CBETA BPM Timing Scan and other details related to safe beam mode operation

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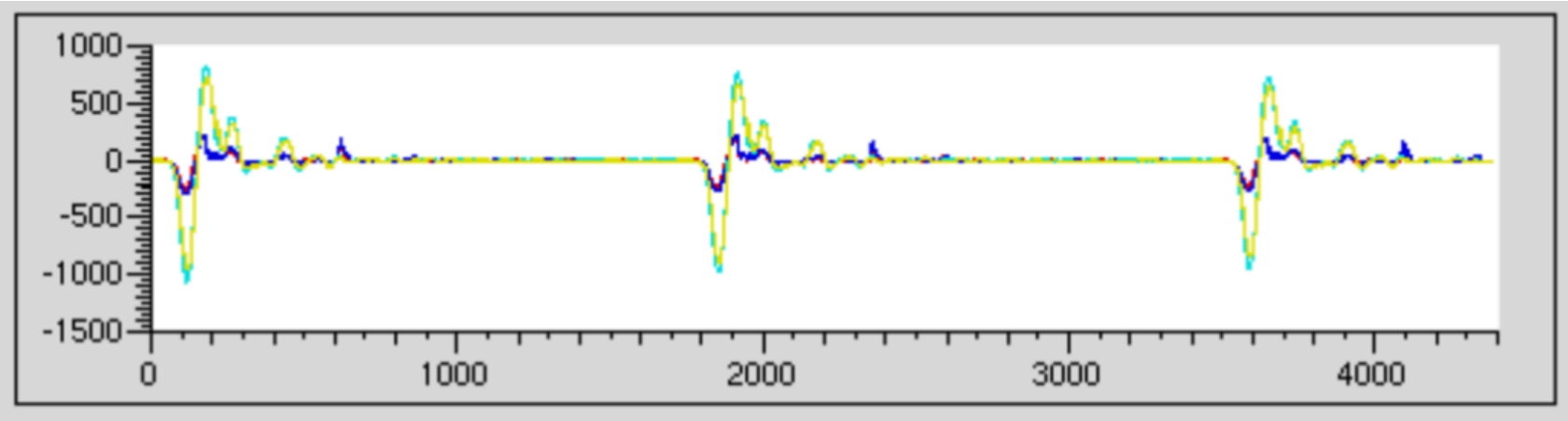
Safe Operating Limit

- Need to define safe operating limit for day 1 operation
  - Is it 100 pA continuous? This would translate to one 10 pC bunch @ 10 Hz, or other equivalent combination

How will we ensure that the safe operating limit is not exceeded?

- Can (or should) this be handled to some extent within the bunch pattern generator?
  - Issue: charge/bunch is not known by the generator
- Is some type of beam instrumentation system needed to do this?
  - Issue: we don't have any beam current transformers
- Should this be handled administratively?
  - Issue: this would not be fool proof

BPM timing scan



- Used to find the correct ADC trigger timing values
- Will likely need to be done often, especially for early beam operations
- Requires about 1000 bunch train injections
  - where each bunch train contains 1 to ~10 bunches
  - about 250 different timing settings with 4 sample average at each setting
  - At 1 Hz train injection rate, about 1000 sec (16.7 minutes) would be required to perform a timing scan
    - This is clearly not acceptable.
  - At 100 Hz this would require about 10 seconds to perform a timing scan
    - This was the case during the fractional arc test and was acceptable

Bunch train injections at fast rate for short durations

- To accommodate the BPM timing scan requirements, would it be acceptable to inject bunch trains at 100 Hz for short durations?

- The question of how to ensure that the overall safe operating mode is not exceeded arises again
  - For example, for each burst of 100 Hz injections, would all injections need to be disabled for some period of time?