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**Date:** February 6, 2018  
**Re:** Meeting Minutes,  
PIP II-IT Discussion and Requests for Work During the March Run

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**Meeting Time:** 9:00 am to 10:00 am

**Meeting Location:** TGC 2<sup>nd</sup> Floor, The Loft

**Attending:**

John Diamond

Craig Drennan

Aisha Ibrahim

Peter Prieto

Lionel Prost

Vic Scarpine

Alexander (Sasha) Shemyakin

*Note: Specific Things-To-Do that came out of the meeting are underlined in the text below.*

*These minutes and the slides presented during the meeting are stored (for now) at Beams-doc-6079.*

*These minutes are highly paraphrased and editorialized, and any additions deletions changes or comments are encouraged.*

**Introductions:**

Sasha Shemyakin had put some slides together as introduction to the layout of the PIP II Injector and to explain what they are expecting from AD / Instrumentation in the coming months.

Lionel Prost is now manager of the PIP II Warm Front-End. Lionel is the money holder and if anyone needs to discuss money issues, they can go to him.

Sasha is the PIP2IT Group Leader.

One of Sasha's slides showed an elevation of the layout of the PIP II Injector Test beam line as it is right now, and below it, a plan view of the beam line as planned for the future (this was just for reference in that it was not up-to-date), for commissioning of the SRF cryomodules.

**Schedule:**

Sasha explained that we are currently part way through a 4-week shutdown, driven by RFQ upgrades/repairs. The next run is expected to start on February 19. The main goal is to demonstrate running the RFQ in the CW mode as well as CW beam. This will be the highest priority for this run. With this goal in mind, other things will be fit into the schedule.

There is a large list of additional studies, which also includes instrumentation.

They expect to end this run the week of April 9.

It is also proposed to have a 3-week run starting near the end of July to do more testing with two specific goals in mind. One is to test the MEBT absorber and the other to test the Laser Wire. If these items are not available, a summer run is not useful. They currently do not have the absorber, but only drawings. The absorber is an expensive item. The management currently supports building the absorber, but there are concerns about the current funding.

Vic asked how long it would take to build the absorber once they say to go ahead with it. How would it effect the July 23 run date? Sasha replied that a decision on the absorber will be made within 2 or 3 weeks and that the July 23 start date will remain if they have the absorber or laser wire to test. (???? Check this statement)

Lionel Prost added the following comments to the minutes:

I am not sure I was here for this, but I would not be as categoric in my statement. I think we should plan for July 23 (as proposed) but we also understand that a lot can and will happen between now and then.

Sasha continued that what he sees for PIP2IT Instrumentation, is that before the end of the current shutdown we will have installed the Single Wire Scanner and the Bergoz ACCT beam current device. They also expect to install the vacuum chamber for the Laser Wire and build the Laser Hut.

Vic reported that construction of the Laser Hut may start Feb 9<sup>th</sup>, but this depends on components and personnel availability. It may start later than this date.

Vic also asked about the final location for the Emittance Scanner. Sasha reported it was in the original position. Vic asked if it could be moved after both choppers. Sasha said no.

Lionel Prost added the following comments to the minutes:

This is incorrect. The emittance scanner is currently at the end of the beam line, hence, after the two kickers (2 kickers + 1 absorber = 1 chopper or chopping system). Its final location is before

the two kickers, after the second doublet (M10). It is not clear to me when it will be moved there, although I believe it cannot stay where it is located now once the HWR cryomodule is brought in.

Vic Scarpine added the following comments to the minutes:

My question about the emittance scanner location was for the final PIP2IT MET layout. Having the emittance scanner after the chopper would allow users to see kicker effects

There is expected to be a meeting on Tuesday, February 6, regarding the Laser Wire work.

### **RFQ Transmission Studies:**

Vic mentioned that Aisha will be heavily involved with the RF Transmission Studies. The RF Transmission studies is a separate effort than the Instrumentation studies.

Lionel Prost added the following comments to the minutes:

I would not agree with this statement. Transmission is good. The question (for instrumentation) is how good. Or, in other words, to what accuracy can we calibrate the toroids.

Vic Scarpine added the following comments to the minutes:

I agree with Lionel. Aisha will be working on getting transmission accuracy numbers.

Sasha explained that there is an ACCT (a.k.a. toroid) on each end of the RFQ. The RFQ Transmission numbers will come from the ACCT measurements and will depend on the accuracy of the ACCTs. They are currently expecting the ACCT accuracy to be within 2%, but there is reason to believe that it will be better than this.

Vic Scarpine added the following comments to the minutes:

Although it is correct that the non-intercepting beam current measurements are with toroids, we should probably use the term ACCT to describe of the new Bergoz beam current device and to use toroids to describe the Pearson beam current devices. This would limit confusion.

Sasha then discussed the question of how they will be able to operate in CW mode. Up until now they have relied on data (instruments?) read at 20 Hz through HRM digitizers. They have never operated using the BPMs or other instruments in the CW mode, because they have never had CW beam.

Lionel Prost added the following comments to the minutes:

Yes. Instruments may be a better word. Note that I think the statement was more like, when we increase the pulse length beyond a certain point (let say 1 ms, but it could be less), we cannot rely

on the instrumentation like BPMs or toroids to control the beam trajectory and monitor beam loss. Hence, we have been relying only on RPUs. The statement about CW operation is one step further when, even if the instrumentation was working properly for long pulse operation, it would not for a real CW beam, for which there is no trigger.

Vic asked how instrumentation will be triggered in the CW mode. The instrumentation readouts are trigger based.

TODO:

Sasha stated that he will need more information on what is needed for triggering from Vic and Instrumentation. Vic will need to meet with AD / Controls to see what can be done.

#### **Documentation of Operational Procedures:**

Sasha expressed the importance of documenting all the operational procedures involved in running the PIP2IT, so they can startup relatively quickly and smoothly again in 2 years, with whoever may be here at that time.

Lionel Prost added, that this need for documentation applies also to the ion source, RFQ, kickers, bunching cavities... and instrumentation.

A single repository should be established for the procedures and programs and instrumentation codes. Consideration needs to be given to what all the things are that need to be captured into this repository. Creation of the needed procedures needs to start right away and while they are running and not wait until after the run is over. In this way the written procedures can be made clearer and more accurate. Sasha plans to give highest priority to this documentation effort in the last week of running.

Craig asked whether PIP II already have a place to store this sort of documentation. Sasha answered that they did not.

Lionel Prost added the following comments to the minutes:

There's a difference between PIP2IT and PIP-II. While there is no formal place to store this sort of documentation for PIP2IT, all our shifts, meetings slides, pictures... are kept on what used to be the srf-proton department drive ([\\beamssrv1.fnal.gov\srf-proton.bd](http://beamssrv1.fnal.gov/srf-proton.bd)). For a lot of us, that would be a natural place to store that documentation. For PIP-II, this is likely not acceptable. I think the management would tell us that Teamcenter can and should be the place for that kind of documents, not only for what it is used for now.

**MPS Work:**

The message from Sasha is that they have an MPS system that relies on the Ring Pickups (RPU's).

Sasha would like to have Instrumentation do some work with the system of beam scraper pickups, to provide an additional layer of machine protection.

TODO:

Vic Scarpine will be setting up meetings that include Arden Warner, Sasha and perhaps Rich Neswold along with John Diamond and others from Instrumentation to discuss what can be done with the scrapers with regard to machine protection.

**PIP II Instrumentation Performance Measurements:**

Sasha would like to schedule dedicated Instrumentation studies sometime in the 3 weeks between February 26 and March 12. Instrumentation will have priority during this time. Outside of this time Instrumentation can still request studies, but other things may then have priority.

Lionel Prost added the following comments to the minutes:

This is my understanding that if we have not reached our goal of running the RFQ in CW mode, this [running in CW mode] would remain the first priority.

Sasha would like for us to evaluate and document the "final" performance results for our PIP2IT instrumentation. We will need to make a plan on how each system can be tested and then schedule the study time with the PIP2IT Operations. Sasha is requesting that each instrument's final measured performance parameters be documented and reported to PIP II. This is to say that we have finished our work, and this is the result. He would like papers to be written, with these official performance specifications for their value to physics and the DOE.

TODO:

Aisha has already done some planning to evaluate the Bergoz ACCT beam current devices during this next run. Aisha stated that she has been anticipating this and estimates that she will need to schedule some amount of study time over the course of a week.

The Single Wire Scanner will have just been installed. There needs to be a plan for commissioning this and doing a performance evaluation.

BPMs were not mentioned. Is there a need to get final performance results on these?

Vic Scarpine Added: Yes, Nathan will work on getting performance numbers for the BPM system.

Vic Scarpine added the following comments to the minutes:

Yes, Nathan will work on getting performance numbers for the BPM system.

TODO:

The Functional Requirements Specification (FRS) is reported to have the specifications that we need to work to meet. Vic or Peter need to go into TeamCenter to get these FRSs.

Lionel Prost Added: I would say these FRSs. There are quite a few for different instruments and sub-systems, sometimes with several levels of details.