



BI-WEEKLY MEETING

19 JULY 2021

Or Hen, Tanja Horn, John Lajoie






Credit to the entire ECCE Team, EIC Project, and all collaborators

ECCE Highlights – last month



Much activity – moving at a rapid pace to meet the global timeframe

21 June – 19 July: midterm activities

-  ☐ Defined production site tasks – Jlab, BNL, etc.
-  ☐ First large scale simulation campaign completed
(https://wiki.bnl.gov/eicug/index.php/ECCE_Simulations_Working_Group)
 - Particle gun
 - Physics
-  ☐ Evaluation of test samples from first large simulation campaign
 - 8 July: 3rd Simulations Workshop was held
-  ☐ Optimization of ECCE for the next simulation campaign
 - 6 July: new crossing angle configuration implemented
 - Completed additional detector subsystem setup with AI support
-  ☐ 12 July++ discussions with co-conveners on cost and risk estimates

ECCE – Computing and Simulations Status

Wiki page with list of simulation configurations for production campaigns:

https://wiki.bnl.gov/eicug/index.php/ECCE_Simulations_Working_Group

25 combinations of PWG x PROCESS x GENERATOR x BEAM = ~160M events (*planned production*)

Production jobs that have been run:

Particle Gun:

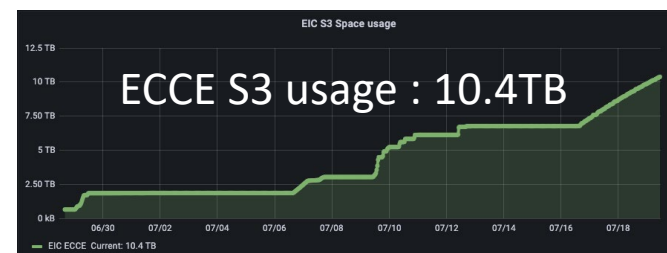
- 5M electron(BNL)
- 5M pion(BNL)

SIDIS:

- low Q2 - 20M(MIT)
- mid Q2 - 20M(BNL) ; 20M(MIT)
- high Q2 - 4M(JLab) ; 4m(OSG)

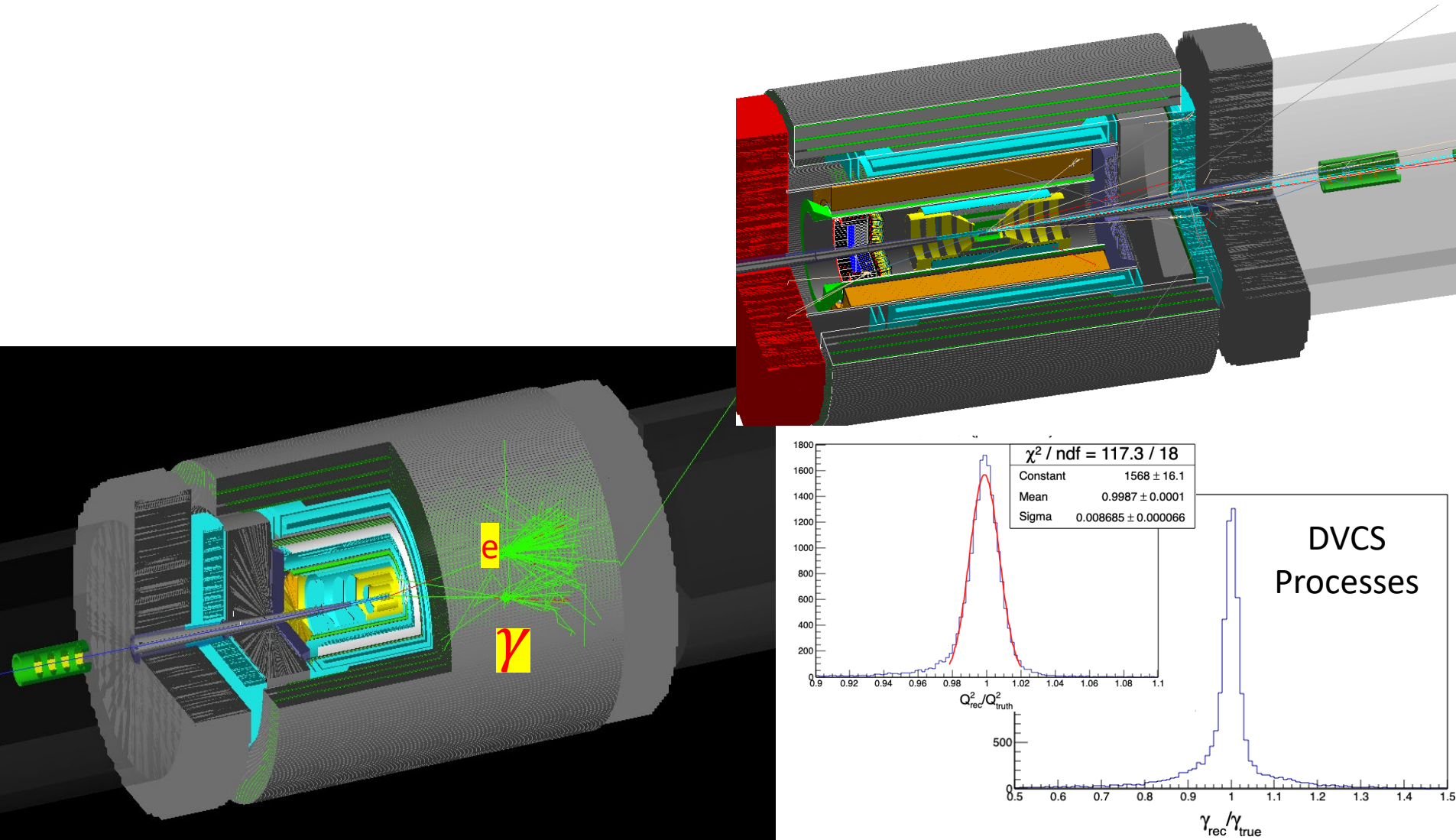
*duplicated to test
production scripts
at scale*

Storage space used so far
(out of ~1000TB allocated for ECCE)



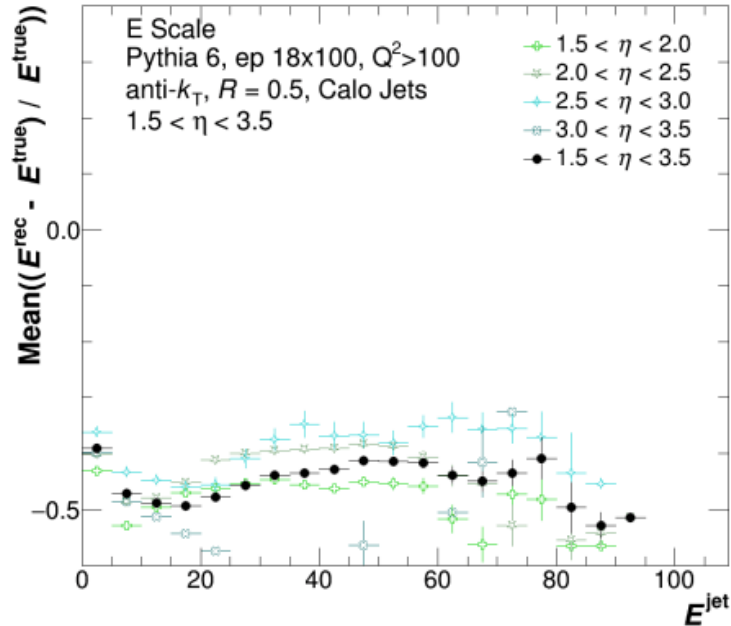
JLab /work/eic2/ECCE: 2.1TB

Examples from the June 2021 Simulation Campaign

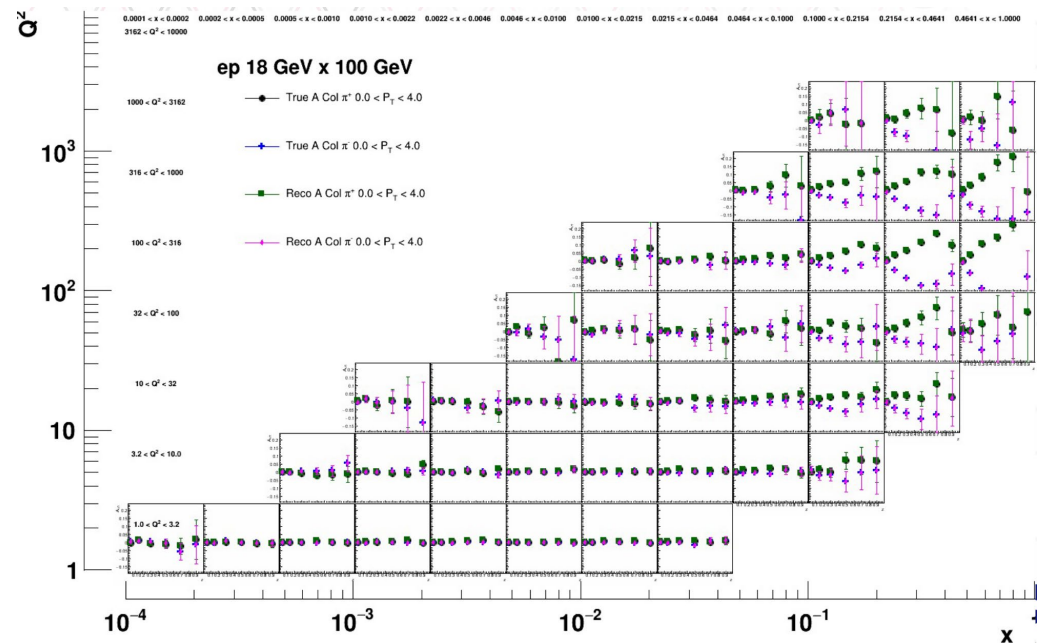


Examples from the June 2021 Simulation Campaign

Energy Scale for Calorimeter Jets

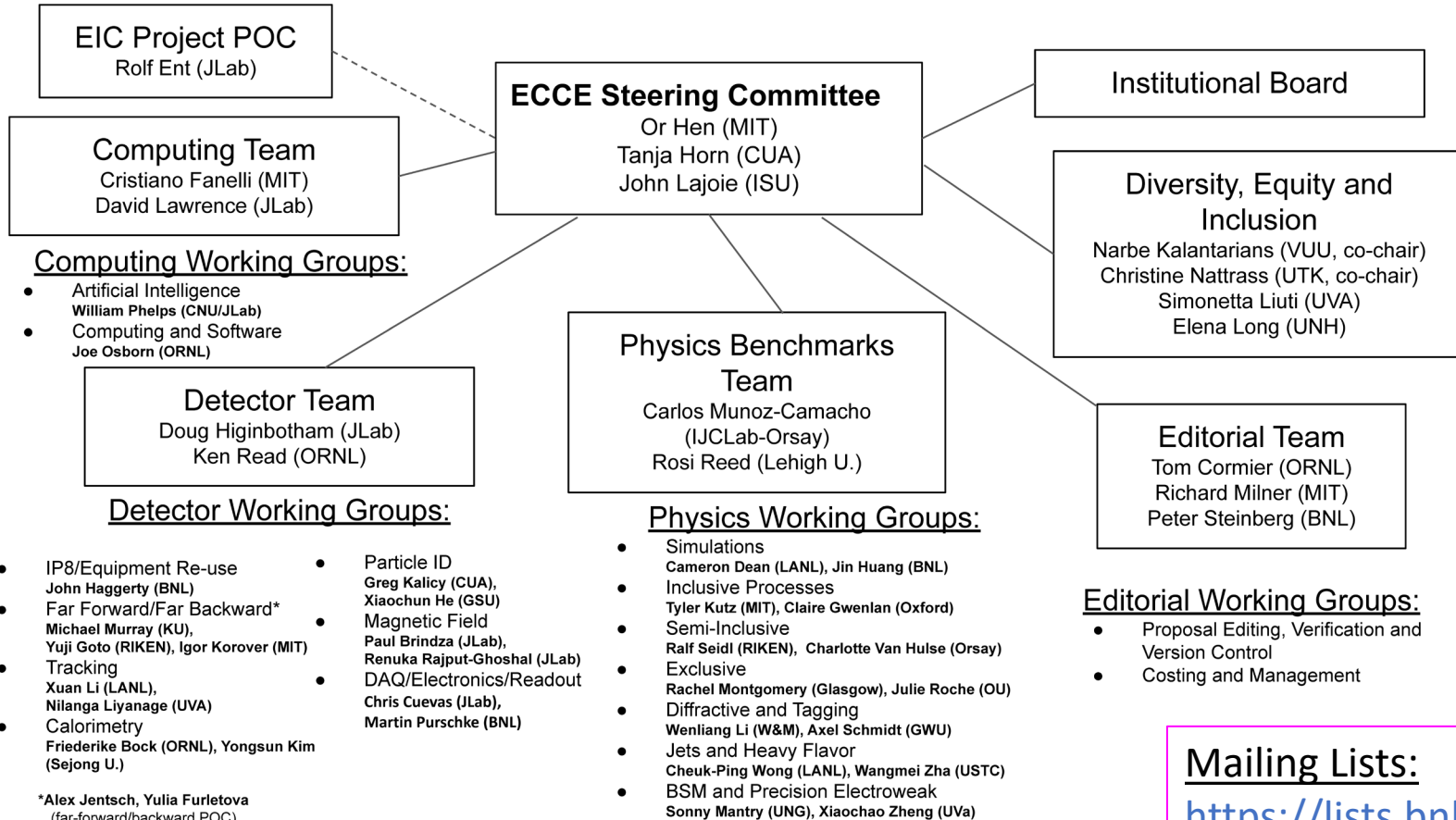


Updated Collins asymmetries



- | | | | |
|---------------------------|---------------------------|----------------------------|------------------------|
| 1. AANL/Armenia | 22. HUJI/Israel | 43. Ohio U | 64. UNH |
| 2. AUGIE | 23. IJCLab-Orsay/France | 44. ORNL | 65. U. Regina/Canada |
| 3. BGU/Israel | 24. IMP/China | 45. PNNL | 66. USTC/China |
| 4. BNL | 25. Iowa State | 46. Pusan Natl. Univ./Kor. | 67. UT Austin |
| 5. Brunel University/UK | 26. IPAS/Taiwan | 47. Rice | 68. UTK |
| 6. Canisius College | 27. JLab | 48. RIKEN/Japan | 69. UTM/Chile |
| 7. CCNU/China | 28. Kyungpook Natl. U./K. | 49. Rutgers | 70. UVA |
| 8. Charles U./Prague | 29. LANL | 50. Saha/India | 71. Vanderbilt |
| 9. CIAE/China | 30. LBNL/Berkeley | 51. SBU | 72. Virginia Tech |
| 10. CNU | 31. Lehigh University | 52. SCNU/China | 73. Virginia Union |
| 11. Columbia | 32. LLNL | 53. Sejong U./Korea | 74. Wayne State |
| 12. CUA | 33. Morehead State | 54. TAU/Israel | 75. WI/Israel |
| 13. Czech. Tech. Univ./CZ | 34. MIT | 55. Tsinghua U./China | 76. WM |
| 14. Duquesne U. | 35. MSU | 56. Tsukuba U./Japan | 77. Yonsei Univ./Korea |
| 15. Duke | 36. NCKU/Taiwan | 57. CU Boulder | 78. York/UK |
| 16. FIU | 37. NCU/Taiwan | 58. UCAD/Senegal | 79. Zagreb U./Croatia |
| 17. Georgia State | 38. NMSU | 59. UConn | |
| 18. Glasgow/Scotland | 39. NRNU MEPhI/Russia | 60. UH | |
| 19. GSI/Germany | 40. NTHU/Taiwan | 61. UIUC | |
| 20. GWU | 41. NTU/Taiwan | 62. UKY | |
| 21. Hampton | 42. ODU | 63. U. Ljubljana/Slovenia | |

ECCE Consortium Structure



Website:

<https://www.ecce-eic.org/>

Indico:

<https://indico.bnl.gov/category/339/>

Wiki:

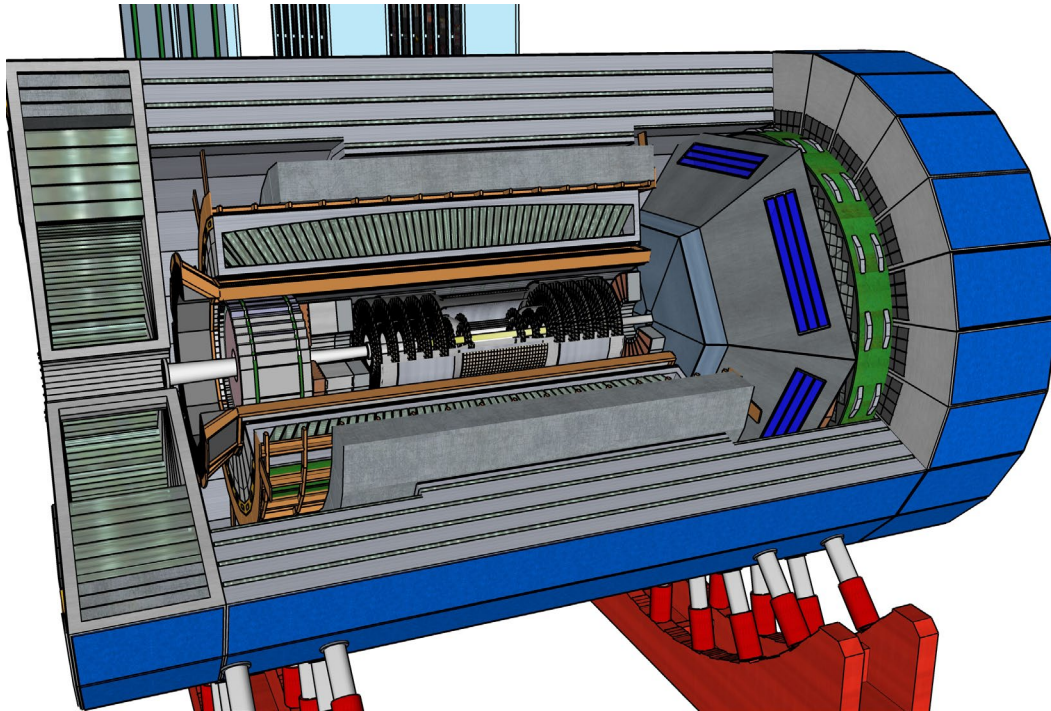
<https://wiki.bnl.gov/eicug/index.php/ECCE>

Mailing Lists:

<https://lists.bnl.gov>

- ecce-eic-public-l
- ecce-eic-ib-l
- ecce-eic-dei-l
- ecce-eic-det-l
- ecce-eic-phys-l
- ecce-eic-prop-l

ECCE General Detector Concept



Items being discussed

- Barrel timing layer
- Barrel EMCal projectivity
- Barrel EMCal support instrumentation
- Tracking disks
- Forward Calorimeter

ELECTRON ENDCAP

Tracking: Large area μ RWELL

Electron Detection:

- Inner: PbWO₄ crystals (reuse some)
- Outer: SciGlass (backup PbGl)

h-PID: mRICH & AC-LGAD

HCAL: Fe/Sc (STAR re-use)

CENTRAL BARREL

Tracking: MAPS Si for vertexing and endcaps
(design to be optimized)

Electron PID: SciGlass (alt: PbGl or W(Pb)/Sc shashlik)
(plus instrumented frame)

h-PID: hpDIRC & AC-LGAD

HCAL: Fe/Sc (sPHENIX re-use)

HADRON ENDCAP

Tracking: Large area μ RWELL

PID: dual-RICH & AC-LGAD

Calorimetry: (option A)

standard W/ScFi shashlik (PHENIX re-use)

long. sep. HCAL

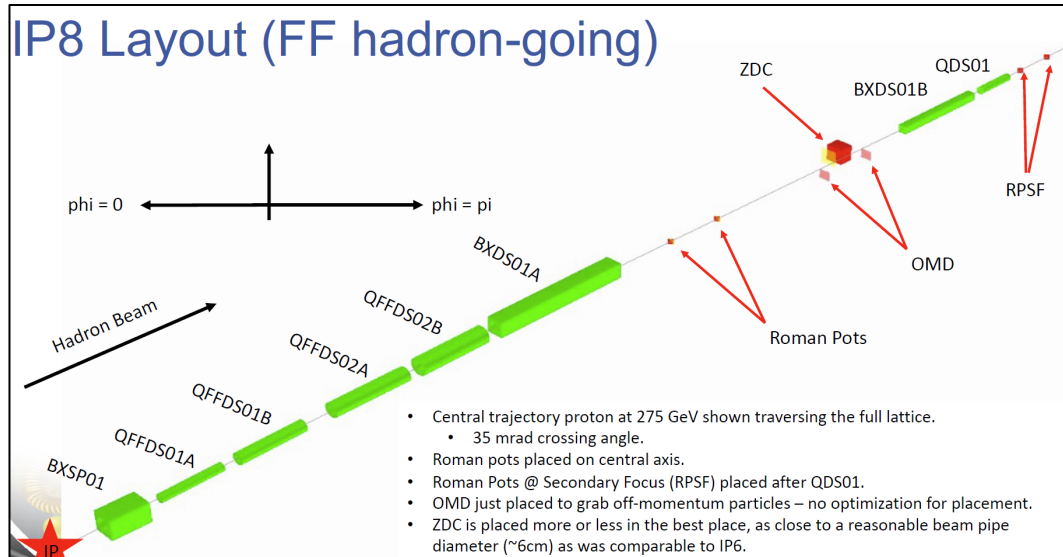
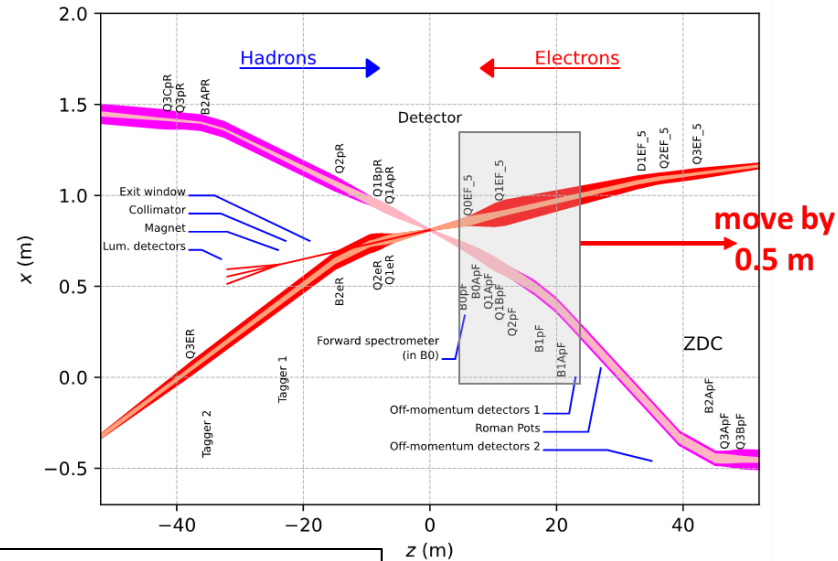
(other options under study)

Major items for the ECCE Detector Concept



Far Forward/Backward Region

- **IP6:** ready for detailed studies – material relevant for simulations with design including the 0.5m shift available at:
<https://indico.bnl.gov/event/10974/contributions/51260/>
- **IP8:** ready for detailed studies – material relevant for simulations:
<https://indico.bnl.gov/event/10974/contributions/51160/>



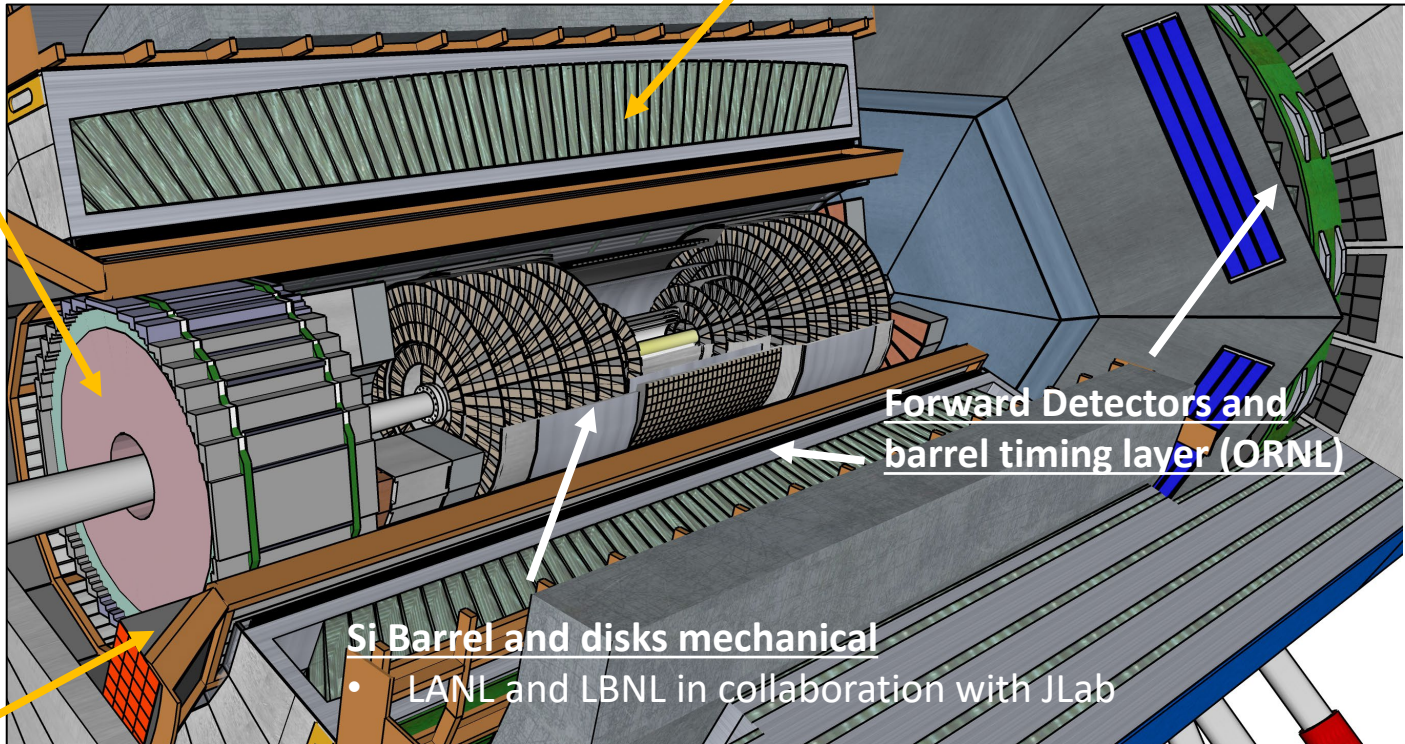
Design/Engineering Activities

Electron Endcap EMCal

- Initial concept (Josh Crafts, CUA)
- Frame and cooling system (IJCLab-Orsay)

Barrel EMCal Support

- Various options EMCal (Josh Crafts, CUA)
- Impact on support structure and frame (MIT)



Si Barrel and disks mechanical

- LANL and LBNL in collaboration with JLab

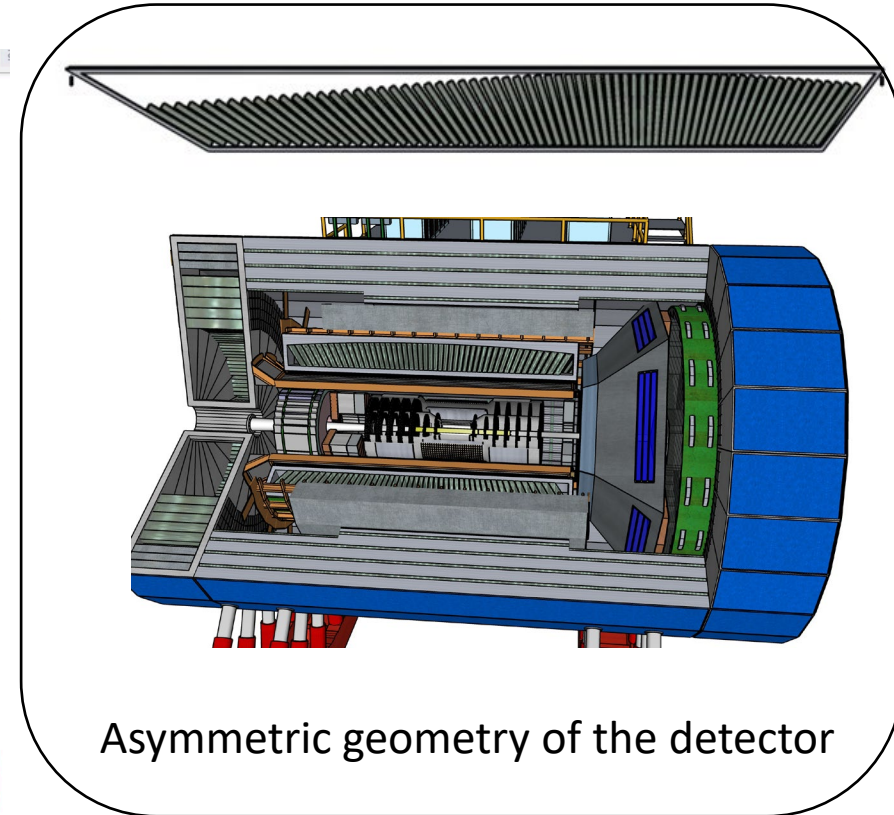
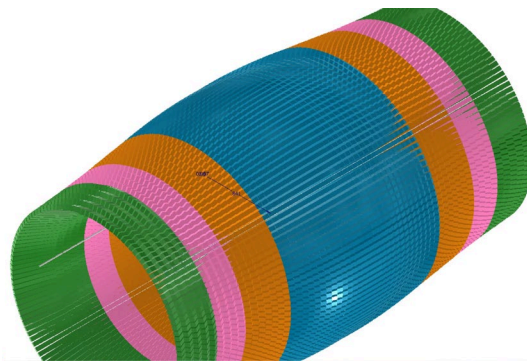
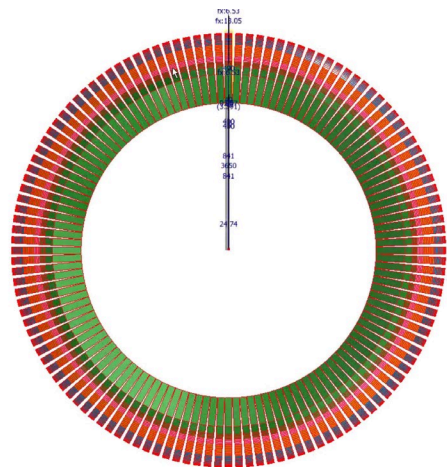
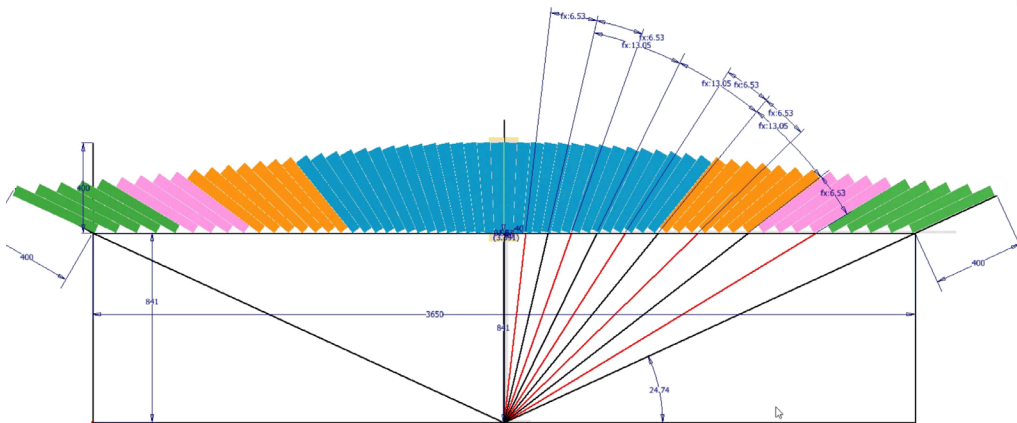
DIRC

- Re-use concept (CUA, GSI)
- Support structure (GSI)

EIC Project :

- Support for barrel EMCal and a universal frame that holds the DIRC and detectors "within" (backward EMCal, mRICH, etc.)
- support of forward Hadron Calorimeter, and how to split it for μ^0 maintenance mode, looking at similar for the backward HCal side.

Design/Engineering Activities Example: barrel EMCal projectivity



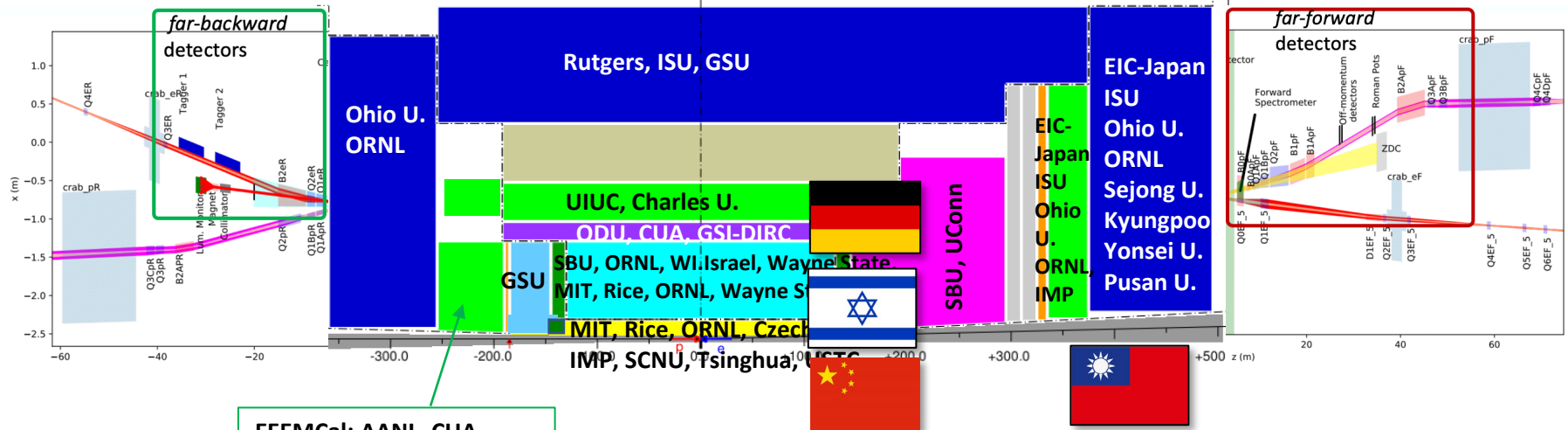
ECCE Consortium and Technology Interest



Glasgow U.,
ODU, UCAD



BGU/Israel, MIT, ORNL, UIUC,
IJCLab-Orsay, EIC-Japan, TAU/Israel,
UVA, GWU, MIT-BATES, HUIJ/Israel



EEEMCal: AANL, CUA,
Charles U., FIU, IJCLab,
MIT, Lehigh U., UKY, JMU



Polarized Beam and polarimetry: MIT, UNH, SBU

Electronics: Columbia, ORNL

DAQ/Trigger: ISU, CU Boulder, OU, ORNL, SBU, UConn, LLNL

Artificial Intelligence: MIT, CNU, Brunel U., U. Regina

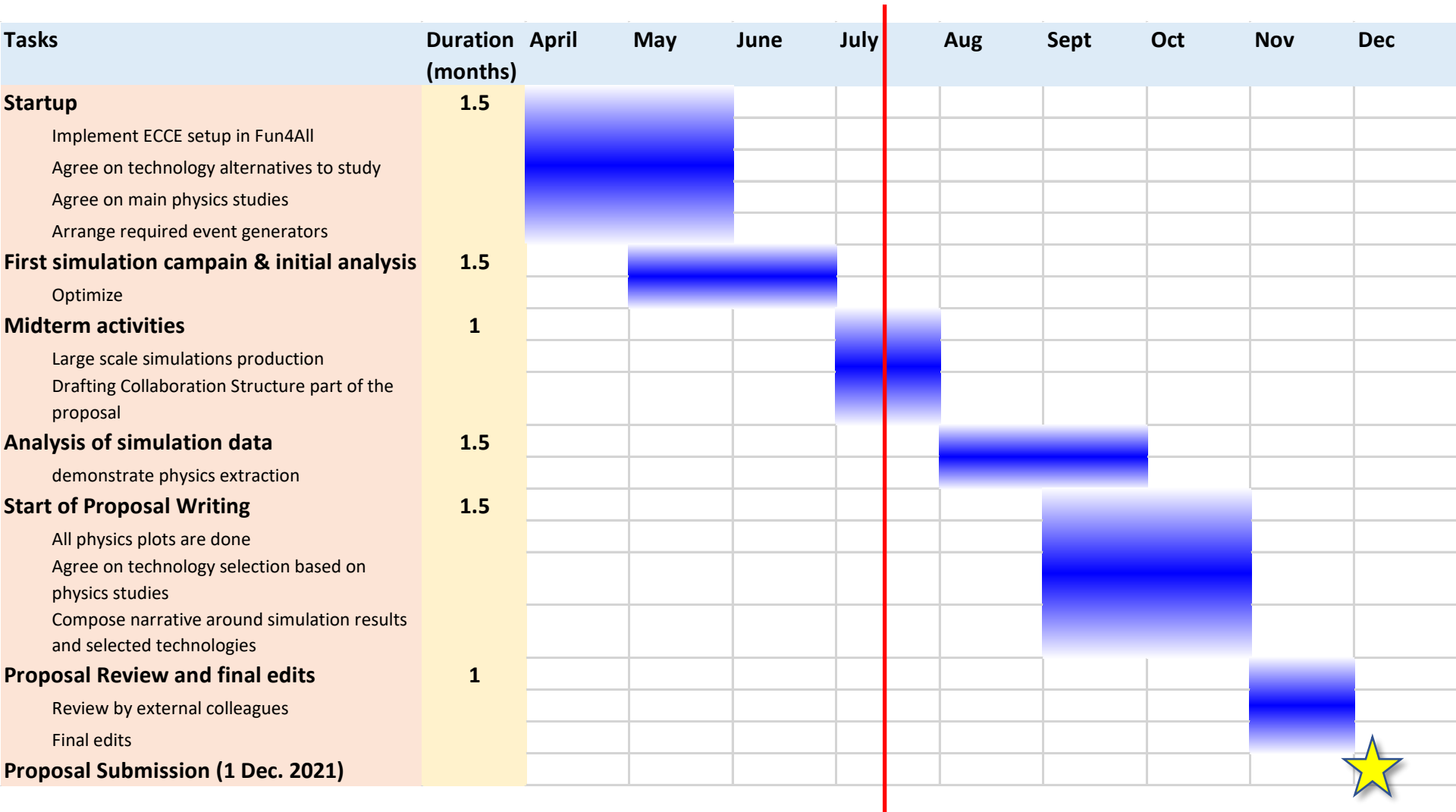


ECCE Anticipated Future Highlights

- ❑ July 19th - Aug. 1st [~0.5 month]:
 - Establish ECCE July 2021 concept
 - Large scale simulations production
 - Drafting 'collaboration structure' part of the proposal by writing team.
- ❑ Aug. 1st - Sep. 15th [1.5 months]:
 - Analysis of simulation data to demonstrate physics extraction.
 - Presentation at August 2-6 EIC UG meeting
- ❑ Sep. 15th - Nov. 1st [1.5 months]:
 - All physics 'plots' are done.
 - Final evaluation of technology selection based on physics studies results.
 - Compose narrative around simulation results and selected technologies.
- ❑ Nov. 1st - Nov. 30th [1 month]:
 - Proposal review by external colleagues.
 - Final edits

ECCE Timeline

Today, 19 July



ECCE Bi-Weekly Meetings Schedule

❑ Will take every two weeks – the next four meetings are:

- ❑ Monday August 2
- ❑ Monday August 16
- ❑ Monday August 30
- ❑ Monday September 13

❑ Suggested meeting times – rotating to accommodate time zones

Date	EDT	UK	Europe	Japan
August 2	5am	10am	11am	6pm
August 16	8am	1pm	2pm	9pm
August 30	4pm	9pm	10pm	5am
September 13	5am	10am	11am	6pm
September 27	8am	1pm	2pm	9pm
...				


ECCE 19 July Meeting Agenda

☐ Updates since last IB meeting

☐ The Teams will present their updates

☐ Next steps: important discussion about the timeline and open tasks and opportunities

9th ECCE Bi-Weekly Meeting



Monday 19 Jul 2021, 16:00 → 19:00 US/Eastern

Description

Connection Information:

Please click this URL to start or join. <https://iastate.zoom.us/j/93478141970?pwd=MUXjMXV0eDJJR0NOSm83Y1F1VmpNQQT09>

Or, go to <https://iastate.zoom.us/join> and enter meeting ID: 934 7814 1970 and password: 112158

16:00 → 16:30

ECCE News and Status

Speaker: Tanja Horn (Cath)

16:30 → 17:00

Detector Team

16:30

Detector Team Report

Speakers: Douglas Higinbotham (Jefferson Lab) , Kenneth Read (Oak Ridge National Laboratory)

16:45

Discussion

17:00 → 17:30

Editorial Team

17:00

Editorial Team Report

Speakers: Peter Steinberg (BNL) , Richard Milner (MIT) , Tom Cormier (ORNL)

17:30 → 17:45

Diversity, Equity and Inclusion

17:30

DE&I Report

Speakers: Christine Nattrass (University of Tennessee, Knoxville) , Elena Long (University of New Hampshire) , Marie BOER, simonetta liuti (university of virginia)

17:45 → 18:15

Physics Benchmark Team

17:45

Physics Benchmark Team Report

Speakers: Carlos Munoz Camacho (IJCLab-Orsay (France)) , Rosi Reed (Lehigh University)

18:00

Discussion

18:15 → 18:45

Computing Team

18:15

Computing Team Report

Speakers: Cristiano Fanelli (MIT) , David Lawrence (Jefferson Lab)

Major items for the ECCE Detector Concept

❑ Optimization EEEMCal and DIRC

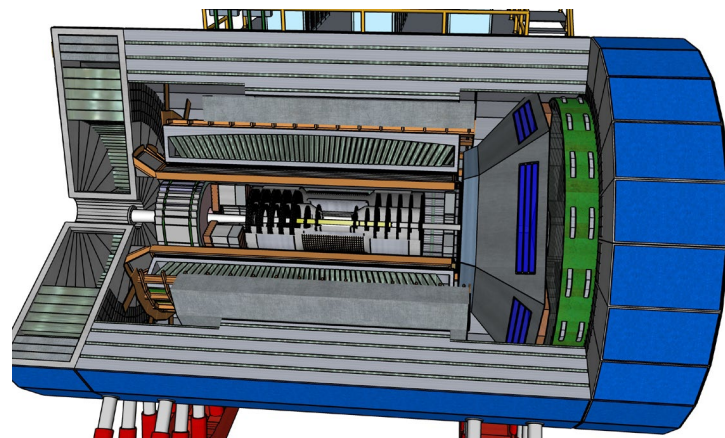
- DIRC prism on electron side has advantages for EMCal, DIRC and dRICH

❑ Barrel detector configuration

- Global optimization to address physics requirement on both e/π and $\pi/K/p$;
Tracking: best use of space

❑ Hadron endcap HCAL

- Alternative for improved resolution



Potential barrel option that may fulfil requirements and has some flexibility

System	Function	Thickness	Inner Radius	Outer Radius
MAPS Si	Vertex/Tracking	47		51
AC-LGAD	Tracking/timing	8	51	59
Inner support for DIRC, EEEMCal		10	59	69
DIRC	PID	3.5	69	72.7
Outer support DIRC, EEEMCal		3.5	72.5	77
TOF/AC-LGAD	Timing/tracking	4	77	81
Barrel EMCal	EMCal, e/p separation	50	81	134
Support for barrel EMCal		6	134	140