

Coherent Activity at Injection?

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Introduction

- Several tools available to provide information on whether there is bunch activity at injection.
- ADTObsBox is currently (and has been since mid-2016) automatically saving 4096 turns of all bunches at every batch injection. This includes all the circulating bunches at the time of injection.
- Can also manually trigger ADTObsBox during the injection process or later to save 32k turns at time of injection or 64k turns at any time to see if there is coherent activity in other parts of the cycle.
- Daniel has recently launched in the CCC the ADT Activity Monitor. This displays bunch by bunch notch filtered peak amplitude over 4096 turns and publishes new values at rate of 2Hz.
- This data is not yet logged, but once it is will be invaluable.
- We have these tools combined with the BBQ to try and understand anything that could be impacting the beam motion.
- From our side, the picture doesn't appear to have changed from the measurements made in fill 5885 compared to measurements made in fill 6054.

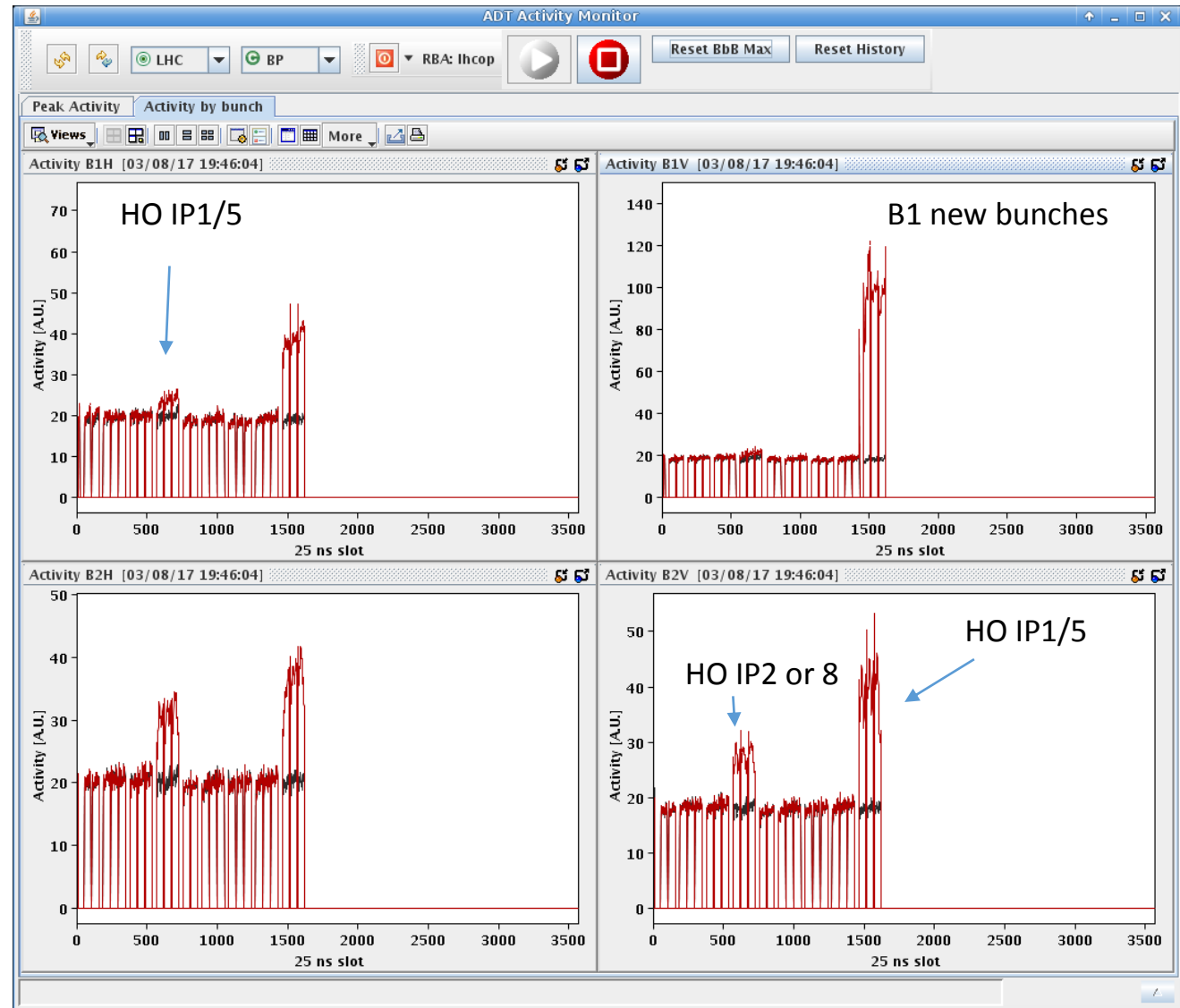
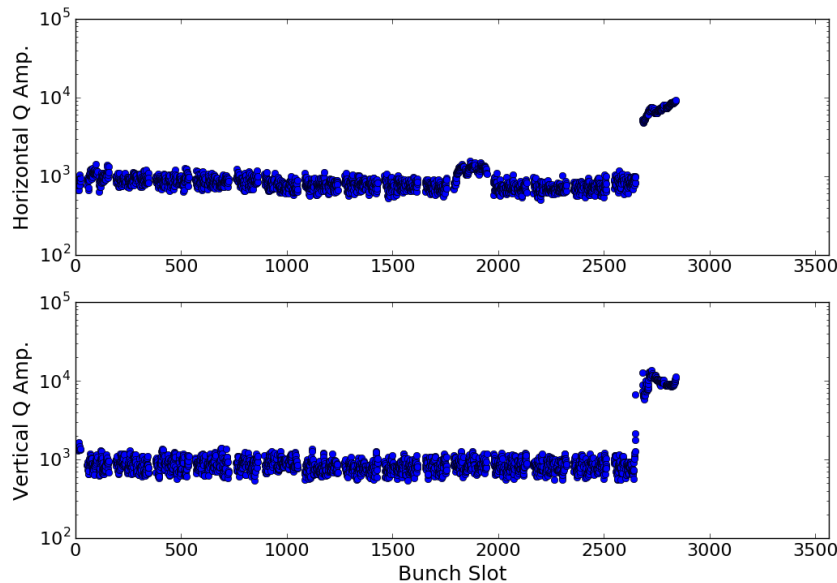
Overview

- Observations with ADT Activity Monitor at injection.
- ADTObsBox during fill 6054.
- BBQ during fill 6054.

Observations with ADT Activity Monitor

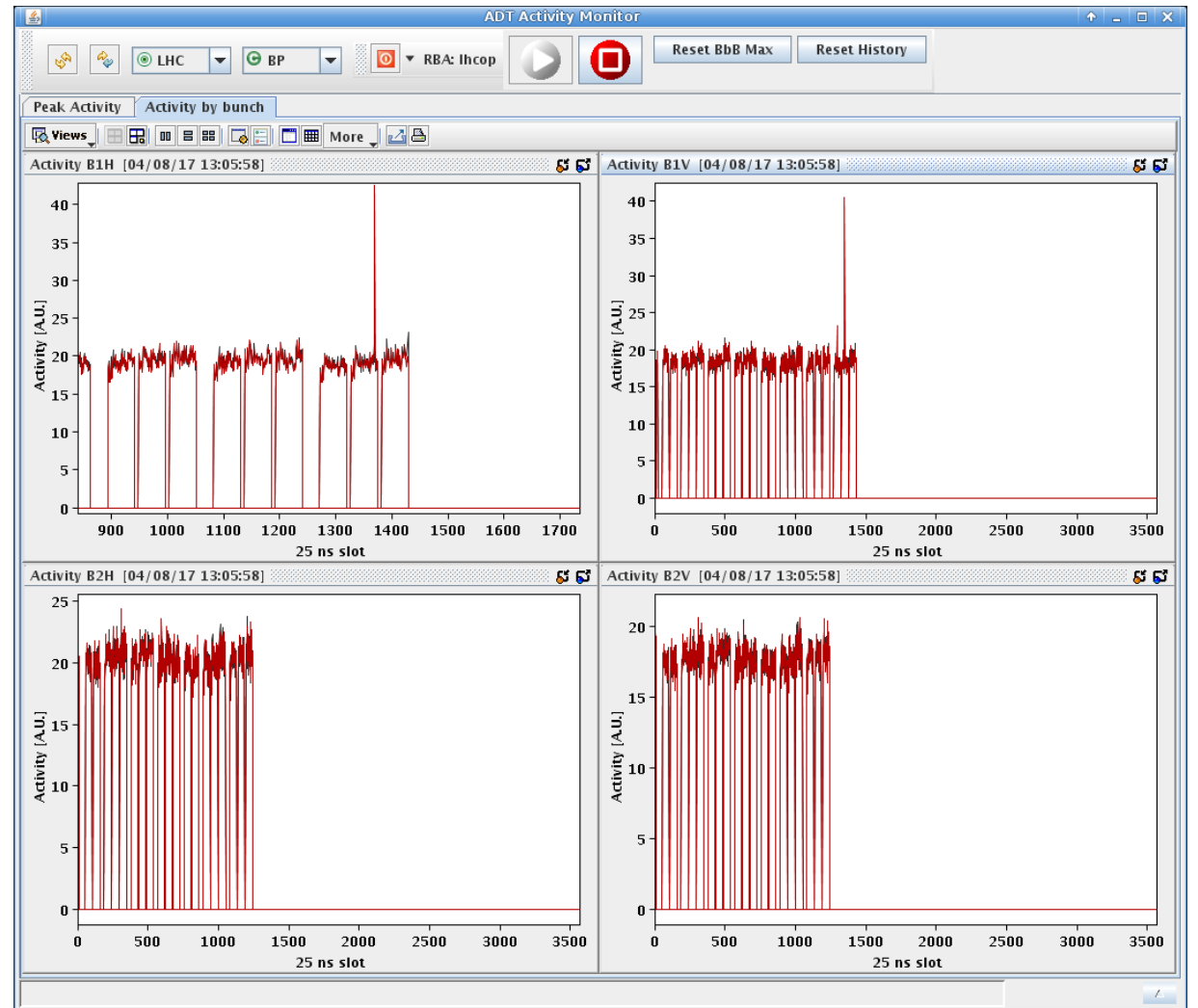
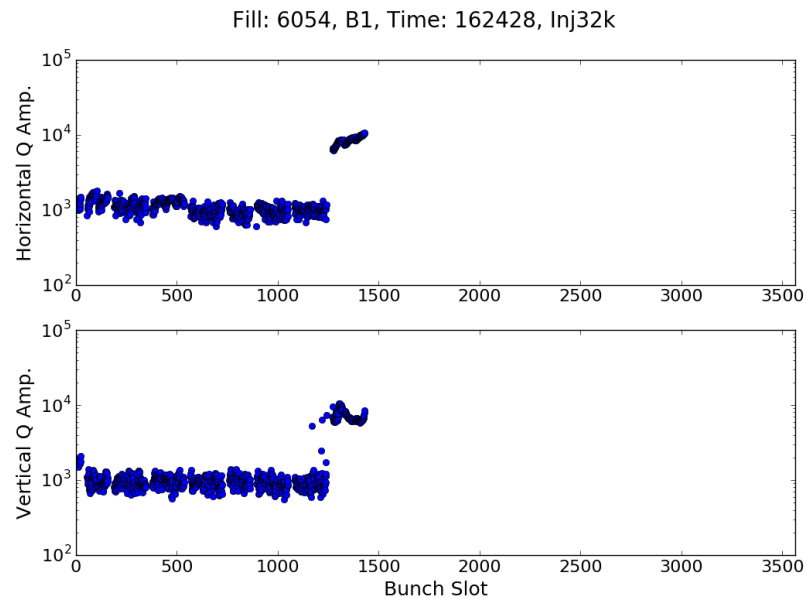
- Exchange of injection oscillation amplitude through all IPs, even going back into the same beam via IP2/8 then IP1/5.
- This happens in every fill.
- Not surprising in general, but the amplitude transmission from one beam to the other is large.
- B1V -> B2V is ~30-40%.
- Not seen in quite the same way in ADTObsBox data.

Fill: 6054, B1, Time: 163804, Inj32k



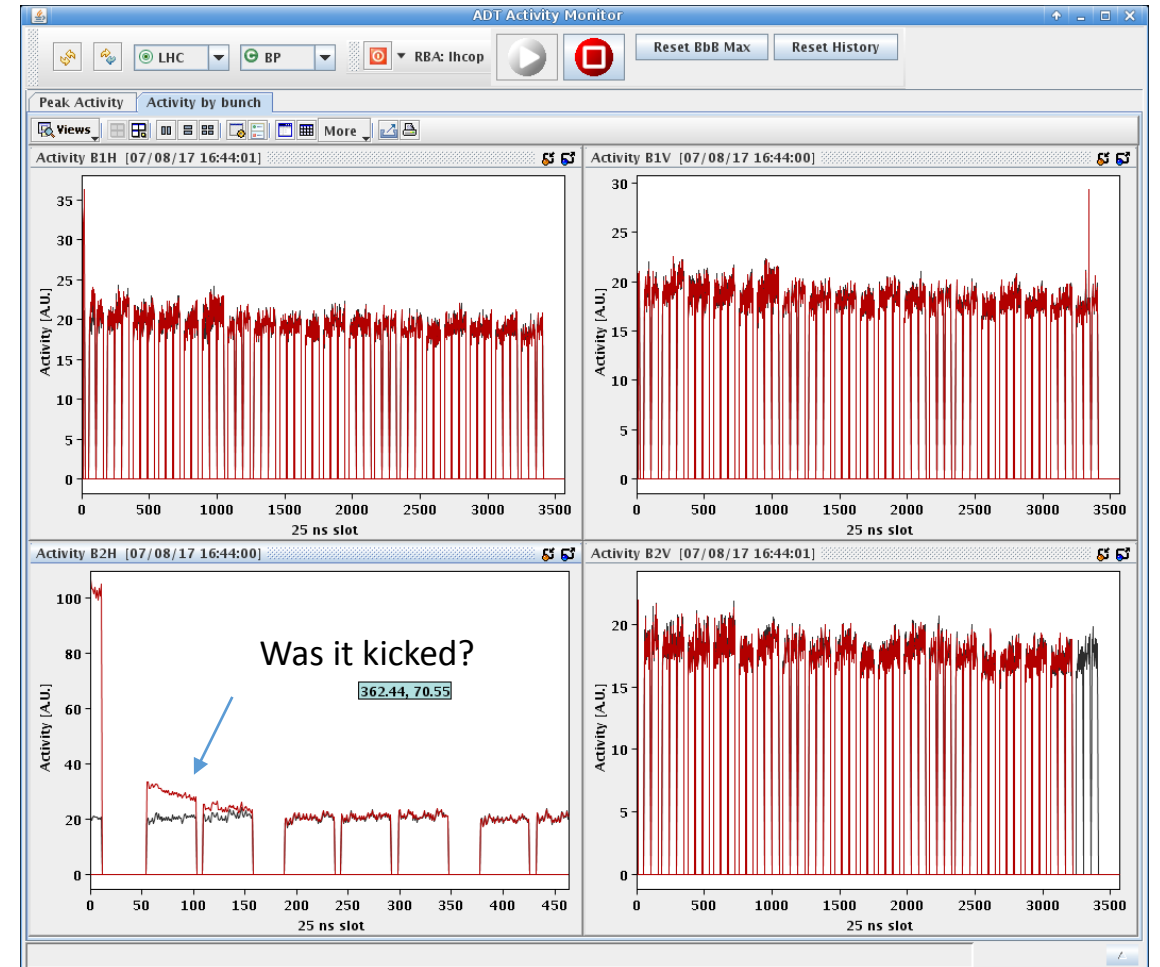
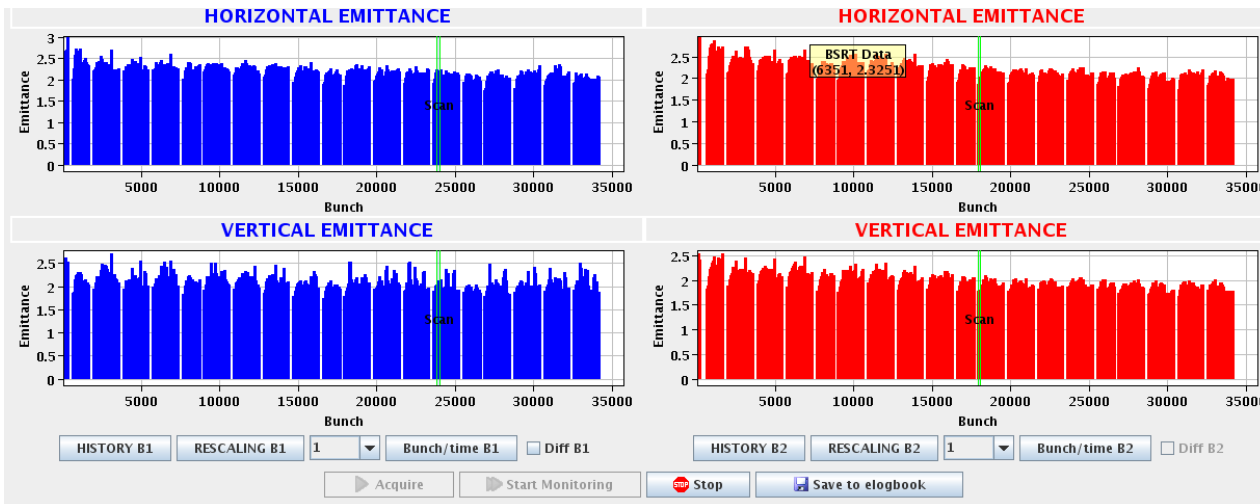
Observations with ADT Activity Monitor

- Single bunches oscillating strongly in most recently injected batch during cleaning for the other beam.
- Cleaning kicks or coherent oscillation? Still being explored, but is also seen in injection oscillation data.
- This is only affecting single bunches and not full batches.



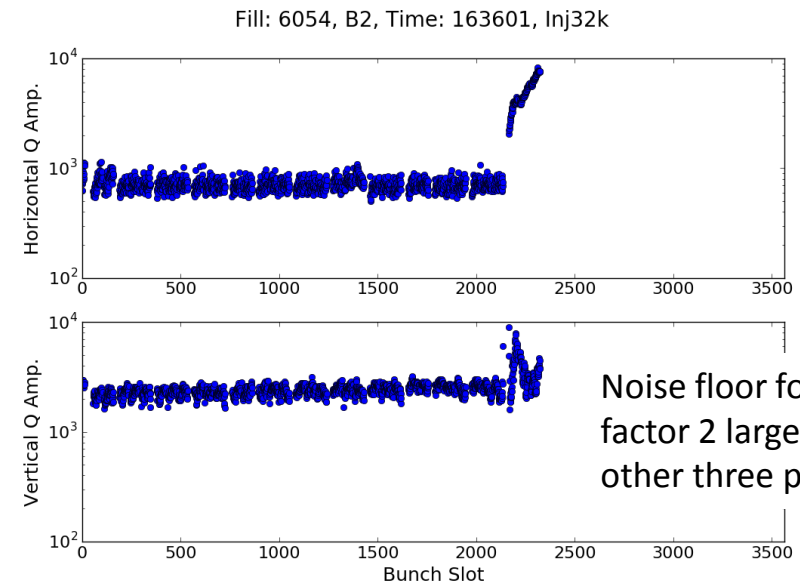
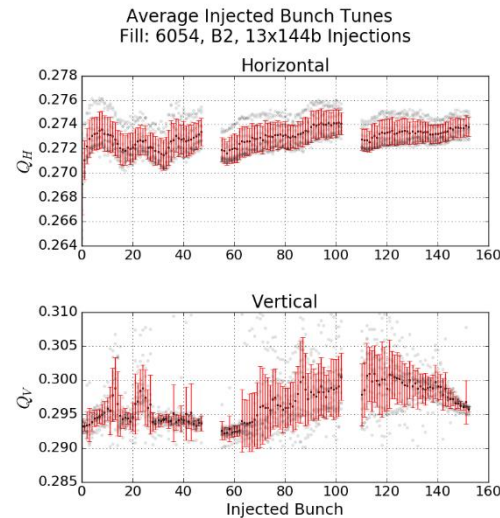
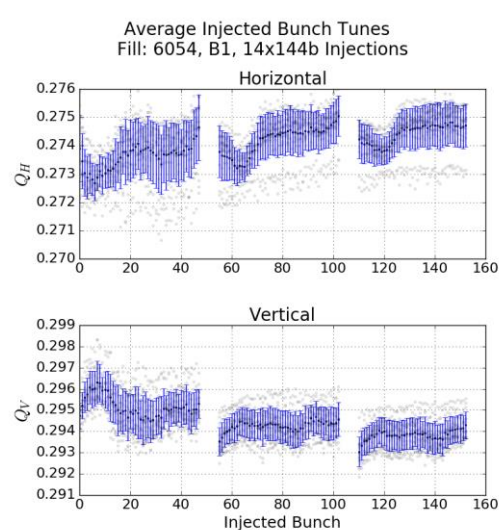
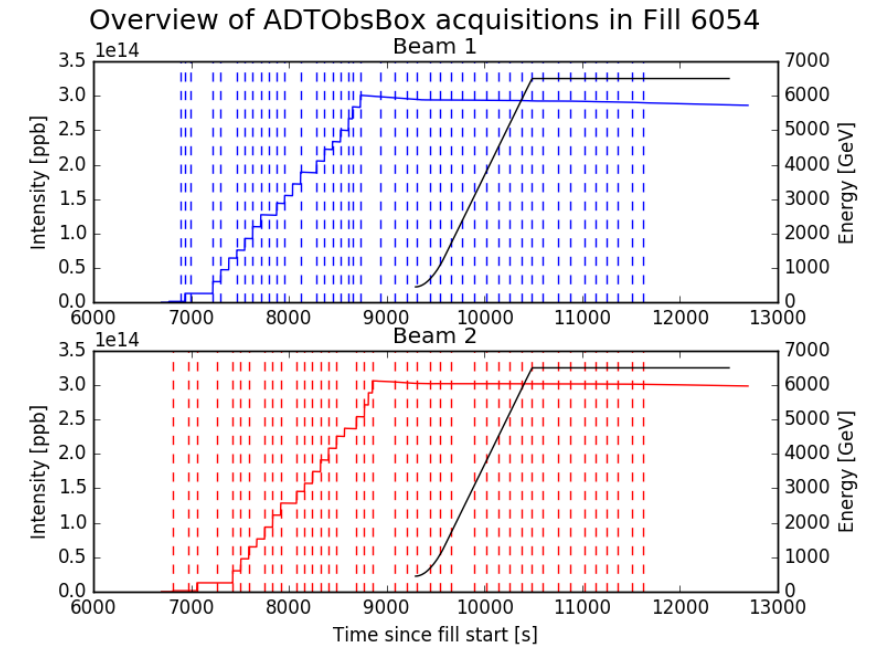
Observations with ADT Activity Monitor

- Strong activity on non-colliding bunches when injecting the final 1 or 2 trains.
- Activity mostly in H and seen individually for B1 and B2.
- Emittance blowup in B2H (at time of next scan was 3.5 μ m) was seen, less so for B1H.



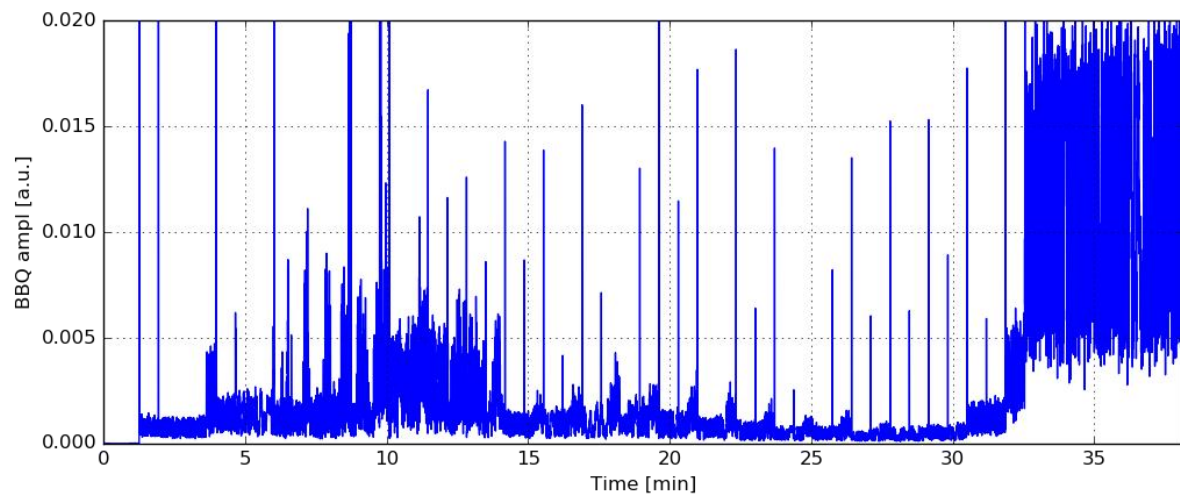
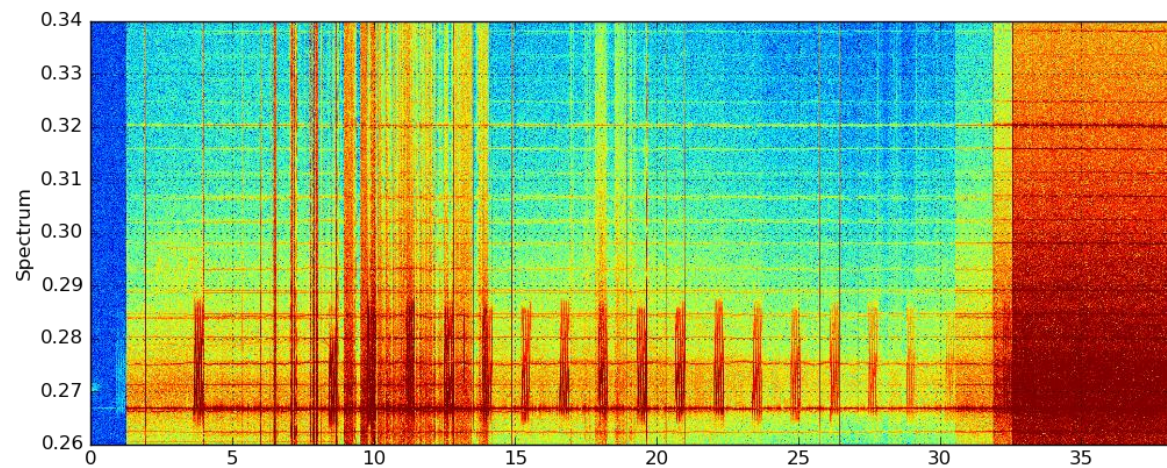
ADTObsBox for fill 6054

- No activity seen that could indicate full beam undergoing coherent motion (no data for B1V for 64k turns).
- Some cases of individual bunches oscillating as described before.
- Noise floor in B2V is factor 2 larger than other three planes but could be related to pickup rather than beam dynamics.
- These observations are consistent with fill 5885.



BBQ for fill 6054

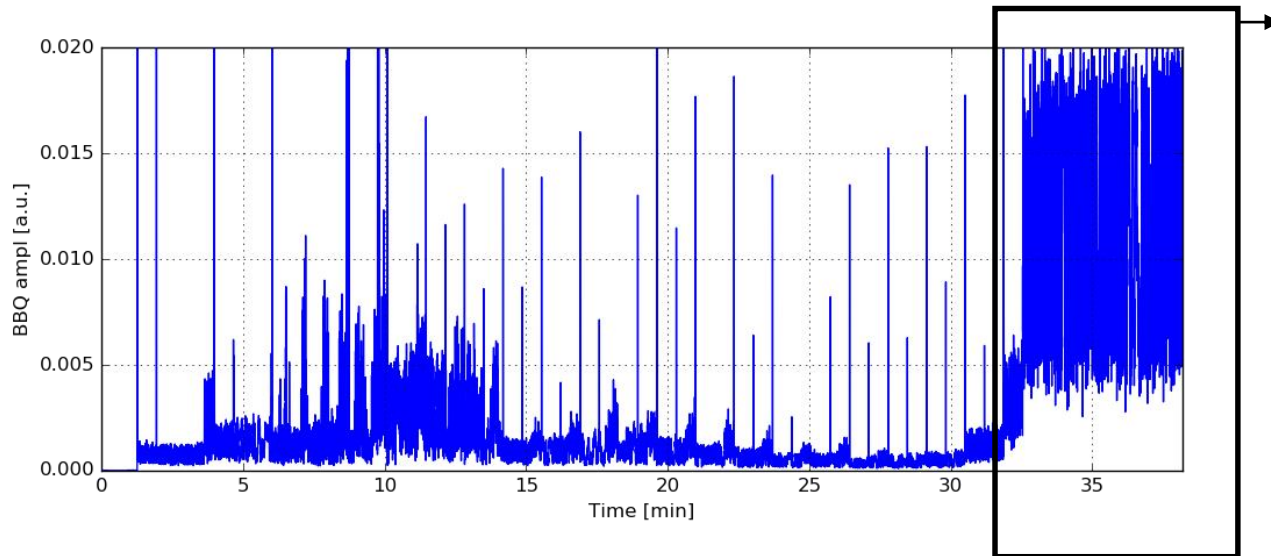
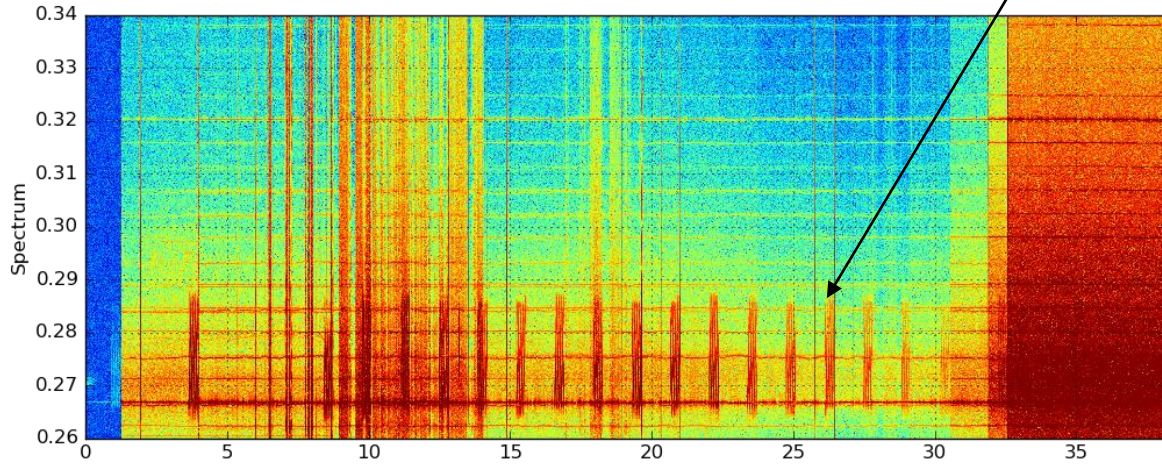
B1H HS



BBQ for fill 6054

Cleaning

B1H HS

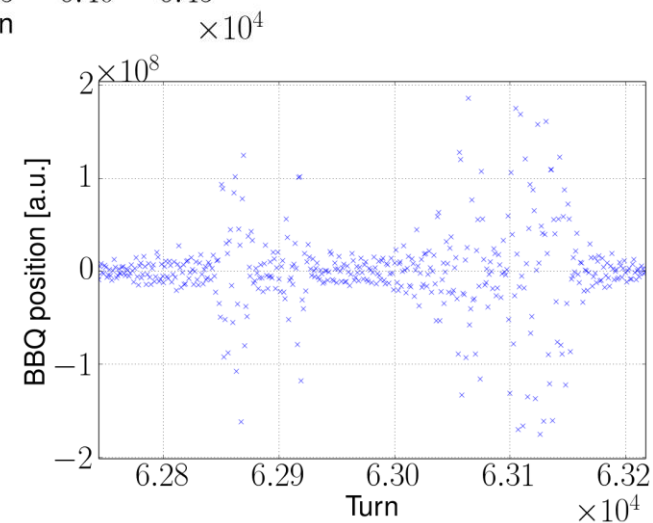
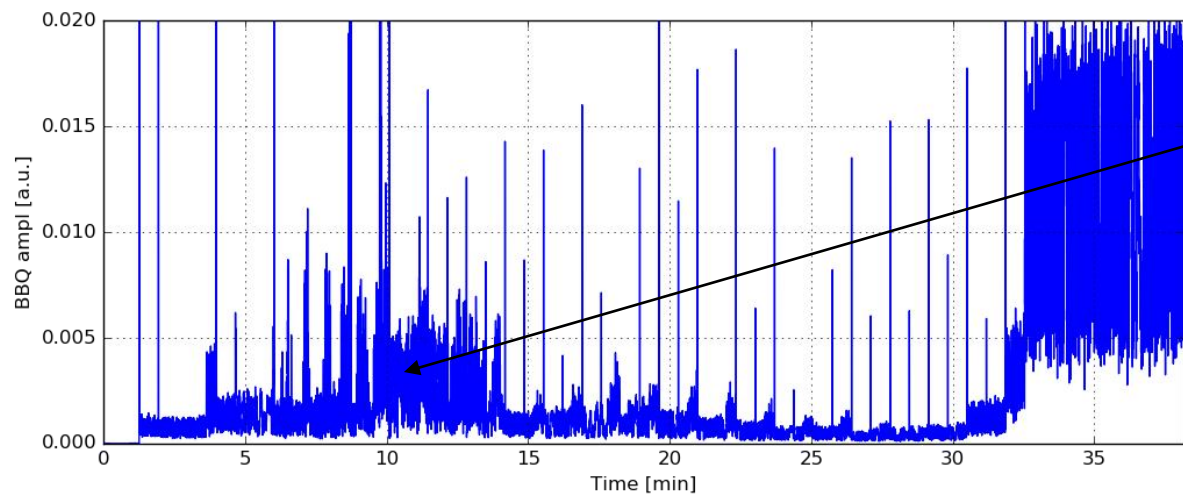
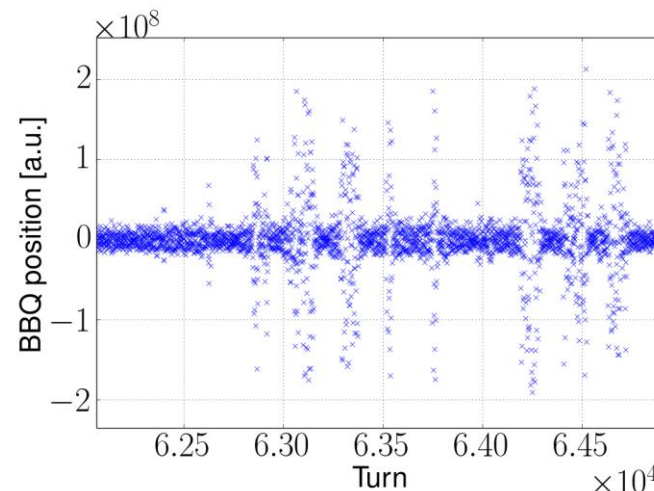
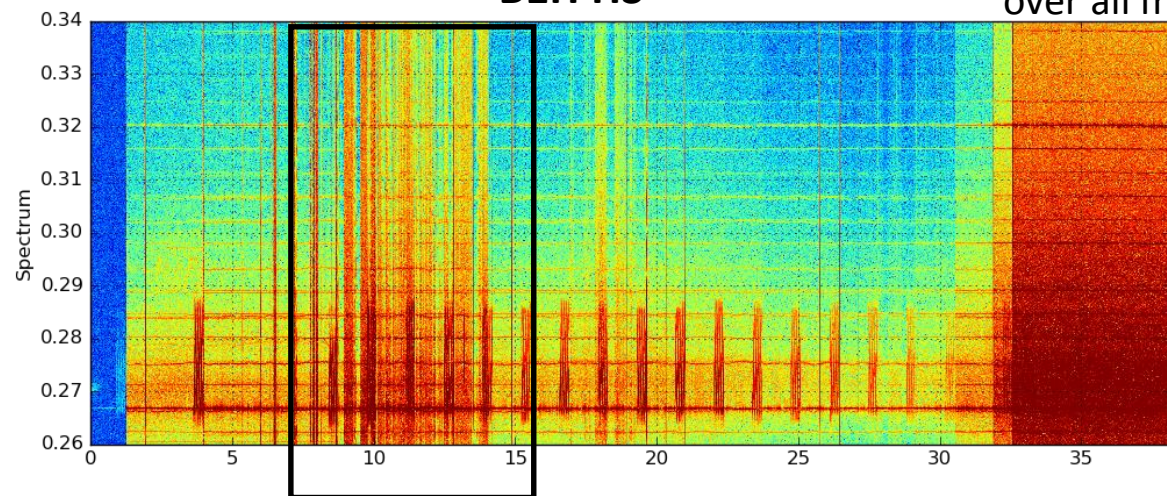


BBQ saturation with high intensity

BBQ for fill 6054

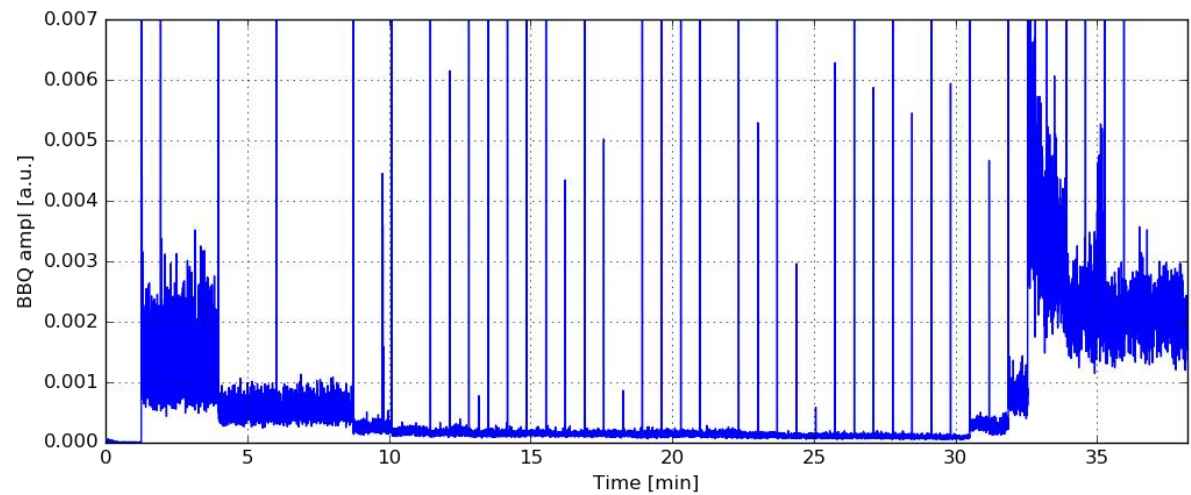
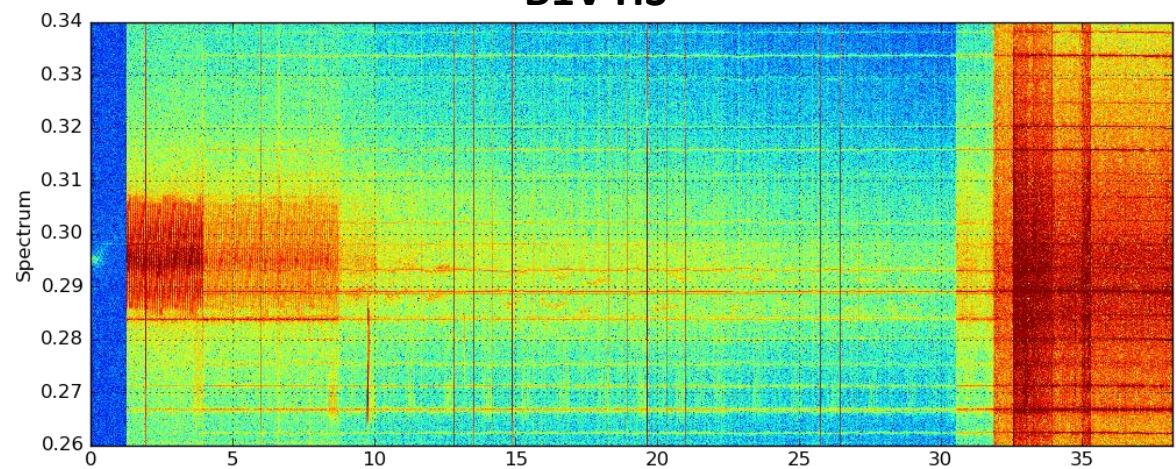
Cleaning has higher effect on BBQ. Appears to act over all frequencies.

B1H HS



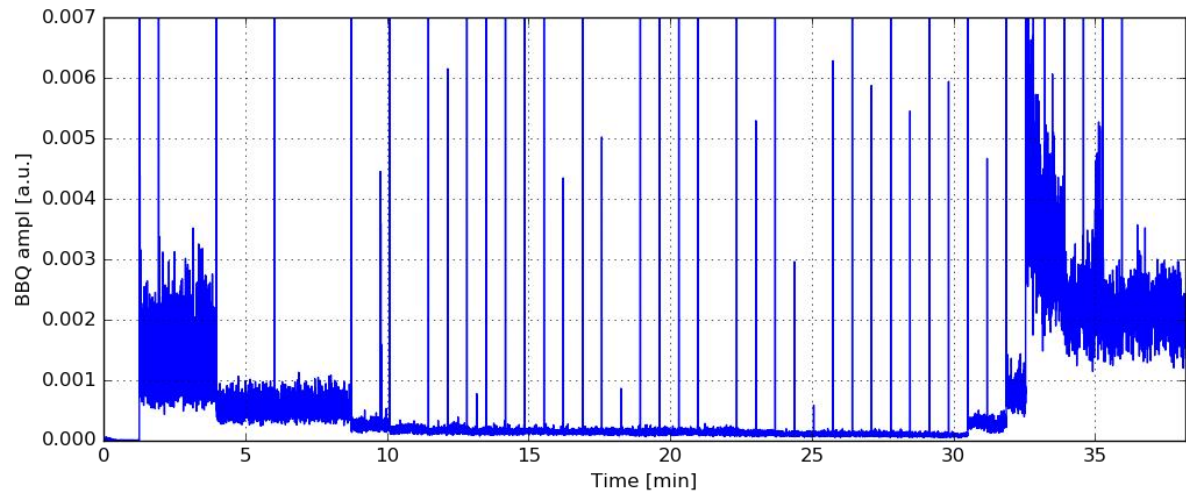
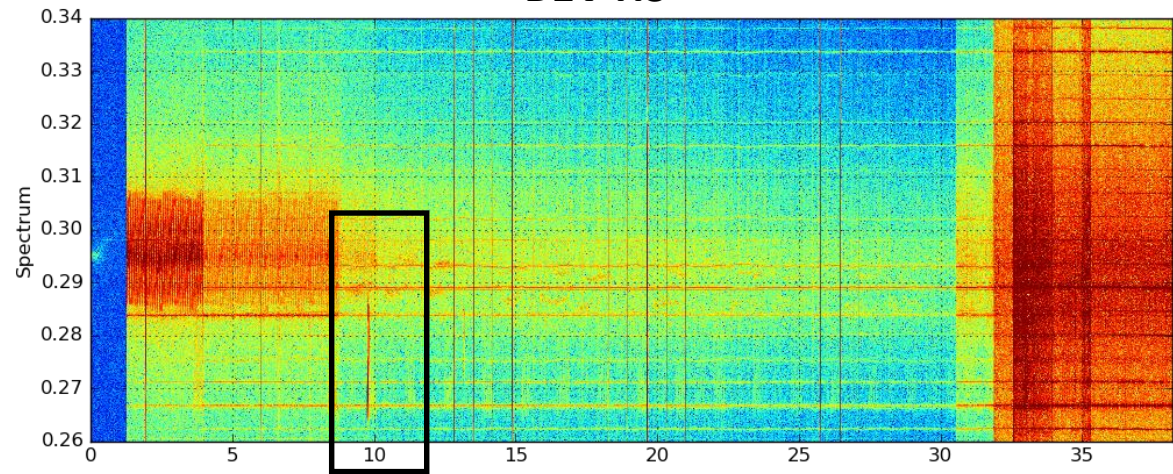
BBQ for fill 6054

B1V HS

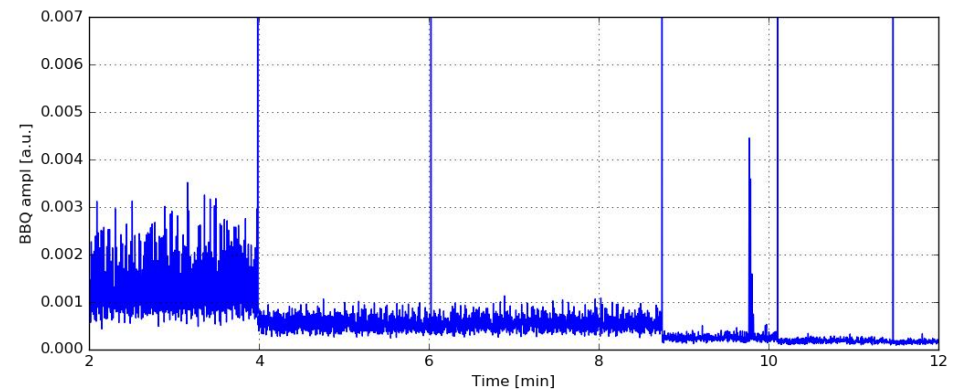
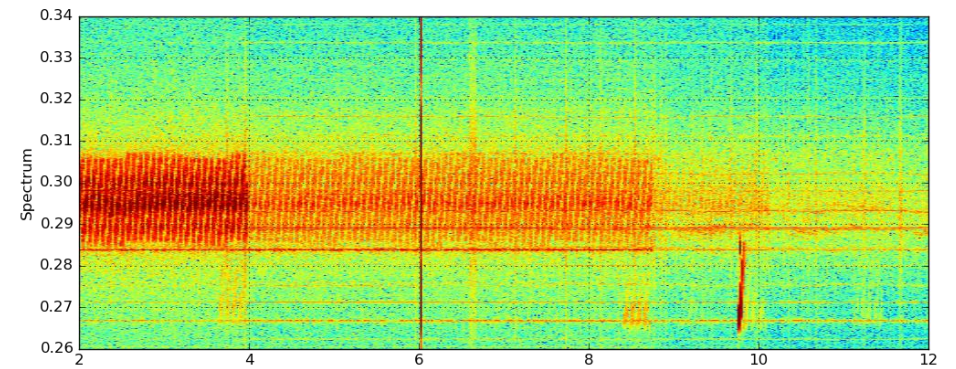


BBQ for fill 6054

B1V HS

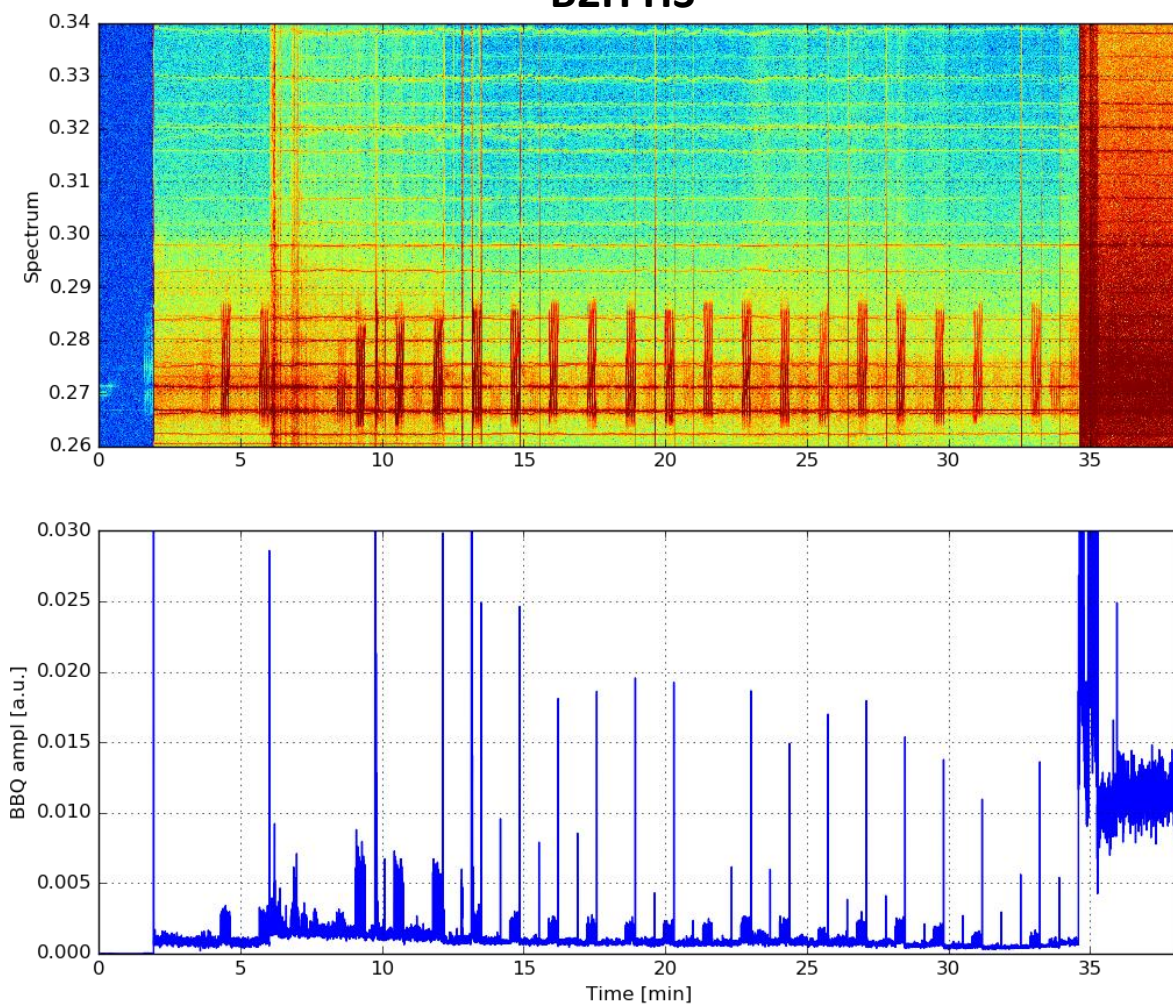


One instance of strong horizontal cleaning in V?



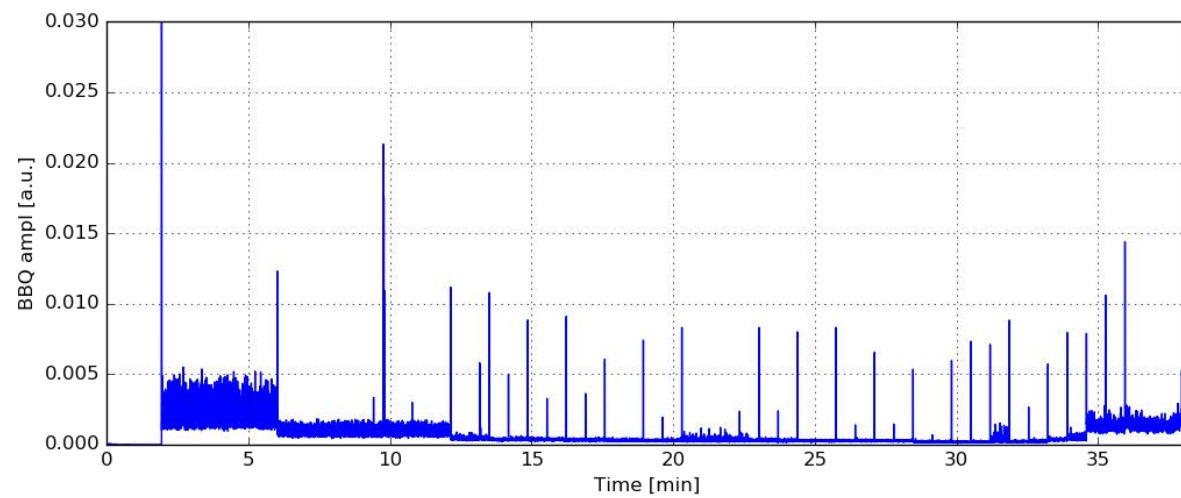
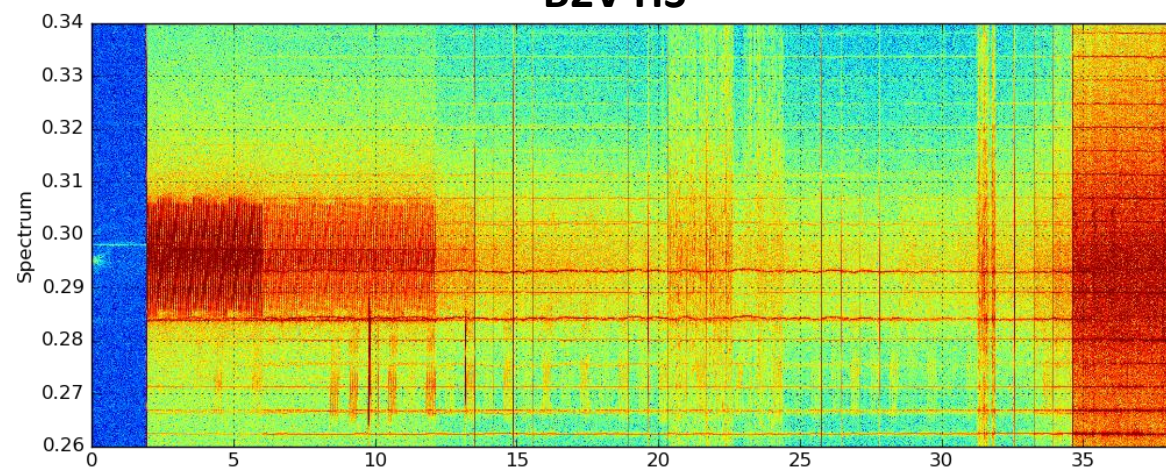
BBQ for fill 6054

B2H HS



BBQ for fill 6054

B2V HS



Thoughts

- We have all injection oscillation data saved.
- We have the ability to see (not yet logged) activity bunch by bunch online.
- We have the ability to store this data at any part of the cycle (with the manual trigger).
- We are in discussions with M. Gasior about saturation effects in the BBQ signal.

- We are open to new ideas of performing the data analysis, or if we need to acquire new data during the next fill/fills, then it is also a possibility.