# eRHIC IR Design Meeting

Draft Minutes for Friday, November 15, 2019

**Present:** Holger Witte (Chair), Jaroslav Adam, Elke Aschenauer, Michael Blaskiewicz, Alexei Blednykh, Kyle G. Capobianco-Hogan, William "Bill" Christie, Charles "Charlie" Hetzel, Henry Lovelace, Christoph Montag, Alexander "Sasha" Novokhatski, Brett Parker, Stephen "Steve" Plate, Vadim Ptitsyn, Michael "Mike" Sullivan, Steven Tepikian, Qiong Wu, Zhengqiao Zhang

## Agenda



## 1 Plan moving forward—Holger

Title: "Plan moving forward"
File: 2019-11-15_PathForward.pdf

1. Weekly meetings instead of biweekly meetings [slide 2].
2. Complete next IR design iteration by around April 2020 [slide 3].
3. Work we need to complete [slides 4–7]
   (a) Crab cavity location—Bob Palmer and Steve Tepikian
   (b) Implement required e-lattice—Steve Tepikian
   (c) Synchrotron radiation masking scheme—Mike Sullivan and Henry Lovelace
   (d) Beam pipe design—Charlie Hetzel
   (e) Physics simulations—"The Friends from Physics"
   (f) Layout and cryostats—Steve Plate, Hamdi, Charlie Hetzel, and Michael Mapes

(g) Corrector scheme—Steve Peggs

(h) Alternative designs—Brett Parker

(i) "Drop Dead Dates" (DDDs of $D^3$s) in order to be included in CDR to be set at next meeting for each task.

4. Other Work (lower priority than item 3) [slide 8]

   (a) Replace B0 magnet

      i. Included here rather than in item 3 because the new design is a drop-in replacement that should not affect the larger IR design.

   (b) Mechanical analysis of magnets—Mike Anerella (SMD)

   (c) Resolve Q1ApR issue

   (d) Quench simulations

5. More Meetings... [slide 9]

   (a) Designated layout meeting—Hamdi, Charlie Hetzel, Michael Mapes, Gary McIntyre, and Steve Plate

   (b) Synchrotron radiation meeting—Bob Palmer, Mike Sullivan, Steve Tepikian, and Henry Lovelace

## 2 New electron rear design—Steve T.

See [slides 3–4] from of Bob's presentation from the last meeting:
Title: "1911-work-v1"
Subtitle: "Baseline Problems & possible fixes"
File: 1911-work-v1.pdf

1. Working on eliminating B3eR and B6eR.

2. Bob: Have a design that eliminates B3eR without having to eliminate B6eR ready to hand over to Steve T.

3. Moving eF Crab from between Q3eF and Q4eF to between Q5eF and Q6eF in order to add dipole between Q3eF and Q4eF and avoid neutron cone blasting crab cavity.

## 3 Simulation update—"The Friends from Physics"

### *3.1 Luminocity Detector Design Update—Jaraslov*

Title: "Luminosity monitor for the EIC, update on light collection and energy resolution"
File: JA-Lumi_20191115.pdf

1. Need to update simulation for when changes are made to geometric parameters and material of exit window.

### *3.2 Polarimeter Placement—Jhengqiao*

Title: "Electron Polarimeter"
File: 20191115_IR_Zhengqiao.pdf

1. Elke: Need to either modify these magnets to accommodate recoil electrons, laser beam, and scattered photons or design another region to do so.
2. Current location is 11 o'clock side of IR-12.

## 4 Status of Blue Ring integration—Henry

Title: "Collider Ring (CR)"
File: Ring_Collider_pres.pdf

1. Arc magnet quad gradients below quench levels.
2. Collider ring has path length increase of 1 cm.
3. Rough draft design has trim quad gradients that exceed quench levels.
   (a) Could be the result of needing additional constraints.
4. Conclusion [slide 12]
   (a) Previous Yellow ring version is functional with the given gradient constraints.
      i. Can be considered a secondary solution to EIC hadron ring
   (b) CR design may also be feasible within RHIC current magnet configuration gradient constraints
      i. Changes to correct for tune and chromaticity have minor effects to the IR Twiss parameters.

## 5 Beam pipe concept (design)—Sasha

Title: "Beam pipe concept (design) for eRHIC"
File: Sasha_eRHIC_IR_HOMs_11_15_19_m.pdf

1. Summary and next steps [slide 17]
   (a) A smooth transition from two incoming pipes to a common IP pipe has been designed to minimize the impedance of the Interaction Region.
   (b) Special HOM absorber is needed to damp unavoidable trapped modes
   (c) The heat load coming from the resistive-wall wake fields must be taken into account
   (d) Continue calculations with approved dimensions
2. Ferdinand: Are significant broadband impedances expected from absorbers?

   (a) Need to do more calculations.

3. Bill: Where would this be located?

   (a) Where beam pipes are almost separated at about 3 m.

   (b) Elke: "But that's inside my detector."

   (c) Brett: Will be an issue if absorber is ferritic as it would be inside the solenoid field.

   (d) Need to iterate design.

4. Alexei: Asymetric synchrotron radiation mask [slide 14] may be a problem.

Additional material provided after the meeting:
Title: "Properties of Ceradyne's Advanced Technical Ceramics for Microwave Applications"
File: Ceramic tiles.png
See also:
Title: "Re: [E-rhic-ir-l] BNL EIC IR Design Meeting"
File: Erhicirl BNL EIC IR Design Meeting.pdf

**6 Next Meeting:** Friday, November 22, 2019 from 2:30 to "3:30" p.m.

### *6.1 Draft Agenda*

1. Drop Dead Dates for "[w]ork we need to complete" (see section 1, item 3)

2. Crab cavity location—Bob and Steve T.

3. All other business