

EIC IR Design Meeting

Draft Minutes for Friday, July 31, 2020

Agenda

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1 CDR section writing updates

- 3.1.1 Interaction Region Design Concept
- 3.1.2 IR Vacuum Design
 - (a) C. Hetzel is finishing up updates.
- 3.1.3 Interaction Region Performance for Scientific Requirements
 - (a) A. Jentsch has updated most of the figures and is updating the text.
 - (b) E.C. Aschenauer needs to read through.
 - (c) Some figures may need additional refinement in the coming weeks and will be indicated as such.
- 3.1.4 Crab Cavity Requirement and Specifications
 - (a) Q. Wu has updated the text on Overleaf, but is currently waiting on a reply regarding a figure.
- 3.1.5 Impedance Modeling
 - (a) A. Blednykh will send E.C. Aschenauer the updated text to integrate.
- 3.1.6 Synchrotron Radiation Analysis
 - (a) M. Sullivan will look over section.
- Let E.C. Aschenauer know if you need to cross-reference with other sections and indicate where it should be placed in the text.

2 Cross check on beam pipe apertures—M. Sullivan

Title: “EIC IR model and beam pipe update”

File: [IR model and beam pipe update.pptx](#)

1. Conservative/aggressive beam tail distribution refers to larger tails/more particles in tails.
2. C. Hetzel’s and M. Sullivan’s simulations (using Synrad and SYN_BKG, respectively) are in good agreement. The slight differences can be attributed to differences in tail approximation method.
3. There is a notable difference between the numbers for the photon absorbers, possibly due to differences in how they are handled. Will discuss with C. Hetzel.
4. Beam tails [slide 15]
 - (a) Outer curves labeled “possible commission tail” are for conservative/aggressive beam tail distribution.
 - (b) Middle curves are for an intermediate beam tail distribution.
 - (c) Yellow lines mark the beam stay clear region.
5. A gold beam pipe coating is best for absorbing incident synchrotron radiation photons, but copper would be better for detector physics [slide 16]. Will need to be looked at by detector physicists.
6. Summary and conclusions [slides 19–20]
 - (a) Synrad and SYNC_BKG agree
 - (b) The background rate is sensitive to the beam tail distribution
 - i. As expected
 - (c) An aggressive tail distribution (such as we might get at first commissioning) indicates a fairly high photon background rate that gets through the central chamber
 - i. $8e4$ SR photons through the beam pipe every bunch crossing
 - (d) The present Synrad beam tail may be too small?
 - (e) A mid-range beam tail distribution (with an approx. 1 hour beam lifetime) looks like it could be OK but we need a more thorough study to confirm these initial estimates
 - (f) The backscatter rate back into the Be central chamber from the face of Q1eR does not appear to be an issue (very small rate)
 - i. The rear electron quad apertures as in Charles’ presentation do not present a background issue from SR

- (g) The backscatter rate from the beam pipe at 19–20 m may actually be as high as the direct hit rate for photons that go through the Be central chamber using a middle-of-the-road beam tail distribution
 - i. We need to do a more careful calculation here and the answer may be even higher at the 10 GeV beam energy (10 times more beam current – 2.5 A)
- 7. C. Hetzel: Backscatter will likely be much lower since incoming photons won't be at normal incidence.
 - (a) M. Sullivan: Yes, this is a somewhat of a worst case scenario.
- 8. E.C. Aschenauer: Still need to look into what background rates would be acceptable for detectors.

3 All other business

None.

4 Draft agenda for Friday, August 7, 2020 from 2:30 to 3:30 p.m.

1. CDR section editing comments
2. Hadron lattice matching into IR—H. Lovelace
3. All other business

Contact H. Witte or W. Christie to be added to the agenda.