

# g2p/GEp Beam Transport Meeting Minutes

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**Attendees:** E. Folts, B. Dillon-Townes, M. Ivenco, K. Allada, D. Williams, T. Michalski, P. Kjeldsen, K. Mahoney, R. Lauzé, P. Degtiarenko

The following is a summary of issues discussed during the g2p/gep Beam Transport Meeting:

- Action Item 10 – JP will do this (has been completed as of 10/20)
- Action Item 11 – Awaiting input from Yves.
- Action Item 13 – Pam stated this has been done. Closed.
- Action Item 14 – While it was reported that 2 harps would fit (last week's meeting), new information regarding bellows sizing indicates only 1 harp will fit.
  - Harps used on existing Hall A large girder are French Harps and are not what is desired for this experiment.
  - Plan will be to use Standard Harp, rather than French Harp or Super Harp. Need an assembly number to make sure we are designing with the right assembly (58432-E-0104).
  - Butch received a response from Doug Higinbotham which stated that a single harp between the BPMs and another upstream could be used to calibrate the BPMs. The magnets between them would have to be turned off for the calibration.
  - There is one already upstream before the fast raster, but it was determined that this is too far away.
  - If the harp is placed on the upside down girder, it will be in the proximity of a vacuum turbo pump and the vacuum folks stated the harp should be 1m away due to potential damage to the wires. A butterfly valve placed between the roughing pump and the turbo pump should eliminate this issue.
  - The ID of the BPM and beampipe in the area was raised. The initial plan was to use a M20 size BPM, but the design of the beamline has been initiated with a M15.
  - The PM-M15 (58432-D-0156) uses end flanges (tapped holes) which are 2.75" OD and 1.375" ID. With a 1" rastered beam, there is clearance of .188" (0.4775cm) around the perimeter. This is less than the 0.5cm requirement we have applied to ourselves. Note that the wire placement is 1.36" (nominal), resulting in a nominal clearance of .180" (0.457mm). Don't know what the stripline dimensions will be for the pickups.
  - The PM-M20 (58432-D-0187) uses end flanges (through holes) which are 4.62" OD and 2.1" ID. With a 1" rastered beam, there is clearance of .55" (1.397cm) around the perimeter. This is greater than the 0.5cm requirement we have applied to ourselves. Note that the wire placement is 1.87" (nominal), resulting in a nominal clearance of .435" (1.105cm). Don't know what the stripline dimensions will be for the pickups.
  - The questions remain regarding; can the beam be effectively steered through the small aperture with the <0.5cm clearance and what is the effect of a larger clearance at the BPM pickups? These questions require input from Accelerator Ops and John Musson.
  - The idea of a more customized BPM (larger aperture tube with M15 clearance at the pickups) was raised as a hybrid solution.
  - If we go to a larger BPM (M20 or hybrid), the cross on the harp will have to be changed as well. Note that 1.5" beam tube is the OD with a .065" wall thickness, resulting in an ID of 1.37". The result is a nominal radial clearance with a 1" rastered beam is .18" (0.47cm) and with a 25mm rastered beam is .193" (0.49cm).

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- JP would like to take advantage of separating the distance between BPMs and adding a 3<sup>rd</sup> harp when the target is at the pivot. This should provide improved calibration which can then be reflected back to the data for the shorter articulating arm. The issue of repeatability of alignment was raised.
- The end result of the discussion is the need for a separate subject meeting to discuss several topics surrounding the BPM performance, required clearances for operations, overall tolerances and their distribution, and required alignment of these components.
- Action Item 16 – Tim has not effectively communicated this need to Chris and Bill.
- Action Item 17 – Need to track down who the right person is for this.
- Ed's goal is to minimize modifications to the existing long girder assembly as he has to reinstall it after g2p for the next experiment. At this time, the BCM and VBV are the only items to be taken from this girder.
- We reviewed the experimental definition drawing and looked at open issues in the Design Requirements Document. Both will be updated for further review.

## **STATUS:**

### **OPTICS:**

- No status update

### **MAGNETS:**

- Putting together a procurement request to get BD magnets from 12 GeV. Would like to take possession before any reallocation occurs.
- The BZ magnets of old are the FZ magnets of today. Butch stated there will not be a nomenclature change due to swapping out the vacuum chamber.

### **BEAM TRANSPORT:**

- The bellows are defined and will cost \$7600 each. Desire qty 6 (for spares). JP stated that so long as the cost doesn't exceed what was originally budgeted, then it is OK. Need to revisit if goes over original budget estimate.
- The vacuum chambers for the FZ magnets are out for quote. Should be a 10 week procurement.
- Plan to use 1.5" OD beampipe on upside down girder assembly.
- Plan to use 2" OD beampipe on articulating arm assembly.
- Regarding BPMs: Need to review Musson data, decide M20 or M15, Length 4.5"-5.5", 2" tube(?)
- Experimental Definition Drawing changes
  - Add turbo pump just after Calorimeter.
  - Add a Cold Cathode Gauge at the turbo pump.
  - The upside down girder will have the following components in this order (from upstream to target)
    - Beam Current Monitor (from long girder assembly in Hall A)
    - BD Corrector Magnet Vertical
    - BD Corrector Magnet Horizontal
    - Standard Harp (no modification due to 1.5" beampipe)

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- Vacuum turbo pump
- Cold Cathode Gauge at turbo pump
- VBV – Slow vacuum valve, automatic (from long girder assembly in Hall A)
- Short Articulating Arm has application specific stripline BPM, modified cross/stroke Standard Harp, application specific stripline BPM, 2" beampipe, window
- Long Articulating Arm has application specific stripline BPM, 2x modified cross/stroke Standard Harps, application specific stripline BPM, 2" beampipe, window

## **RAD CON:**

- Likes the new dump design – still a lot of neutron radiation during run
- Shielding of local electronics is recommended – Ed wants to know what is required to shield balcony above target area.

## **SOFTWARE:**

- Nothing new to report.

## **VACUUM:**

- No status update

## **INSTALLATION:**

- No status update

## **ALIGNMENT:**

- No status update

## **EES – I&C:**

- The stripline BPM testing was done end of last week. John is assessing the data.
- Can't find data on the calorimeter control electronics. Probably need to take it back to its original design and evolve from there.

## **EES – OPS:**

- Simon will be the one repairing the 2<sup>nd</sup> FZ magnet PS. He will also install a current monitor assembly on it – 10V output range.

## **EES – SSG:**

- No status update

## **TARGET/DUMP DESIGN ACTIVITIES:**

- No status update

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## Action Items:

Action Item #	Date Added	Action Item	Responsible Individual	Due Date	Date Closed
10	9/28/10	Get a list of targets to Kelly Mahoney. The same info sent to RADCON	J.P. Chen	10/8/10	10/20/10
11	9/28/10	Define the settings for chicane magnet current monitoring.	Y. Roblin	10/19/10	
12	9/28/10	Define if instrumentation is required for the low current dump. If so, what should be monitored?	TBD	TRACK to close	
13	9/28/10	Get SANE target screens to Henry Robertson.	G. Lahti	10/19/10	10/19/10
14	10/5/10	Need to assess if two harps will fit on the articulating arm.	L. Dillon-Townes	10/12/10	
16	10/5/10	Understand why there is a hole in the center of the rastered beam that comes from the faster raster/slow raster combination. Stated to be a waveform generator issue. Clarify this. If not HW, then probably SW?	C. Cuevas B. Gunning	10/26/10	
17	10/5/10	Get Accelerator Ops involved in reviewing the LC dump monitoring issues.	T. Michalski	10/26/10	
18	10/19/10	Set up separate subject meeting on BPM, alignment, harps, calibration issue(s).	T. Michalski	10/26/10	

## Design Decisions:

Date	Decision Item
8/31/10	The transport line exiting the FZ2 will have no vacuum connection to the target chamber. A beryllium window will terminate that line.
8/31/10	M20 BPM's were decided to be used on the transport line exiting the FZ2.
9/14/10	The Target will only be set at 80° and 90°, not 70°, per Al Gavalya.
9/14/10	The gap between the beam tube end and the target window was discussed. It should be minimized – consider 1 cm as a maximum gap. Re-opened during 9/21/10 meeting – look at using helium bag.
9/30/10	The requirement for BPM accuracy is 0.1mm – per discussion at BPM requirements meeting and subsequent analysis/e-mail from K. Allada.