E906/SeaQuest AEM Report

Kazutaka Nakahara

University of Maryland College Park

5/12/2014

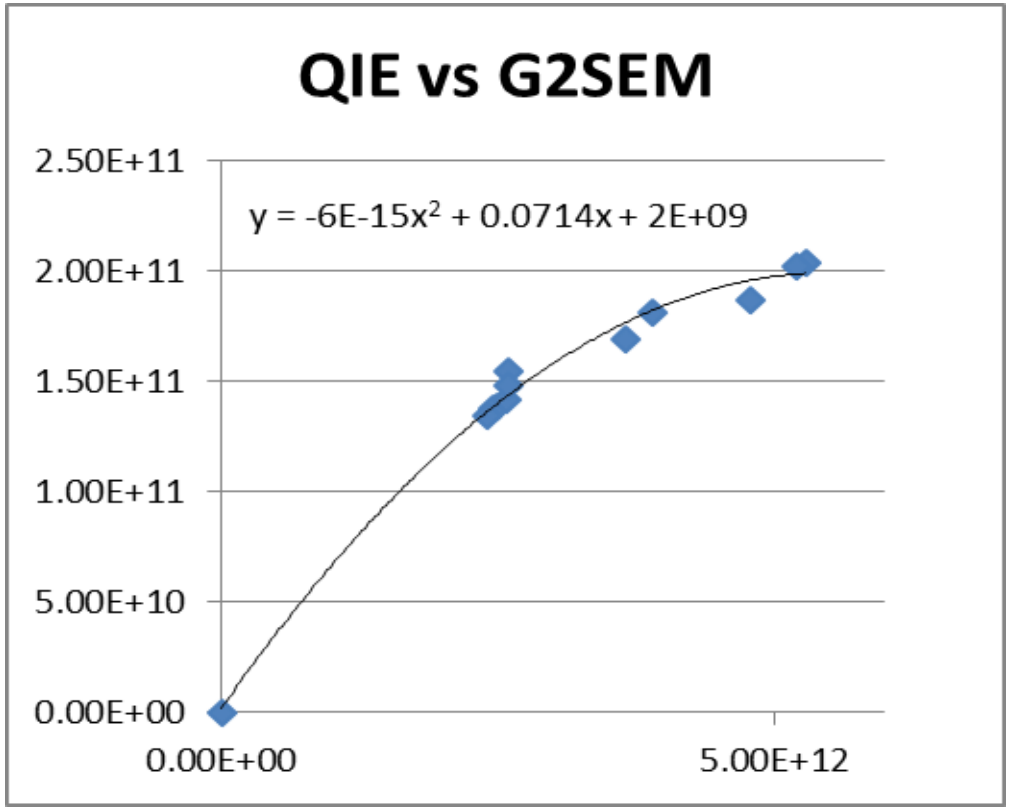
Effect of adding Neutral Density Filter

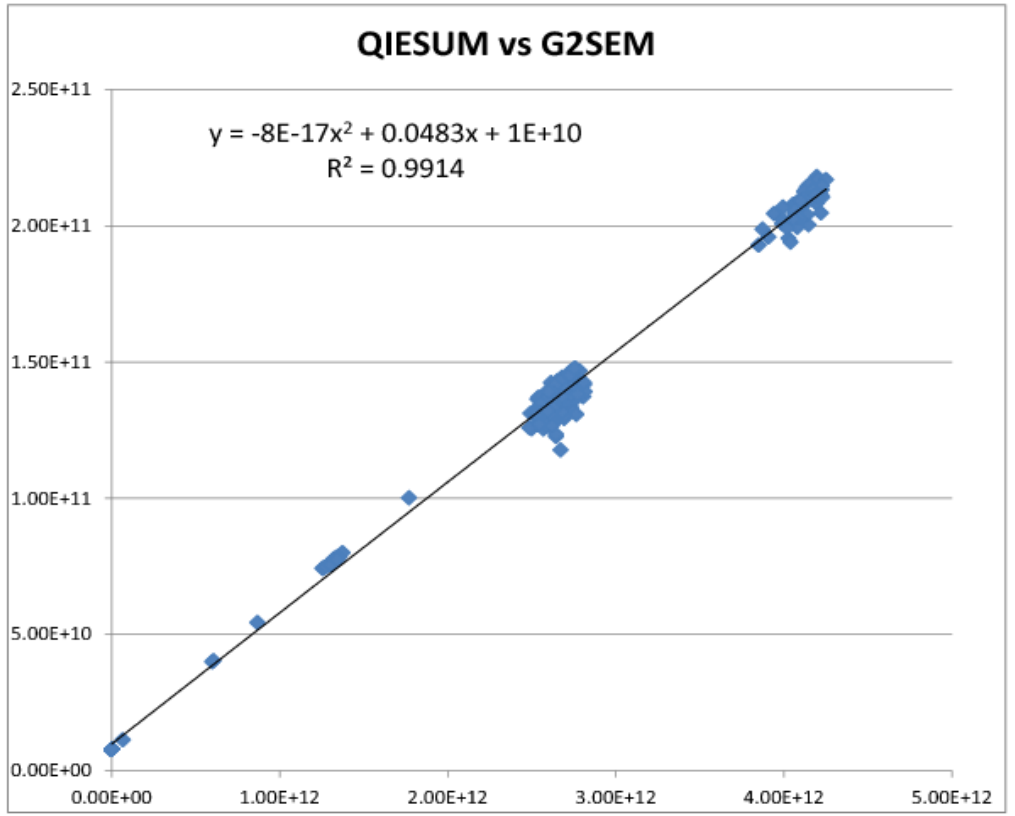
We were allowed to test up to 4-turn injection by fencing off part of the north parking lot. This revealed (or perhaps confirmed) some interesting things.

Cerenkov beam monitor was seen to be saturating (non-linearities seen at high beam intensities). PMT sag?

Similar saturation effect seen on NM3ION.

- Added neutral density filters in front of the Cerenkov PMT.
- 5% filter on Monday
- 2.5% filter on Thursday





Beam Status

A few recent changes:

- Calculation of duty factor for each spill now includes all RF buckets within a turn. (7 booster batches instead of the 6 filled)

  ➔ will never get 100% DF (max = 85.7%, or 6/7 booster batches), but…

  ➔ clears away any confusion about which RF buckets we're including in the calculation…we are now including all of them.

- Integration window starts at 100 turns after the $75, and goes for 369000 turns.

$$\text{DF} = \frac{\langle I \rangle \langle I \rangle}{\langle I^2 \rangle} = \frac{(\sum I)(\sum I)}{N(\sum I^2)}$$

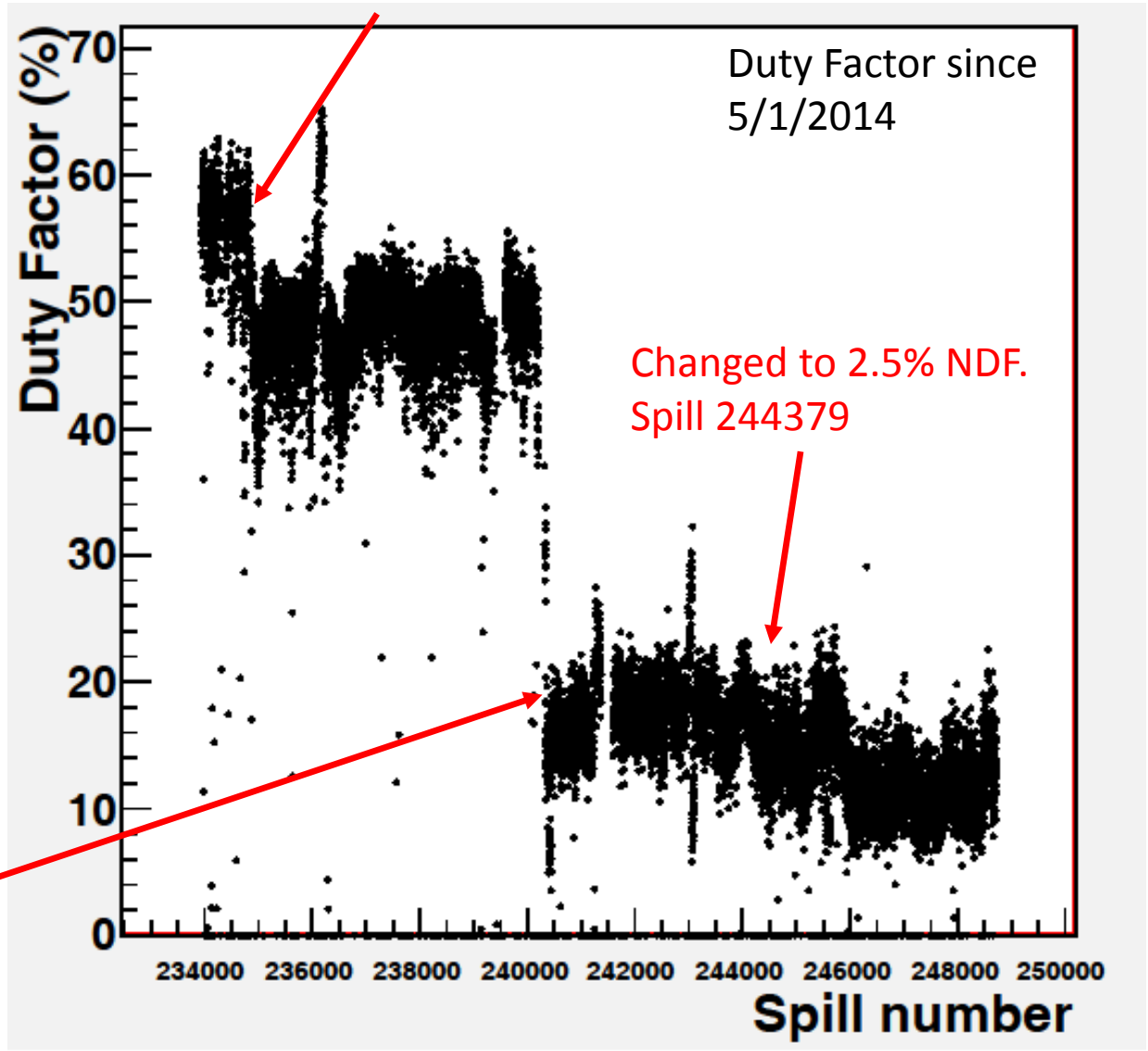
- No change in the way duty factor calculated for the 7.5kHz system.

Beam Status

- Cerenkov beam monitor was seen to be saturating (non-linearities seen at high beam intensities). PMT sag?
  - Added neutral density filters before the PMT.
  - 5% filter on Monday
  - 2.5% filter on Thursday

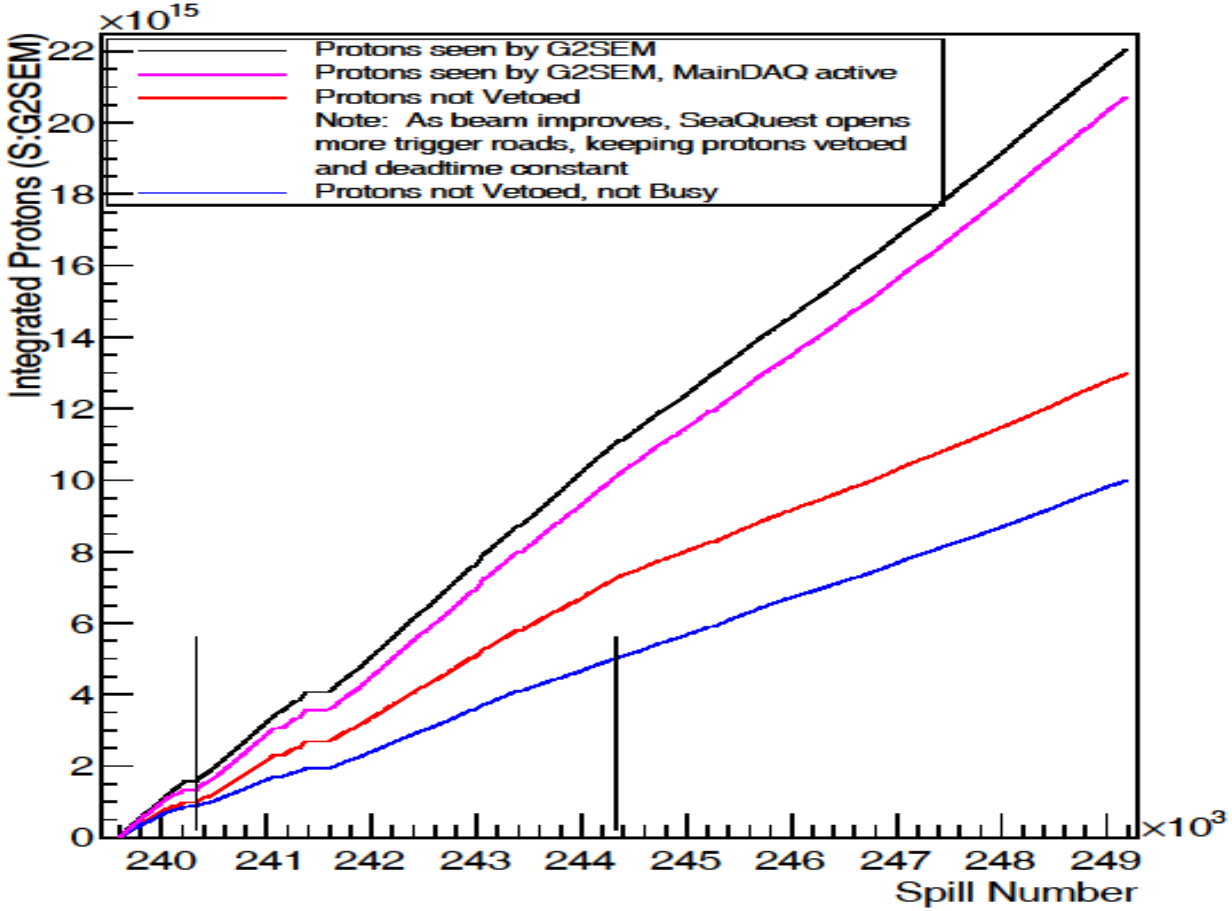
➔Spikes in beam intensity not seen before can now be seen.

➔Duty factor lower than what we had previously thought. (~60% → ~15%)



Beam Status

- Which also means…
  - While we are inhibiting the same amount of beam as we were before, we now have a better measure.
  - ~50% inhibited at current threshold levels. Beyond this point, many of our events become too messy to be able to reconstruct.



Other…

- We continue to improve our trigger road set.
  - Removing hot roads to bring down data volume to a reasonable (and cleaner) level.
  - Looking at inclusion of Level 2 (Pt) cuts.
  - These are likely to improve data quality, but effect won't be able to replace improvements in the duty factor.
- Foil calibration performed by AD on NM3ION.
- QIE board sees occasional crashes.
- Target flammable gas detector changed to VESDA – 1 transient "trouble" alarm. Nothing seen on FIRUS.
- All hodoscopes turned off during power glitch (?) during a thunderstorm on Wednesday.