C-AD

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Radiation

Safety Minutes of Radiation Safety Committee of Feb 29, 2012

Committee

Subject: Review of e-lens at RHIC and Operations at 255 GeV

Present: D. Beavis, R. Karol, E.T. Lessard, A. Etkin, C. Theisen, C. Montag, J. Sandberg, W. Fischer, P. Sullivan, D. Phillips, J. Hock, and C. Gardner.

The committee met to review and radiation issues related to e-Lens operation in the 10 O'clock IR region. The e-Lens uses 10 keV electrons to reduce the loss rate of the beams, which will increase the integrated luminosity for a given injected beam intensity. The system does not impact the overall emmittance of the beam and therefore does not impact the beam dump, collimators, or other apertures.

Issues

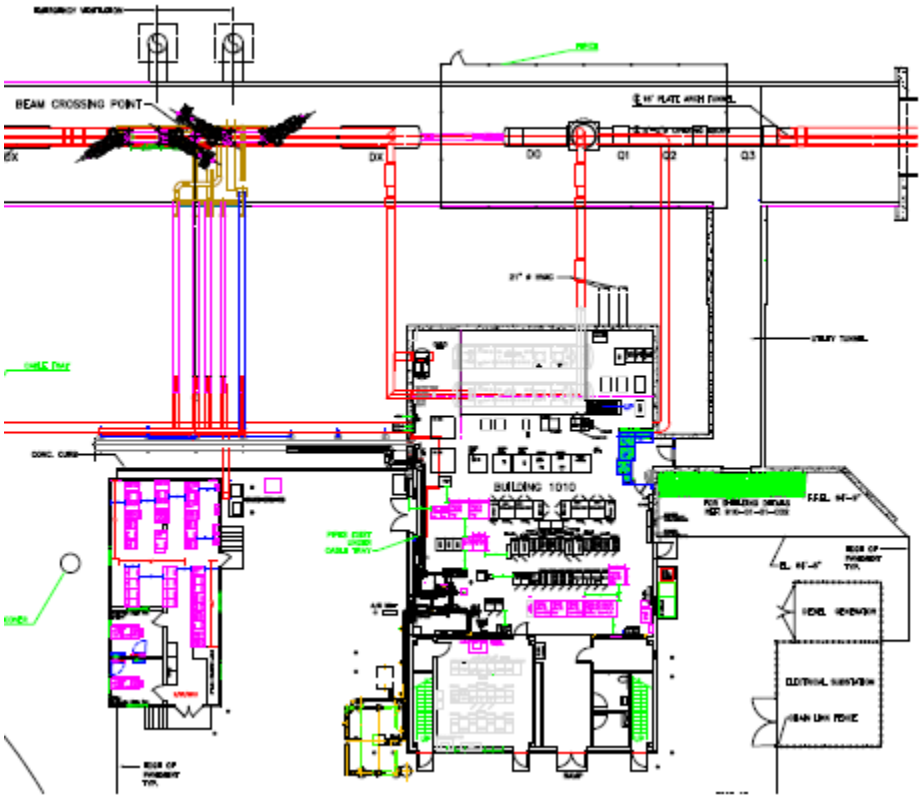
W. Fischer has provided a description[1] of the e-lens system. Personnel are expected to be able to work near the e-lens system while it operates. The potential exposure to x-rays leaking from the vacuum vessel was discussed. K. Yip calculated[2] x-rays leaking through the stainless steel vessel and none were found. However, the vessel will have an optical window for a camera. The Project must provide details for the optical window to ensure that x-rays do not leak through it. **(CK-fy2013-RHIC-801)**

The e-lens project needs to establish how the power supply will be limited in voltage so that the x-ray leakage does not exceed the maximum allowed by the weakest component. E-lens personnel were confident that the internal structure would not allow large voltage excursions but the committee was provided with no convincing analysis. This may be a simple as placing an orange tag or equivalent on the power supply to ensure it is not replaced with one of higher voltage. The present power supply has a 2 amp-10kV maximum rating.
(CK-FY2013-RHIC-802)

The layout of the e-lens at 10 O'clock is shown in the figure below. The e-lens will use some of the existing five 14-inch diameter ports that were placed in the berm for PHOBOS. These ports were evaluated by the RHIC Project and then for the future intensity upgrades[3]. One cable tray runs through the labyrinth and a hole was place through the concrete block wall over the door. This was not considered an issue for MCI dose leaking out the labyrinth. The e-lens does not introduce any apertures for the RHIC beam at 10 O'clock.

The e-lens will share the water system that was installed for PHOBOS and now used by the spin flipper system. The water system should be on a list to be tested if it is not already on such a list. **(CK-FY2013-RHIC-803).**

No other issues of air, gas, water or other material activation was found.
There was a comment about some racks that are floating at several kV. This will be referred to the ASSRC committee for their review.



Layout Of e-lens at RHIC 10 O'clock IR.

Operating RHIC at 255 GeV

It is desired that the high energy stores of polarized protons be operated at 255 GeV instead of 250 GeV in an effort to maintain higher beam polarization. The calculations for muon leakage at 300 GeV are in progress. Initial calculation show that the leakage at 300 GeV should meet all regulations but the committee chair believes that the calculations need to be further documented so that they can be properly reviewed. **With the limited number of stores anticipated for the 255 GeV operations the committee recommended that the department proceed with the plans to operate at this energy.**

It was noted that if 300 GeV leakage becomes an issue and would require costly mitigations then the limit could be lowered to 275 GeV, which is the expected upper limit of some of the magnets.

References

1) W. Fischer et. al.; http://www.c-ad.bnl.gov/esfd/RSC/Memos/Elens_PAC2011.pdf
2) K. Yip memorandum, March 9, 2011; http://www.c-ad.bnl.gov/esfd/RSC/Memos/rsc%20memos/main%20pages/rsc_memos.htm
3) http://www.c-ad.bnl.gov/esfd/RSC/Memos/RHIC_misc_pene.pdf

CC:

Present
RSC
RSC Minutes e-File
D. Raparia (Chair of ASSRC)
RSC Info List
A. Dress
A. Pendzick
D. Phillips