MOM Report

Data Collection for December 2 to March 24th

Paolo Franchini, Paul Kyberd and Ryan Bayes

MOM

31 March 2016

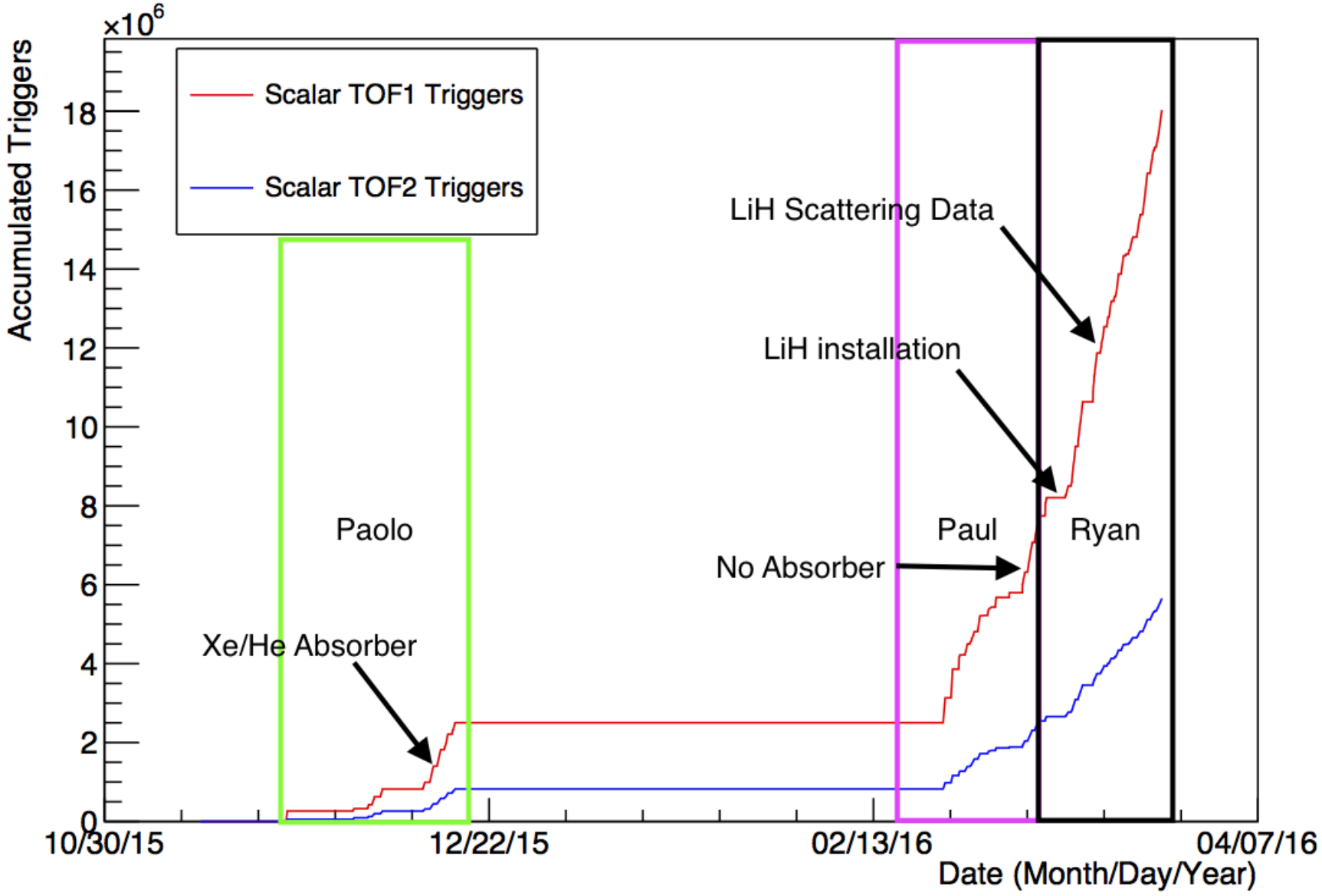
Outline

1. Summary of Operational Activities
2. Paolo Franchini's MOM Shift
3. Paul Kyberd's MOM Shift
4. Ryan Bayes' MOM Shift
5. Lessons Learned?

Since Last Collaboration Meeting...

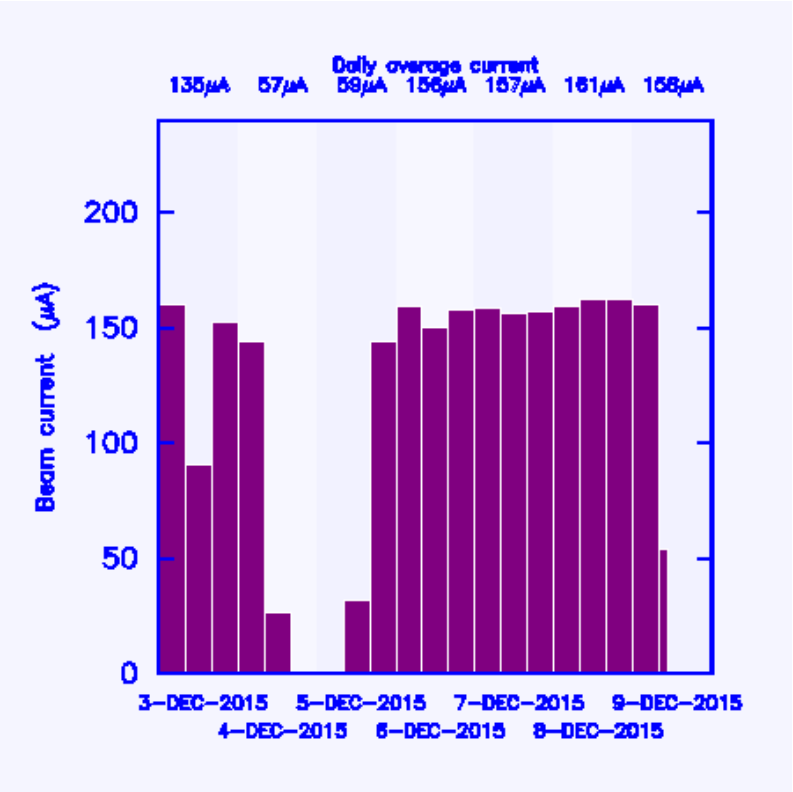
- Three MOMs have been on shift since CM43
  - Paolo Franchini: 1 Dec. - 22 Dec.
  - Paul Kyberd: 21 Feb. - 6 March
  - Ryan Bayes: 7 March - 25 March
- Duty coordinator took MOM responsibilities after Paolo Franchini's term
  - MOM to resume duties during User runs.
- Four primary studies have been conducted
  - Multiple scattering in Xenon/He Filled absorber.
  - Straight tracks with no absorber.
  - Pion beam rate study.
  - Multiple scattering in Lithium Hydride.

Since Last Collaboration Meeting...



3/12-7/12 shift summary

- Thu 3rd
  - Hall closed in the early afternoon
  - Beam tune (Dean Adams)
  - Data for TOF0/TOF1 alignment
- Fri 4th
  - No beam, vacuum leak in the linac
  - Magnetic search
  - FCU in flip mode @ 50A
- Sat. 5th
  - FCU in flip mode @ 100A
  - Pion beam at 140/200/300 MeV/c
- Sun 6th
  - More data with FCU @ 100A
- Mon 7th
  - FCU in flip mode @ -100A
  - Pion beam at 140/200/300 MeV/c



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TOF alignments runs

- *Experimenter*: François Drielsma

- Tried several settings to get more particles at TOF2

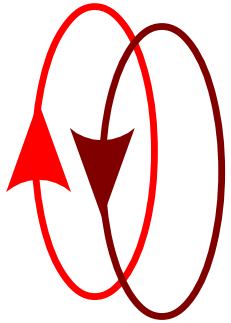
- 240 MeV/c muon beam; **all beam line magnets on**: 10K@TOF2
- 240 MeV/c muon beam; **Q7, Q8 and Q9 off**: 17K@TOF2

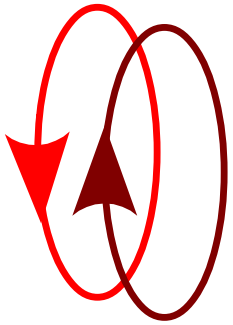
- Very low statistic at TOF2 in the reconstructed data
- Data useful for TOF0/1 alignments

2

FCU alignments runs

- *Experimenters*: C. Rogers/S.Middleton
- FCU current @ 100 A in **flip mode**
  - Pion reference run
  - Pion beams:
    - 140 MeV/c: 30K@TOF2
    - 200 MeV/c: 20K@TOF2
    - 240 MeV/c: 20K@TOF2
    - 300 MeV/c: 20K@TOF2
- FCU current @ -100 A in **flip mode**
    - 200 MeV/c: 20K@TOF2
    - 240 MeV/c: 20K@TOF2
    - 300 MeV/c: 20K@TOF2





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13/12-17/12 shift summary

- Fry 11th: absorber filled with Xenon, pressure stable during the weekend
- 5 days x 13 hours (2 shifters + 2 extra shifters)

- 13th-16th:
  - *Experimenter*: John Nugent
  - Scattering measurement
  - No field in the FCU
  - SSD has run without Helium
  - Pion beam: nearly 50K @ TOF2
- 17th: Reference run, Xenon evacuated, replaced by Helium 4

Overview of the period

- **FCU** stable
- No issues for the **absorber** filled with Xenon

- Few delays and glitches in the data taking mostly due to ISIS
- <u>No major issues from the MICE side prevented to take data</u>
- **Data quality** constantly checked: OnMon and OnRec plots, physics shifter and experimenters

- MOM/DC and DC/MOM **handover** checklist implemented
- Huge effort from the shifters that have permitted a longer period of data taking.

5

Expert Run

Feb 16th

Expert run.
Went ahead in spite of the fact there was no beam due to an ISIS start up problem.

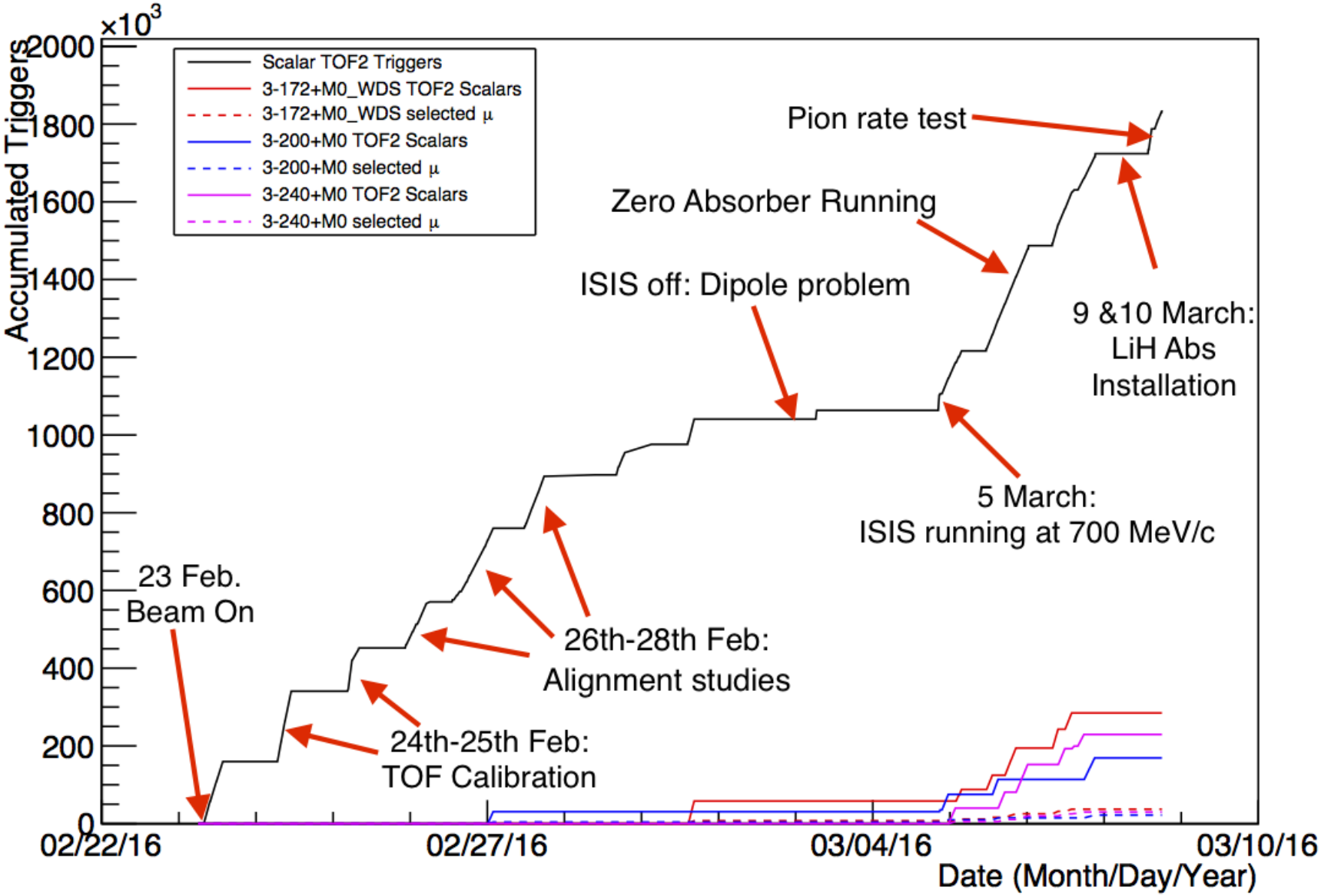
Hall search revealed a problem with the PPS – turned out to be vibrations from a walkway placed on the Mezzinine generating vibrations which stopped the PPS search of the RF Mezzanine – fixed by moving the walkway!

OnMon	OK
OnRec	OK
Problem with a corrupted string written to the CDB.	Fixed

Feb 19th

Backup day for expert run. Cancelled due to visit by Distinguished Guests from the Chinese academy of science.

Empty Focus Coil Running: 23 Februrary - 8 March



February 22

Shifter training

Programme

TOF Calibration	Durga
Detector Alignment	Francois
Zero absorber – need to end by 07 March to allow LiH install	John N
Emittance	Victoria
Globals	Melissa

800 MeV running; 64/50 rep rate; 2V

February 23 – am

Beam Tuning - Henry and Dean Adams. OK

Running 24th – 28th

Started cycle with no Decay Solenoid, so event rates low.
Problem with pumping down the Focus Coil, meant we had to start with studies which did not need vacuum in the space

TOF calibration; Alignment studies

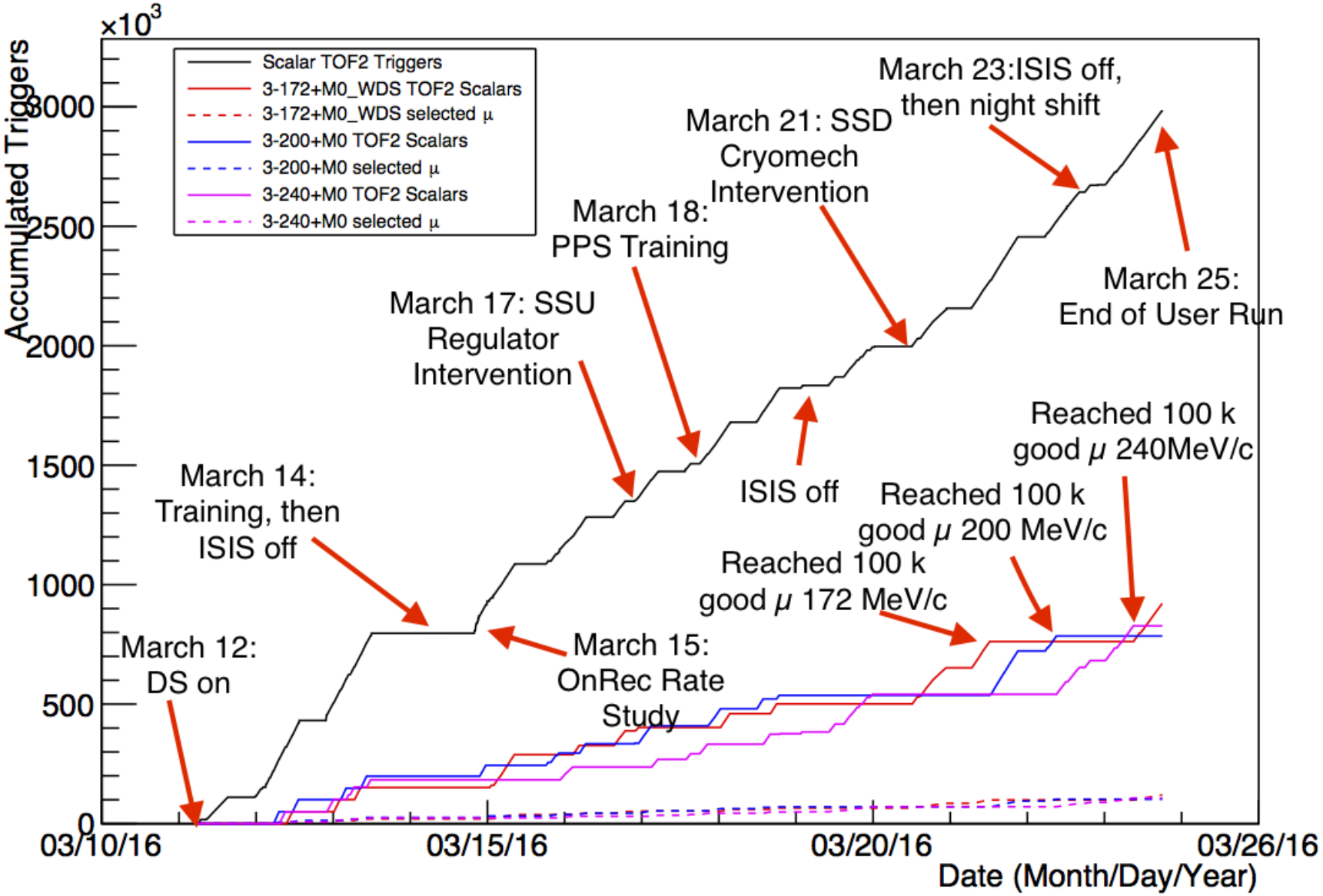
Running February 29th – March 7th

Focus coil problem sorted out on Monday.
Decay solenoid was installed by DL working Monday and into the evening on Tuesday, so we had DS by half way through the Tuesday evening shift.
Start running zero absorber.

Wednesday 2nd	ISIS 24 hour stop
Thursday 3rd	ISIS dipole problem – no beam from 20:00
Friday 4th	ISIS repairs
Saturday 5th	ISIS comes back on slowly – to ensure no more problems with magnets decide to run at 700 MeV - the beam bump had to be retuned.
Sunday 6th	Run zero absorber running.

Problem with ISIS meant that the installation of the LiH was delayed while the zero absorber running was completed.

LiH Scattering Physics Data Collection



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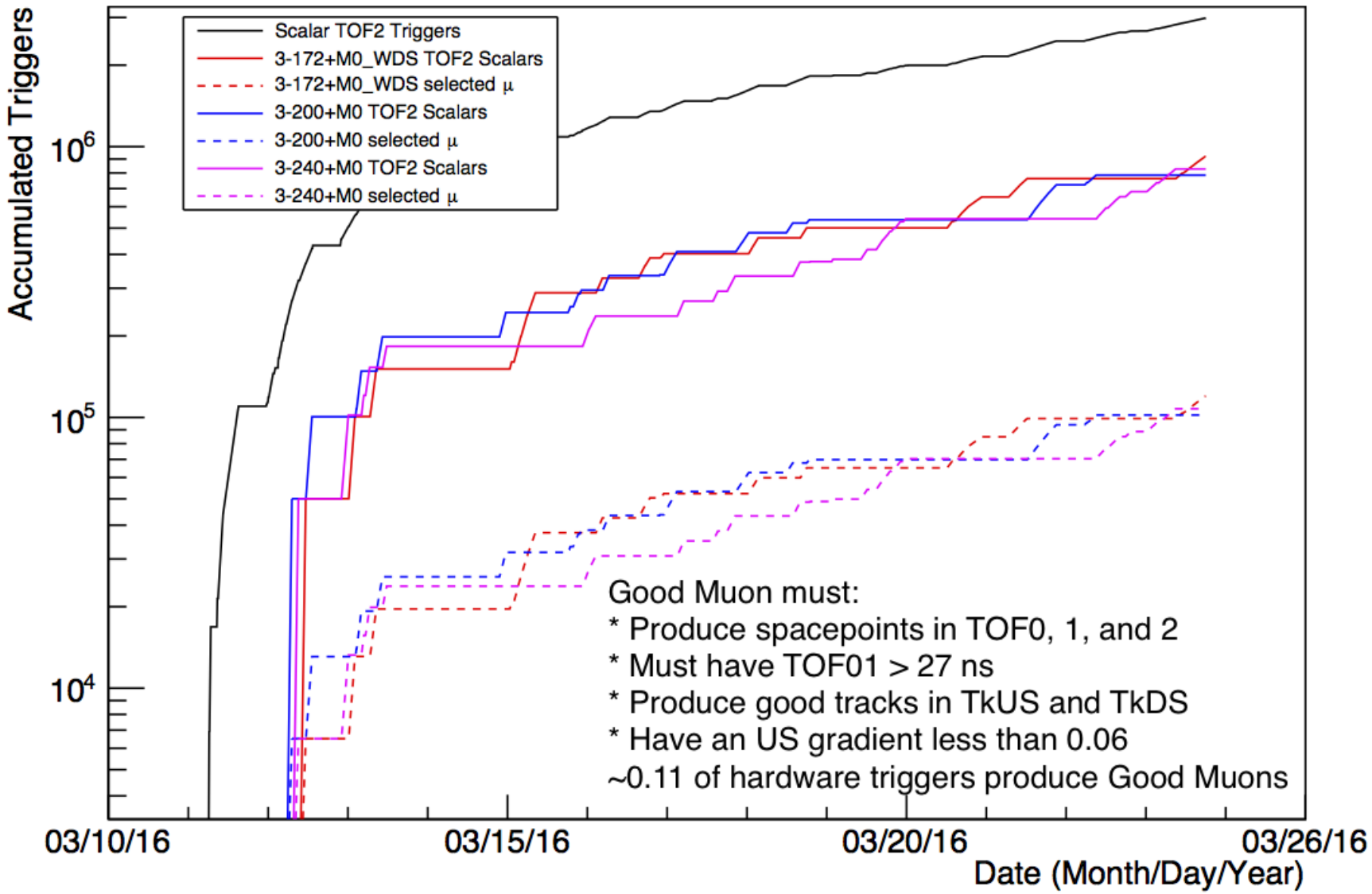
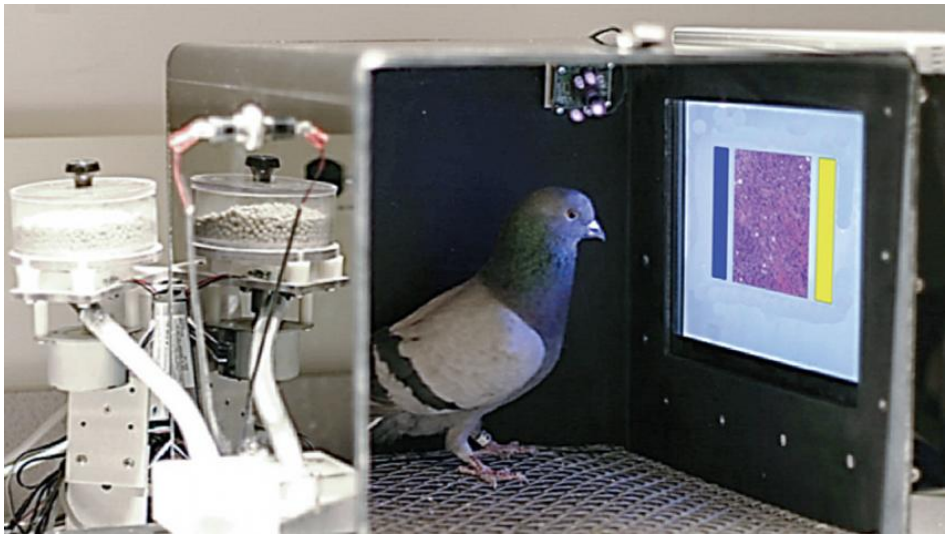


Shifter Training

- Integrated training with run periods.
  - Necessary during sustained running
- Had several self contained training days.
- Meant to train and refresh shifters on Safety, PPS, Beam line, and control room operations.
- Largely successful, but needs to be kept concise.



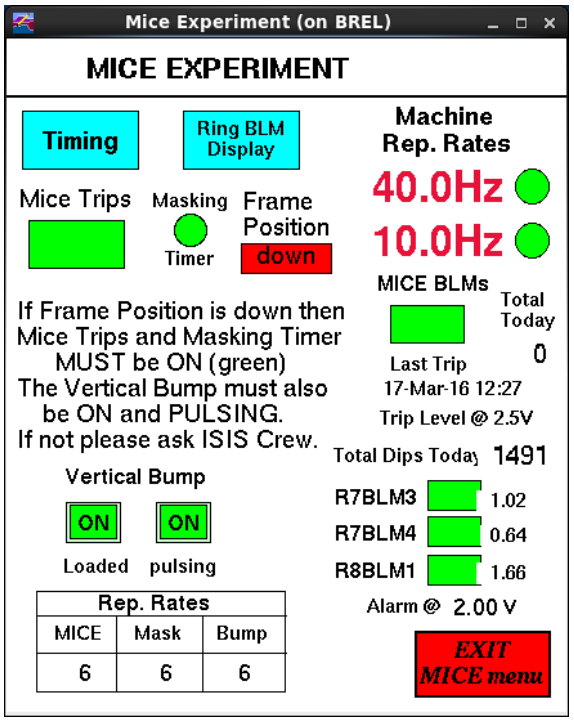
R. M. Levenson et al., PLOS ONE (18 November 2015)

New Items in Training

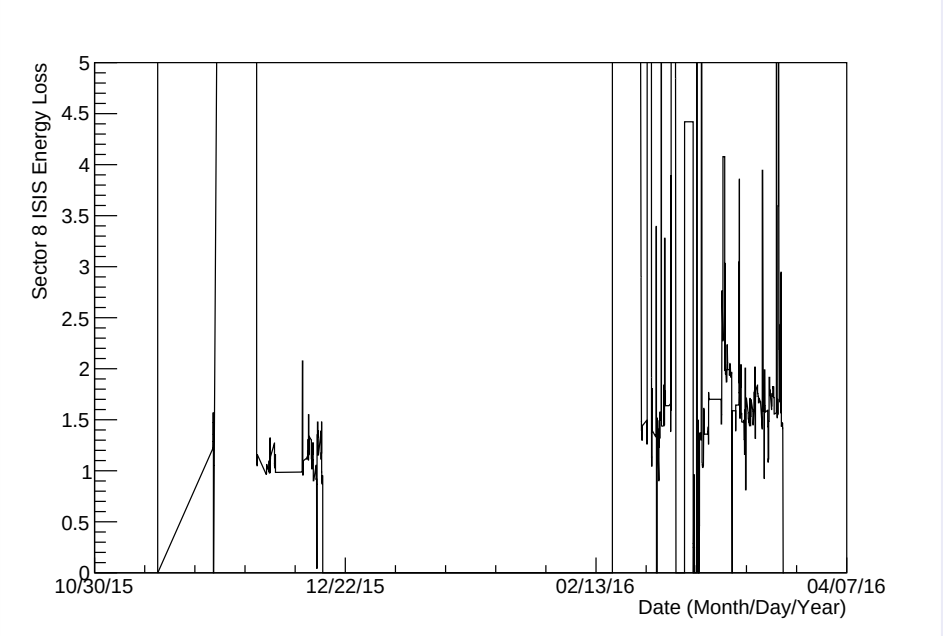
- Safety training streamlined.
- Full PPS training for all shifters.
- Adopted a shifter directed standby procedure for February-March running.
  - Shifters raise/park the target
  - Recover from standby.

ISIS Interactions: Spills, Trips, and Bumps

- Successfully petitioned for ISIS beam loss trip level of 2.5 V
  - Allows us to reach agreed upon 2 V beam loss.
  - Direct increase in rate by 40%-100%
- Some issues with losses with beam bump
  - Tuning exercises did not produce a solution to make ISIS and MICE happy.



ISIS beam losses since CM43



Interventions

The Helium must flow

- Several direct interventions forced pauses in data collection

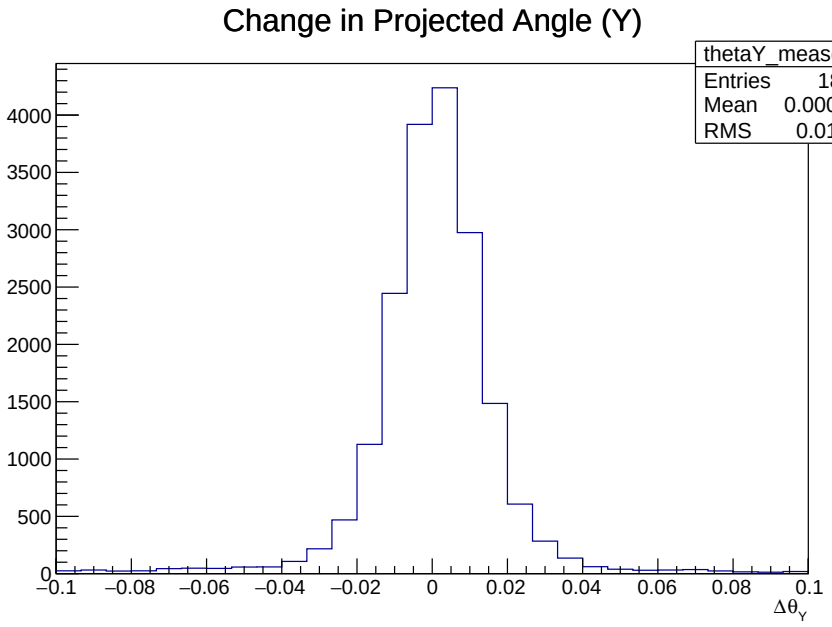
Tracker Helium

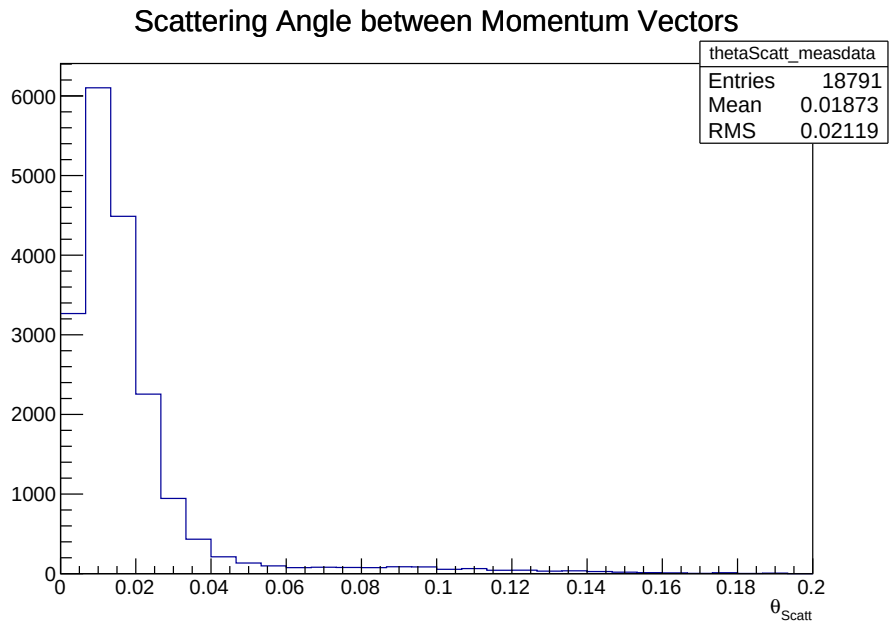
- Stopped flowing on 11 March in TkDS.
- Volume 0.3 air by Saturday (not significant to scattering studies).
- Sustained interventions continued to make sure flow continued.

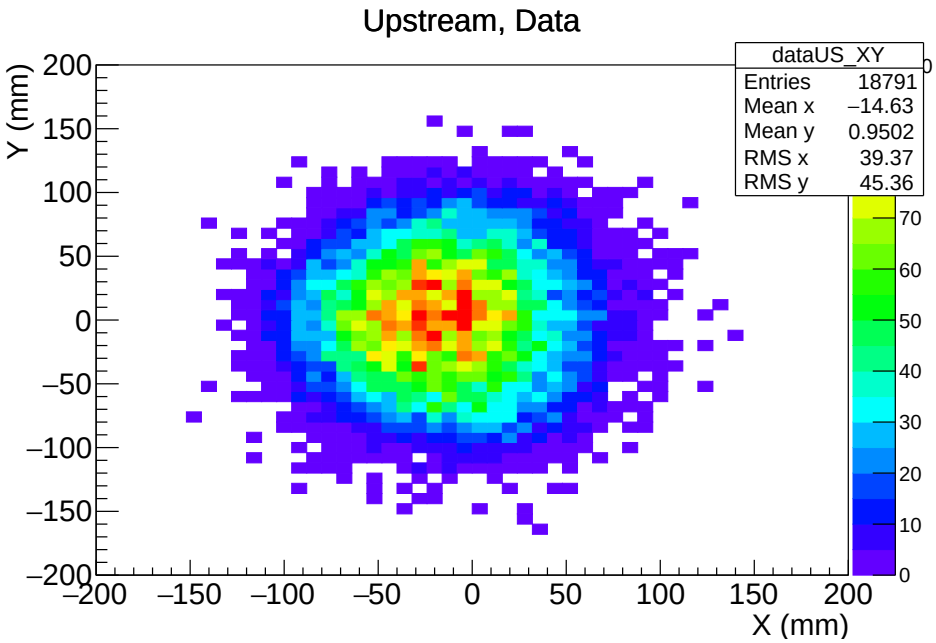
Spectrometer Solenoids

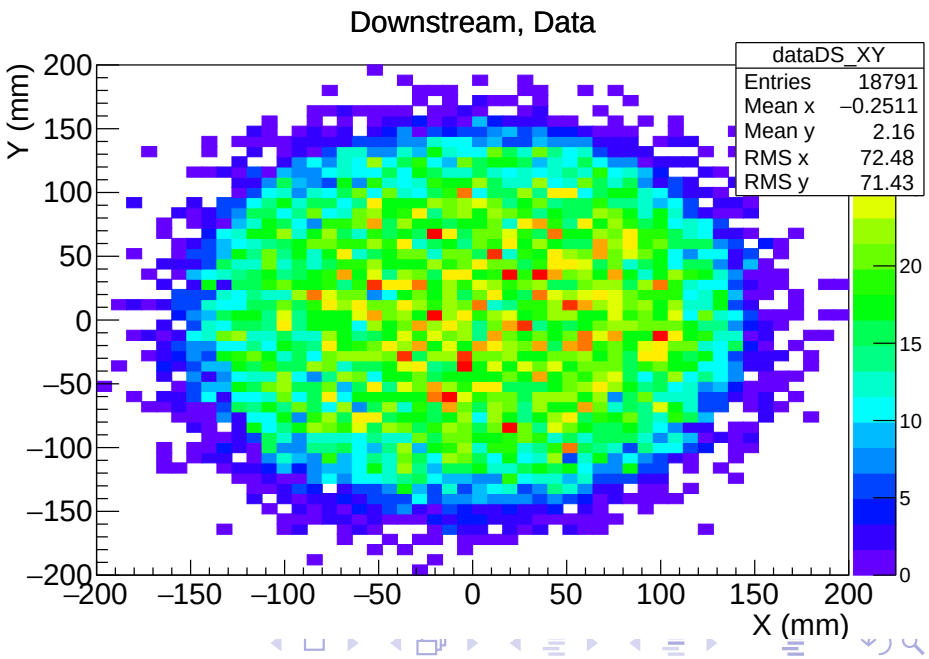
- Two separate malfunctions of SSU and SSD caught by shifters
- Required sustained interventions on 17th (SSU) and 21st (SSD).
- Reactions were timely and productive.

No Absorber Physics Data Collection: 200 MeV/c

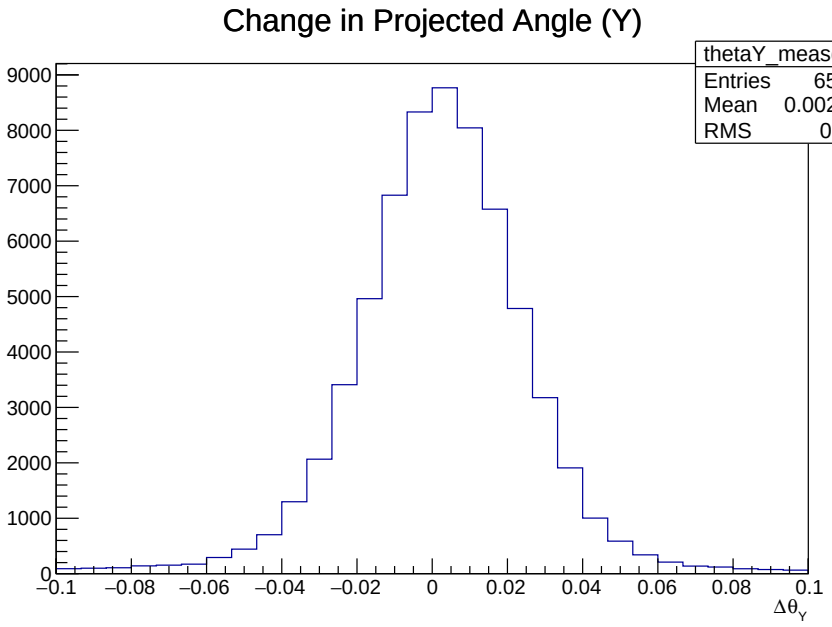


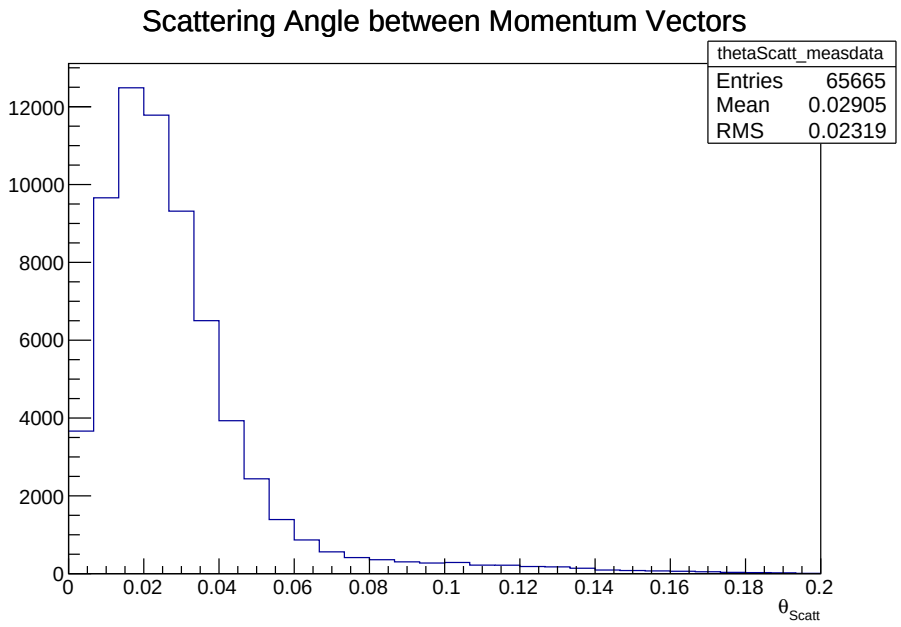


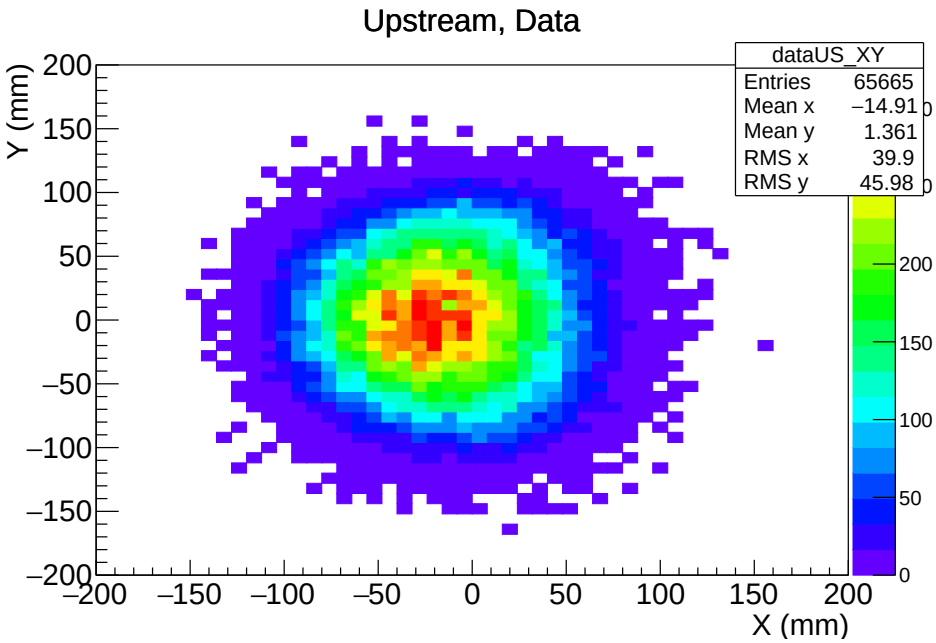


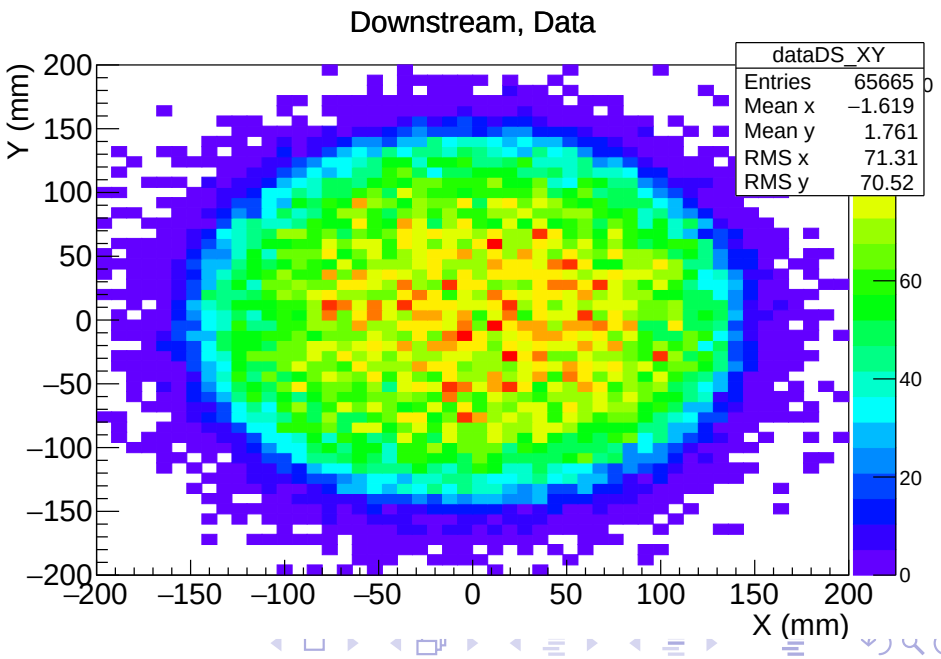


LiH Scattering Physics Data Collection: 200 MeV/c









An Excellent Dress Rehearsal

- Successfully completed a data collection campaign
  - All physics goals achieved
  - Needed to take advantage of a subset of contingency time
  - Success to build on for full Step IV
- On the fly training regime works
  - Can be made more efficient.
- Successful interplay between commissioning and operations.
  - Facilitated by MOM/DC transitions.
  - Expert cover proved to be responsive and efficient.
- Congratulations to the shifters and all involved for a successful run.