

Summary of P2MAC April 10-12, 2017

Valeri Lebedev

April 14, 2017
PIP-II meeting
Fermilab

Introduction

- PIP-II Machine Advisory Committee took place on April 10-12, 2017
- Committee members: Rick Baartman (TRIUMF), Roland Garoby (ESS - chair), Frank Gerigk (CERN), Kazuo Hasegawa (JAEA, J-PARC), Sang-Ho Kim (ORNL, SNS), Deepak Raparia (BNL), Jie Wei (MSU, FRIB), Hans Weise (DESY).
- Web-site:
<https://indico.fnal.gov/conferenceOtherViews.py?view=standard&confId=13692>
- Objective: Review of PIP-2 CDR
 - ◆ CDR draft was made available for reviewers 1 month before the Review
 - ◆ 24 presentations on the review covered major CDR topics
 - 22 presentations were aligned along CDR text and consistent with it
 - Last 2 were on the R&D: (1) PIP2IT, (2) SRF
 - 1 presentation was done by our Indian colleague (Optics measurements & correction)
- Preliminary report was made available after the review

Four Questions of the Charge and Committee Answers

- Q1: Is the scope of the facility described in the CDR both feasible and likely to satisfy the requirements outlined in the Mission Need Statement?

YES

- ◆ "CDR is precisely tailored to these medium and long term goals"

- Is the facility likely to meet the enumerated performance goals incorporated into the Functional Requirements Specification (FRS).

YES

- ◆ "The data available convincingly indicates that all accelerators as well as the whole facility will meet the enumerated performance goals."

- Q3: Have the risks inherent in the conceptual design been adequately identified and appropriately targeted within the R&D program?

YES, but...

- ◆ A lot of risks retired but many are left: SSR-2 and LB650 cavities, reliability of piezo devices, RF couplers, injection girder in the Booster.

- ◆ Also: risks associated to procurement of high technology devices

- Q4: Can the conceptual design be characterized as being sufficient to provide the technical basis for CD-1?

YES

Recommendations

- R2: Consider the addition of a low power beam dump in a straight section at the end of the linac tunnel for beam tuning/study.
- R3: Flesh out and finalize the Booster injection girder design.
- R9: Establish a test stand to assess the long-term reliability of the microphonics & LFD compensation set-up, which also addresses the reliability of the fast tuners. ...
- R10: Foresee long-term testing of all RF couplers under PIP-II operational conditions.
- R11: Implement a new control system and a new MPS in PIP2IT as soon as reasonably achievable. That will be a very useful test before extension to PIP-II.

Comments/Ideas (additional to what we presented)

- Cold trap/(cold section) of beam pipe before the HWR section may help to:
 - ◆ minimize particle migration from the warm MEBT and absorber into the SRF section, and
 - ◆ slow down a pressure wave due to an accidental vacuum leak in the MEBT.
- Since CM repair scenarios are discussed, the dis- and re-assembly procedures should be discussed & documented at the planned CM review.
- Plan to potentially remove a single cryo-module from the tunnel while all other are kept cold. It requires protection measures (rail, guiding system...)
 - ◆ Do not risk the CMs isolation vacuum.
 - ◆ Consider also some dedicated RF coupler protection scheme.
- Energy stability in Booster injection: the goal of 0.01% & 0.01 deg for amplitude and phase stabilization is sought
 - ◆ Verify if these values are actually required for injection into the booster
 - ◆ Consider alternative schemes to reduce linac energy variations, e.g. a debuncher cavity at a suitable distance from the linac end.
- Transfer line: As the linac has space for an energy upgrade to 1.2 GeV it would make sense to increase the magnet bending radius such that the stripping rate at 1.2 GeV is $<10^{-8}$.
 - ◆ VL comment: presently dipoles in arcs can support 1 GeV operation. There is no solution for 1.2 GeV injection into present Booster

Conclusions

- Overall - very positive review
- Committee read the CDR text
 - ◆ About dozen typos were found
- Corrected version of the CDR is at the CDR site
 - ◆ Several additional problems were found by our staff
 - all corrected
 - ◆ Some FRSs need to be corrected before the final version is issued