Progress report for
Proposal for an electron polarimeter
a luminosity monitor and a low Q^2-tagger

July 2014

Polarimeter and Luminosity Detector Working Group

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1 Overall Progress Summary

The group has after receiving the official approval of the project by BNL in February 2014 concentrated on the following topics.

1. To hire a postdoc for the project.
2. Develop a Monte Carlo code, which calculates small and wide angle bremsstrahlung taking into account polarization dependencies
3. Improve the IR design to integrate all the requirements coming from physics in the hadron and electron beam direction
4. Integration of the IR design in the EIC-Root simulation framework

In the following a short summary on the 4 points is given. No funding has been spent on the project.

1.1 Hiring of the PostDoc

Three excellent candidates have been identified. The last interview will be conducted on Friday 11th of July 2014. If all visa issues can be quickly cleared for two of the possible candidates, the selected candidate should be able to start by September 2014, for the other candidate as there are no visa issues a start at an earlier date is possible.

1.2 Monte Carlo code to simulate polarized Bremsstrahlung

The first version of a Monte Carlo calculating polarized Bethe Heitler scattering by Vladimir Makarenko has become available. The group is currently verifying the results. We would prefer to show results on the polarization dependent term **a** in the bremstrahlungs cross section $\sigma_{brems}=\sigma_0(1+ aP_eP_h)$ **only** after several more cross checks of the results. As soon as this is done the plan is to extend the MC code to calculate wide-angle polarized bremsstrahlung.

1.3 IR-Design

In the last month the IR design as presented in the EIC White paper (arXiv:1212.1701) has been significantly improved to incorporate the physics requirements as detailed in
https://wiki.bnl.gov/eic/index.php/IR_Design_Requirements
The optimization included to use simpler to built magnets especially for the hadron IR triplet, but also having a specific design for the lepton beam direction, which will allow to integrate a low Q2-tagger and the luminosity monitor. Figure 1 shows a schematic layout of the current IR design.
This design has been presented at several meetings, for details the talk (http://jacow.web.psi.ch/cgi-bin/conf/EIC2014/editor.zipdownload?paper_id=TUDL1022&wanted_file=TUDL1022_TALK.PPTX&hcheck=D8BCBE64D4734522088DBC1859599BE4) by Brett Palker at the conference "EIC14 The International Workshop on Accelerator Science and Technology for Electron-Ion Collider" and the talks by E.C. Aschenauer and V. Litvinenko at the EIC User Meeting
(http://skipper.physics.sunysb.edu/~eicug/meetings/SBU.html) are best suited.

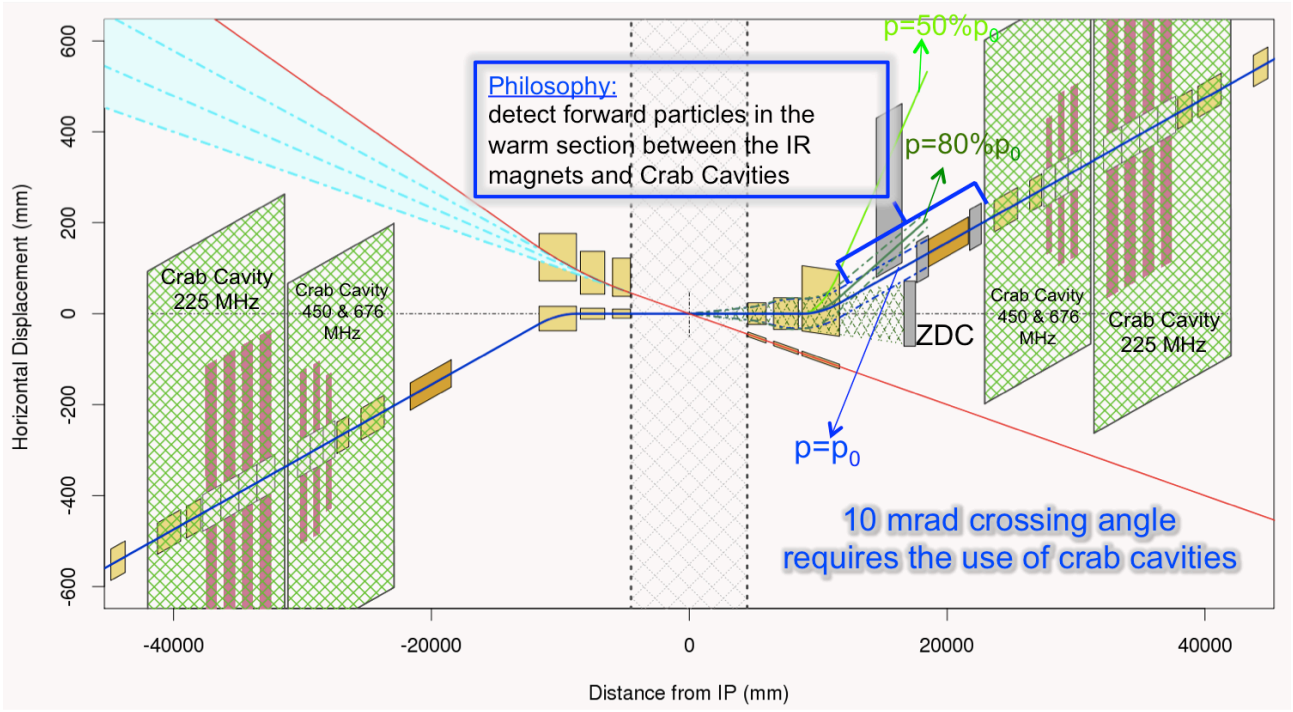

Figure 1: Schematic layout of the eRHIC interaction region.

Further the group was working on getting the first layout of the bypass of the non-colliding lepton beams through the IR. This is important as this poses several space constrains for the IR and the tunnel region close to the interaction region. Figure 2 shows a schematic layout of the current bypass design though the interaction region at IR-8.

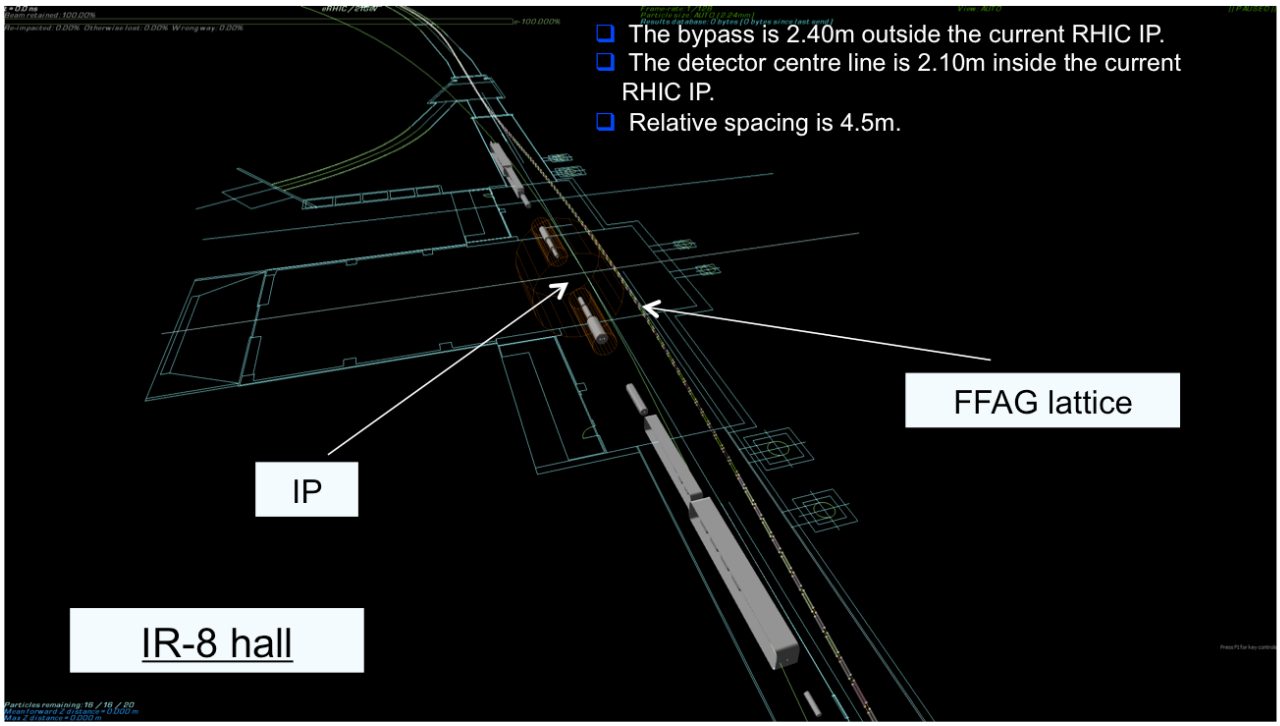

Figure 2: Schematic layout of the eRHIC bypass for the non-colliding beams through the IR.

The group is currently working on a interface document, which details all the space constrains due to the eRHIC non-colliding beams passing through the IR.

1.4 Integration of the IR design in the eRHIC simulation framework

Alexander Kiselev, Brett Parker and Stephen Brooks have been working to define a concept that allows easily importing CAD-design files as well magnetic field maps into the eRHIC simulation package EICRoot (for details on EICRoot see https://wiki.bnl.gov/conferences/images/8/8d/EicDetectorSimulations.pdf). Having an automated procedure will make it extremely easy to follow changes and updates in the design and keep the failure rate at a minimum. Figure 3 shows some example pictures of integrated IR components into EICRoot.

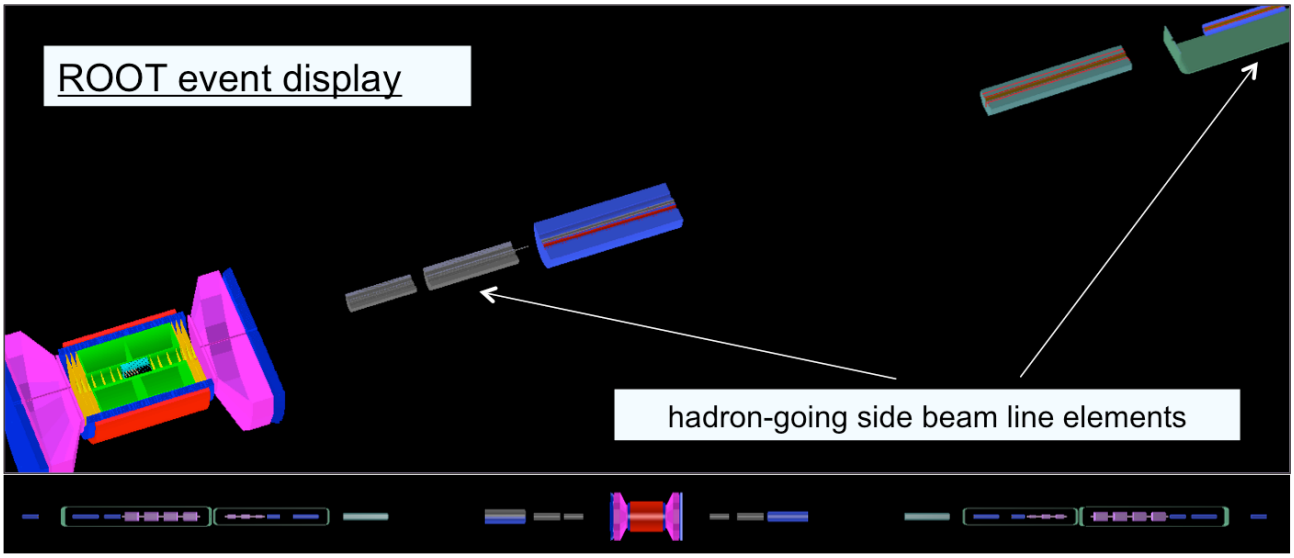

Figure 3: Example plots showing the integration of IR components into the eRHIC Geant Simulation framework EICRoot.