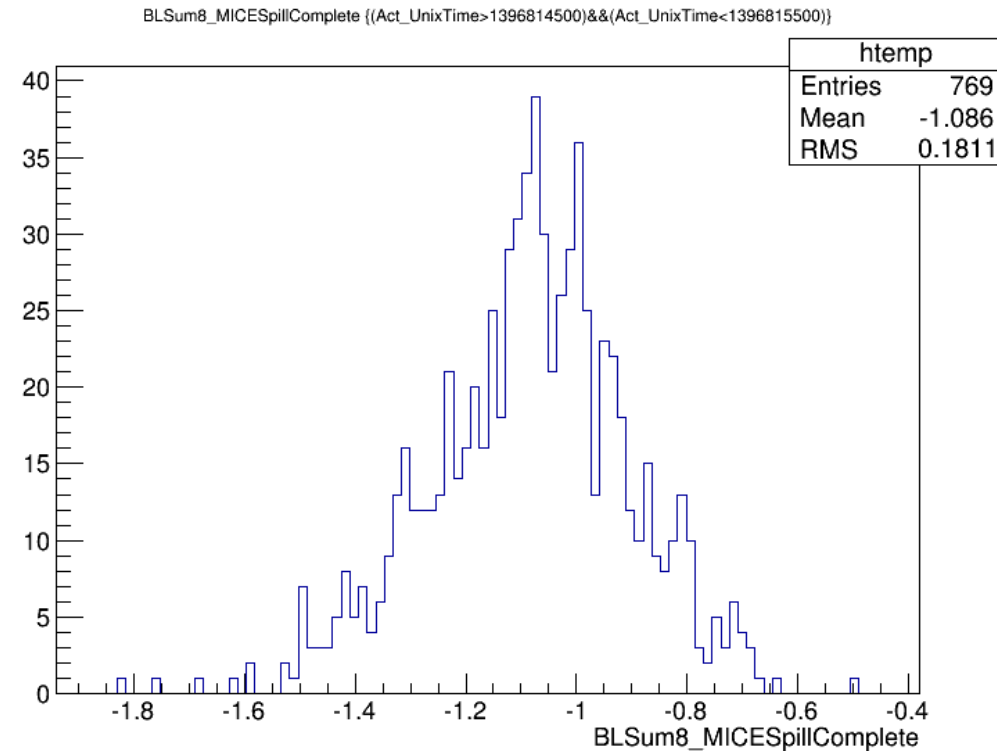
Due to large number of alarms decided to use the 'bar graph monitor'

2V, 4V comparison:

Integral (wrt. time) of sum of Sector 8 beam loss monitors:



2V by eye on monitor



4V by eye on monitor

Conclusions

- Target Compatibility:
 - No increase in amount of scraping early in the MICE pulse.
 - No evidence of causing additional loss on the next injection.
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- DAQ Compatibility:
 - Only TOF VME crates were tested.
 - DAQ operated fine with 0.78Hz spill rates.
 - Measured the VME readout time per trigger to be ~1.1ms.

Thanks

Thanks to Adam, Dean, Henry, Pierrick, Yodan, and the ISIS crew for such a successful and pleasant shift.