EIC Yellow Report Status

Kolja Kauder – NPPS Meeting, Dec 04, 2020

Updated Timeline

- November 1 - November 18   SC starts assembly of independent review team (readers)

- November 18   Full Yellow Report draft available

- **November 19-21**   **4th YR workshop: Present status, discuss content, finalize plans**

- November 22 - December 20   Editing by Steering Committee, Conveners and Sub-conveners

- December 21 - January 3   Period of web-based EICUG community input

- January 3 - January 10   Editing of Yellow Report(s) folding in community input

  Release draft Yellow Report on EICUG web pages

- January 10 - January 31   Independent team reads and comments

- February 1 - February 15   Final editing of Yellow Report(s) to fold in reader comments

- February 22   Release of Yellow Report(s) including putting on arXiv

Adds five weeks of breathing room – still a tight schedule

Status of the Manuscript

Snapshot from Nov 19:

Volume I – Executive Summary: Unwritten (to be expected)

Volume II – Physics: ~300 pages

Volume III – Detectors: ~200 pages

Plus about 100 pages of references and Appendices

- This seems to be the target number. Quantitatively on track, but still lots of refinements left
- Done in Overleaf. Currently, designated LaTeX pointman needs ~9 hours to compile

Winning Cover Design from Yulia Furletova
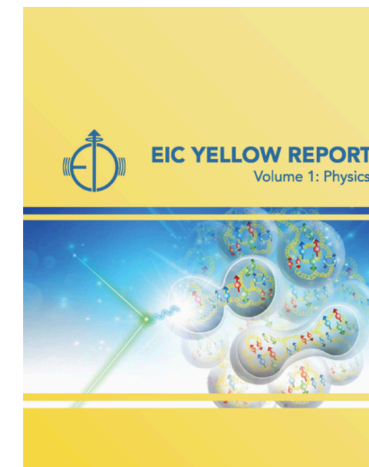
Physics Working Groups

- Lots of work done.
- Many needs to juggle…
- Mostly acceptable compromise
- B field? min-pT vs. resolution
- PID, some pT needs more than twice as high as ~achievable

vertex, PID, HCAL

minimim p_T, HCAL

tracking, PID, HCAL

minimum p_T threshold, PID

neutral detection @ forward, $\pi0$ and γ for DVCS, HCAL coverage

Detector Working Groups

Tracking:
- Large parameter space (technology, B-field, conflicting requirements...)
- Two baseline options: Hybrid and All-Silicon

Calorimetry:
- All requirements initially defined for Calorimetry can be satisfied with the existing technologies
- More space would allow improvements

PID:
- Reference detector design well addressed
- Tension in barrel PID, eID
- Some promising speculative options need further investigation

Far Forward:
- can achieve baseline physics goals with anticipated technologies
- Work continuing to maximize physics potential

Detector Matrix v 0.2 is released
- ... and changed its nature to "Reference", no longer "Requirements
- Some changes are quite large – and time is short to re-run studies

IR, Magnet, Integration, Complementarity

far-backward detectors

far-forward detectors

Out of this (and my) scope.

Alexander on Integration?
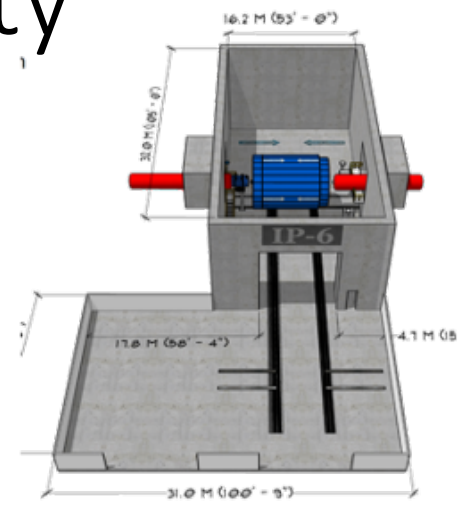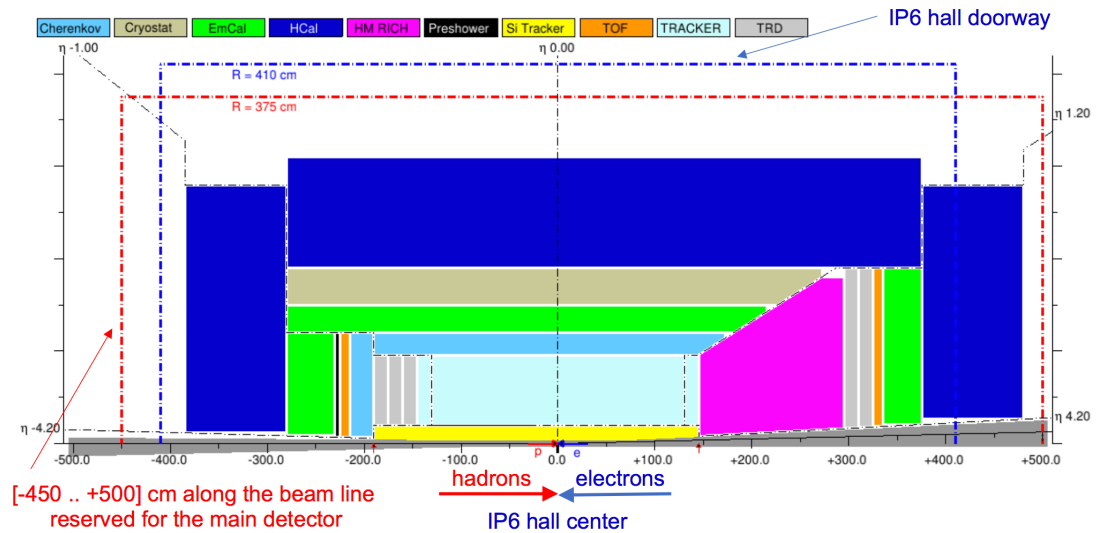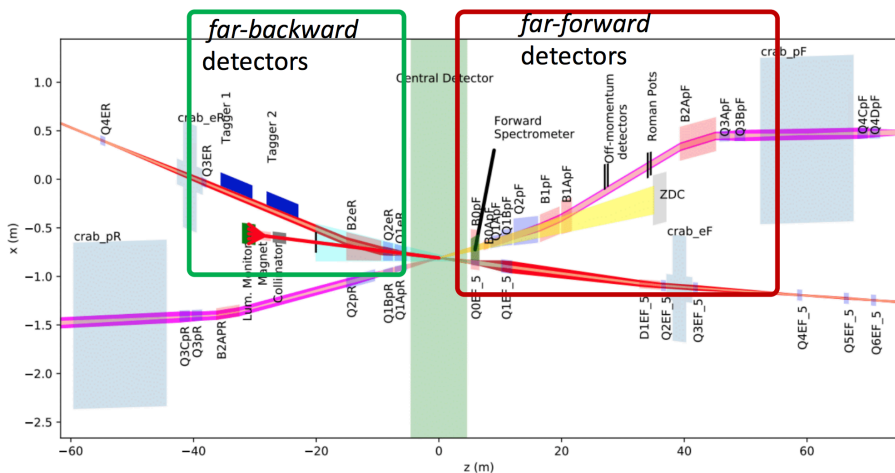
Parameter	New Magnet	BABAR/sPHENIX Magnet
Maximum Central Field (T)	3	1.5
Coil length (mm)	3600	3512
Warm bore diameter (m)	3.2	2.8
Uniformity in tracking region ($z = 0$, $r < 80$ cm) (%)	3	3
Conductor	NbTi in Cu Matrix	Al stabilized NbTi
Operating Temperature (K)	4.5	4.5

Software in the YR

Status of 11.10 CDR version written by Andrea
- Reconstruction time of DIS events
- Importance of software design, development, and planning for success of the EIC
- **Growing software effort**
  - EIC Software Consortium (eRD20)
  - SWG
- **Overview**
  - Activities of SWG
  - Software Tools
- **Discussion**
  - simulations for detector optimization
  - Monte Carlo event generators for the EIC

Add tools used for YR, common projects from EoI

Add role of AI/ML: cross reference to 11.11

Data and Analysis Preservation
- **All YR studies need to be reproducible, "should" be on github!**

Involvement from EICUG

Join the GitHub organization as described on https://eic.github.io/github/

Upload the code of your YR studies

Leave a README with simple instructions

- Good call from Markus, and good discussions – but so far little movement from conveners and contributors

Maxim: "DAP is mandated by the funding agencies […] For DAP to be truly successful it must be a part of the planning process early on and become an integral element of the experiment's infrastructure."

EIC YR Status, Kolja, NPPS Meeting

EIC Software Next Steps

Kolja Kauder – NPPS Meeting, Dec 04, 2020

Fast Simulation

Editing by Steering Committee, Conveners and Sub-conveners

Most pressing issue – lots of things need to be redone in a short time frame (including Christmas)

Final editing of Yellow Report(s) to fold in reader comments

- Matrix 0.2 smearing script was requested the day after the YR meeting, **deployed on Monday** announced on Friday
  - to improve documentation
- So far no positive or negative feedback – good?

- DELPHES version available (not announced though); working on activating a validation volunteer
- Common Output Format seems in limbo, haven't heard from Dima in a while

Caveats (~=next steps):
- Perfect angular resolution assumed
  → Can do better and I have "signals" it may be okay to go ahead with them
- Silly pi/K/p PID; can't be avoided ("better than 3.5 sigma" is not specific enough)
  → Interface to 3-7 existing concepts upcoming
- No min-pT, min-E
  → Easy, but conceptually ambiguous
- No vertex resolution; never requested and presumed not something for FastSim
- No eID/electron purity; unclear how to do it in FastSim, trivial to do as an afterburner

Slow Simulation

- Not aware of much movement one way or the other, but expect this issue and the battle of the frameworks to roar back soon after YR is published
- Interesting development: A recent detector concept seminar generated a lot of questions on (lack of) GEANT implementation; put them in touch with fun4all

- Chris's validation group is starting to produce ePHENIX simulations, my validation group is starting to take those and parameterize/compare them to eic-smear scripts

Δ φ vs ge
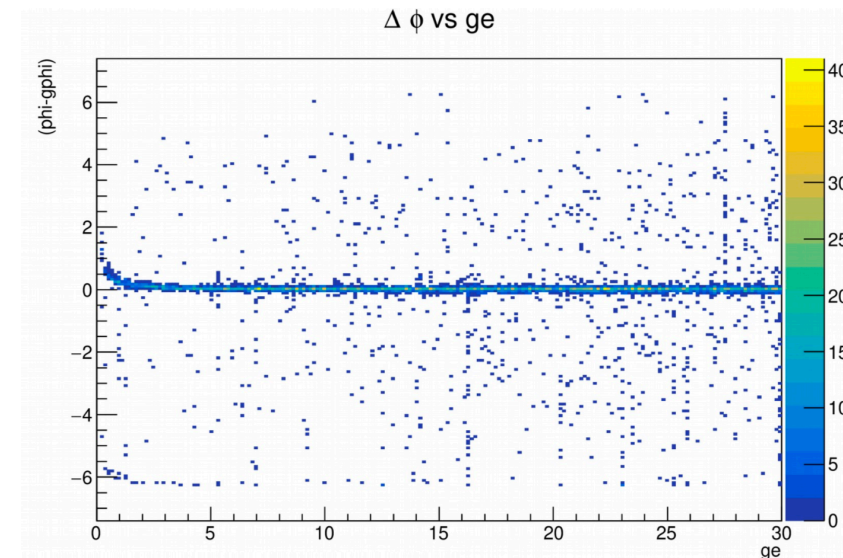
Event Generators

Add to the suite:
- eSTARlight is now hosted on the EIC github
  → Interfacing with authors to improve their (and my) HepMC knowledge
  → HERWIG, SHERPA, … soon
- Sartre authors are part of validation and bringing Sartre in compliance

Validate:
- Latching onto MCEG validation team to make sure our suite is tested

Documentation:
- BeAGLE documentation is on the way to be primarily hosted on eic pages. Handed keys off to PA.
- I have the green light and am in the process of migrating remaining wiki-hosted documentation to pages

Event Generators

The following event generato

- ep
  - DJANGOH: (un)pola
  - MILOU: A generator
  - PYTHIA: A general
  - PEPSI: A generato
  - RAPGAP: A generato
- eA
  - BeAGLE: Benchmar
  - eSTARlight: Monte

Monte Carlo Event Generators

PYTHIA6

DJANGOH

PEPSI

BeAGLE

EIC is moving rapidly – exciting 2021 ahead!