

eRHIC IR Design Meeting

Draft Minutes for Friday, March 6, 2020

Agenda

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- 1 Requirements document for lattice parameters—Q. Wu

Title: “electron Crab Cavity Related Lattice Parameters”

File: [20200212_CrabCavity_eSRLatticePara.docx](#)

| | Limitation |
|-----------------------|---|
| Beta function | $110 \text{ m} < \beta_c < 200 \text{ m}$ |
| Curly H | $\mathbf{H} < 2.0 \text{ m}$ |
| Dispersion | $D < 0.5 \text{ m}$ |
| Dispersion derivative | $D' < 0.1$ |
| Phase advance | $87.5^\circ \leq \varphi_c \leq 92.5^\circ$ |

Table 1: From requirements document referenced above.

1. J.S. Berg: What is the effective region of the crab cavity (for the purpose of the beta function constraints)?
 - (a) Q. Wu: For electron crabs, should be around 30 cm to 50 cm.
2. E. Aschenauer: Is there an upper limit on the beta function at the IP for the crab cavity to work?
 - (a) V. Ptitsyn: As long as quads between crab cavities and IP are unchanged, it shouldn't effect the crab cavities.

2 Update on low- Q^2 tagger—J. Adam

Title: “Low- Q^2 tagger”

File: [JA-Low_Q2_tagger_20200306.pdf](#)

1. Current simulations assume a perfect vacuum.
2. $Q^2 = 2EE' (1 - \cos(\theta_e))$ is a naive formula that neglects electron mass. The real equation gives a lower bound for physically possible Q^2 values of order 10^{-9} [slide 4].
3. Summary [slide 10]:
 - (a) Upper range of tagger acceptance is $Q^2 \sim 10^{-2}$ GeV.
 - (b) Confirmed by the model of quasi-real photoproduction and by Pythia6
 - (c) The upper limit is a result of B2eR (and the entire beamline) aperture, very unlikely to change.
 - (d) Lower limit is $Q^2 \lesssim 10^{-7}$ GeV, depends on the actual physics process.
 - (e) Achieved with the tagger placed 10 cm away from the axis of the beam.
 - (f) Working now on a realistic model of the tagger detector and incorporation of beam effects.

3 Electron forward lattice—J.S. Berg

Title: “IR Matches”

File: [JSBerg-200306.pdf](#)

1. C. Montag: How wide is syn rad fan from dipole right before crab cavity?
 - (a) 4 mrad
 - (b) C. Montag: A 1 cm fan should be able to fit through a 10 cm (diameter) crab cavity aperture.

4 All other business

None

5 Draft agenda for Friday, March 13, 2020 from 2:30 to 3:30 p.m.

1. Update on existing RHIC survey information—M. Llado and G. McIntyre
2. Update on beta function limitations and physics requirements—E. Aschenauer and V. Ptitsyn