

Notes from the 09/12/06 MI BPM Upgrade Meeting  
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These notes can be found in Beams docDB #1526.

Agenda as announced:

Project announcements - Steve and Bob  
2.5 MHz measurements - Rob, others  
MI BPM status list ("punch list") - Dave  
53 MHz gains - Bob Dysert  
Transition board controller status - Stefano  
& Board by board gain control - Stefano  
Alarms - Dave, Steve, Luciano, Brian  
Diagnostic/testing - Marv, Manfred, Peter  
Software, FLASH, Seam - Steve, Luciano, Brian  
Validation - Rob  
AOB

#### 0. Announcements.

- Pizza party will be Friday September 29 at noon at Pal Joey's.  
Email will be sent out to work out details.

- A list of remaining tasks was shown (beams-doc-2450). The items mentioned are given below. There was some lively discussion but it seems clear that the 2.5 MHz pbar measurements are very important and useful for accelerator operations.

The items are:

1) 2.5 MHz pbar measurements. Establish that the software and hardware is working as designed, quantify what that means in regards to providing useful measurements in the presence of the observed electrical noise, understand what is truly important to operations, and make "reasonable improvements (in terms of what's physically possible and practically achievable with available resources and time) that will provide important and definitive operational and machine physics benefits."

2) Short batch proton measurements. Note: implementing the individual transition board gain settings and establishing a suitable "base" gain for this type measurement will solve wideband measurement issues with this beam structure. Further investigation, after transition board "base" gain is established, is necessary to understand narrowband measurements with this beam structure.

3) 53 MHz gains. First we should get the 53 MHz gains set for short

cables and all cycles. Bob and Bob will have a report Tuesday Sept 12.

4) Alarms. External control signals first. Steve, Luciano, Dave, Brian.

5) Board-level gains. The plan is to have this functionality by the end of September. Stefano, Steve, Bill.

6) Diagnostics/test signals. Steve, Manfred, Marv, Manfred, Brian.

7) Alarms/self-test. This is listed as "Components with the BPM system" in Dave Capista's note in beams-doc-2428.

8) Debug odd behavior. Need a definitive priority list.

#### 1. MI BPM status list ("punch list") - Dave

- Dave showed some slides showing data from two different types of measurements. One was the short batch closed orbit measurements (30 compared to 7 bunches). In this case no differences in position would be expected but some are seen, both in the horizontal and the vertical. This may be due to a lack of sufficient gain at some locations. Dave can collect more data to help study this issue.

- Then he showed some ideas on how to improve the 2.5 MHz TBT and FLASH measurements. These include the proposed capacitor change to the transition boards as well as software changes to how the first and last turns are defined.

#### 2. Validation - Rob Kutschke

- Rob showed many plots from state 11 (RR -> TeV) and state 20 (ACC -> RR). His plots can be found in beams-doc-2451.

- In those slides one will find BPMs that look great with very little noise and others that have quite a lot of noise that in some cases make it difficult to find the first or last turn reliably using a simple threshold.

- He also found cases where kicker noise contributed a bad position measurement in a single turn.

- There was a great deal of discussion about the measurements, whether providing reliable first and last turn measurements in the majority of the cases is sufficient, whether second or other turn measurements could be useful instead, etc. Clearly there is still work to be done.

- Rob will propose an algorithm for finding the first and last turns that will work reliably in most of the cases. This could conceivably be replaced by timing (choosing a time and calling the measurement at that time the first or last turn).

### 3. 53 MHz noise and gains - Bob Dysert and Bob Webber

- First, Bob W. showed some noise studies. Raw data was shown for ~3 turns of pbar beam. There were plots shown of the A cable as seen by the Echotek and B after a single-pole high-pass filter (simulating the effect of a capacitor change on the transition board). He also showed a simulation of what the Echotek will output (not a full simulation) and then A+B and  $(A-B)/(A+B)$ . He cycled through all of the BPMs, showing some nice quiet BPMs, some with low frequency noise (much reduced by the filter), some with high frequency noise (not really affected by the filter), etc. Much of the information is consistent with Rob's analysis. Many of the 500 BPMs have noise. BPM 620 is particularly bad and others in the 600's have noise. 324 was compared for 2 different days. In this case the noise is consistent over the period. In many others the noise has a different time dependence on two different days.

- We encourage Bob to include the files in docDB.

- Next Bob showed work that Bob D and Bob W have done to measure and then specify proposed gains for 53 MHz beam under 6 different beam conditions. This will all be released as a beams-doc note. There is a proposal for low, medium and high gains that can be used for the different beam conditions. This will have to be looked at by the MI department to be sure that the typical intensities make sense.

- Once this base is established the board-by-board gains will need to be implemented as well.

### 4. Transition board controller status - Stefano & Board by board gain control - Stefano

- The meeting ran long (almost 2 hours!) so Stefano did not get a chance to show where he is at. The latest status can be found on the web page:

[http://www-ese.fnal.gov/mi\\_bpm\\_tb\\_ctl/MI\\_BPM\\_TB\\_Controller\\_Report\\_2006\\_09\\_12.pdf](http://www-ese.fnal.gov/mi_bpm_tb_ctl/MI_BPM_TB_Controller_Report_2006_09_12.pdf)