

Minutes from the BNL EIC IR Design meeting

Meeting date: October 18, 2019.

Compiled by: Bill Christie

We started the meeting by going over the Draft Agenda and asking if there were any suggested changes. Bob Palmer pointed out that he'd sent a short (3 slides) presentation to the mailing list. They fit closely to the Crab cavity location update discussion in the draft agenda, so we'll discuss them at this point in the mtg.

Draft Agenda:

- Update on Simulation – Alex J.
- Summary from EIC Collaboration mtg – Holger W.
- Update on Crab cavity location – Steve T.
 - Add Bob's presentation
- Update on Hadron Matching – Henry, Holger, and Guillaume
- AOB

Presentation by Alex J. File name is IR_Simulation_update_10_18_2019_v2.pdf. Posted on the Sharepoint site for today's mtg.

- Walks through his slides
- Discussion that the Beta* can be increased to get the low Pt part of the Roman Pot acceptance.
- Elke points out that the Silicon detectors that reside in the pots can also be designed (R&D) to eliminate the insensitive edge regions of current detectors, in essence getting the detector closer to the beam.
- Ferdi suggests that one could consider the idea of having a partial vacuum inside the Roman pot enclosure, which could allow for the reduction in the wall thicknesses.
- Alex illustrates on one of the slides that, as the collision energy changes, the utility of the B0 detectors and Roman pot detectors changes. Has to be taken into account when optimizing collider setup.
- Moves on to ZDC slides.
- Basic ZDC setup seems to satisfy the acceptance requirements.
- Shows the issues that arise from backgrounds associated with forward particles hitting the forward electron crab cavities, and spaying background into the ZDC.
- Point made that the transverse dimensions of the Crab cavity should be checked (in simulations Alex used a half width of 64 cm).
- Quong asks Alex if he could provide her with some feedback about how much the width on the electron crab cavity (on the side towards the forward proton beam) would have to be reduced to make this issue ok/manageable.

Summary from the EIC Collaboration meeting by Holger. No slides.

- Holger gave the BNL EIC IR Design presentation at the meeting, and he felt it went well. Few questions or discussion of the presentation at the EIC mtg.

- He points out that he also saw the JLab IR Design presentation. He says it appears that there may not be any Physics simulations yet for the Jlab design.
- The use Ni-Ti magnets. There was one magnet shown that had a peak field on the wire of 10.1T, which just won't work.
- Also pointed out he was a bit surprised, at this stage, to see some intricate details presented for the end of magnet details for some magnets presented.
- Not much discussion at the EIC mtg about either IR Design.
- Jlab is starting to discuss ideas to push to a luminosity of 10^{35} . Also talking about positron beams.

Steve leads a short discussion on the crab cavity locations. He had no slides, but did use the slides that Bob P. had sent in the meeting. File name is 1910-work-v3.pdf. Loaded onto the Sharepoint page for today's mtg.

- Discusses current location of the cavities.
- Phase difference in current setup is about 180 degrees.
- Refers to one of Bob's slides to show current location, and spot further forward from current location that he looked into.
- Bob points out that, as a motivating factor for this discussion is integration, it will be important to include an estimate of the geometry for the B2ApF magnet into the files and figures.
- Discussion that it may be beneficial to consider adding an additional crab cavity at a different location.
- Conclusion that moving the crab cavities may be possible but needs more work.
- Steve brings up point that the emittance gets large if the forward electron crab cavity is moved further forward, ~ 38 nm.
 - o Vadim suggests that a radial beam shift of ~ 1 mm may resolve this. Henry seems to agree with this.

Bob goes through his slides.

- Discussion on slide #1 is that, if a 400 MHz cavity is needed, that then more 200 MHz cavities may be required, and the 18 m space along the beamline available in the current design, which looks to be sufficient for the current design, may not be enough space.
- Quong points out that there may be ways, by for example going to two cavities/cryo vessel, to decrease the needed space a bit.
- Slide 3 points out that there looks like an issue with synchrotron radiation from the incoming electron beam hitting the forward electron crab cavity. Implies that some masks will have to be added to the design in this region to prevent this.

Update on Hadron Matching, discussion started by Henry.

- Right at point, after some confusion introduced by Bill on beam direction definitions, we were informed that the room was booked for a 3:30 pm meeting, and we needed to finish essentially immediately.
- We ended the discussion on the Hadron matching immediately.

Draft agenda for next meeting, which will be two weeks from today.

- An update on the crab cavity location studies – Steve T.
- An update on Hadron matching – Henry, Holger, Guillaume
- An update on simulation – Alex J.
- An update on the geometric dimensions of the crab cavities – Quong
- AOB

End of meeting