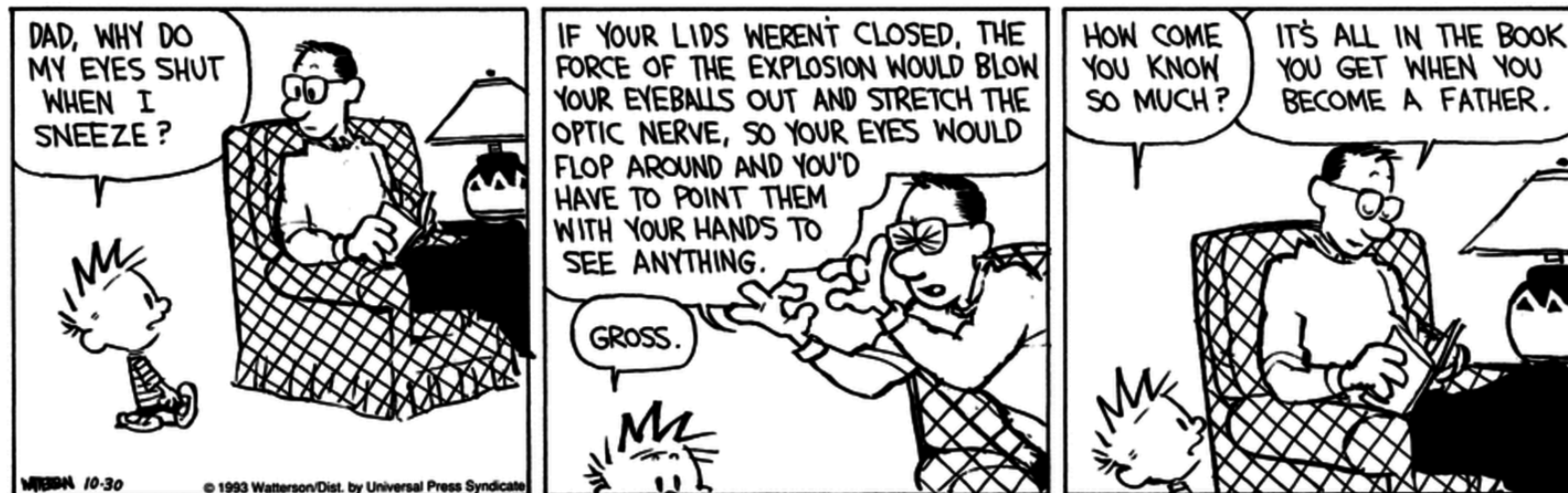


ECCE 7th

Bi-Weekly Meeting

On behalf of the ECCE Steering Committee

Or Hen, Tanja Horn, John Lajoie



It's Been Another Busy Two Weeks!



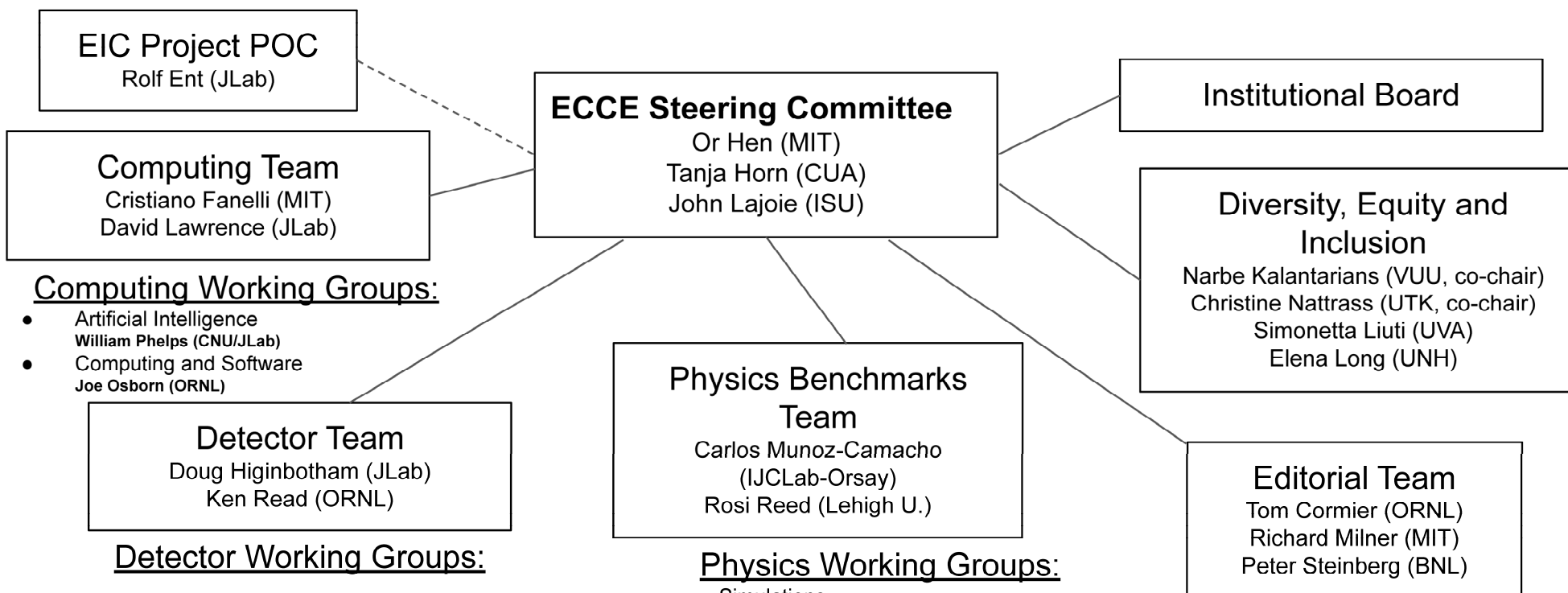
June 2021

Mon	Tue	Wed	Thu	Fri
31	1	2	3	4
09:30 ECCE Physics Meeting 21:00 ECCE Physics Meeting	08:00 ECCE Calorimetry Working Group Meeting 09:00 SIDIS WG meeting 09:30 Electroweak Physics Weekly Meeting 1/ 10:00 EIC/ECCE Computing bi-weekly +2 more	09:00 Inclusive Reactions WG meeting 12:00 Diffractive and Tagging Working Group I	07:30 ECCE Forward/Backward Working Group 12:00 ECCE Team Convenor Meeting	10:00 ECCE Exclusive Reactions 10:00 ECCE Tracking Working Group Meeting 13:00 ECCE PID Working Group Meeting 15:00 A.I. WG Meeting
7	8	9	10	11
09:30 ECCE Physics Meeting 14:00 Inclusive Reactions WG meeting 16:00 6th ECCE Bi-Weekly Meeting 20:00 Simulation Office Hours 21:00 ECCE Physics Meeting	08:00 ECCE Calorimetry Working Group Meeting 09:00 SIDIS WG meeting 09:30 Electroweak Physics Weekly Meeting 15:00 ECCE Tracking Working Group Meeting	09:00 BABAR Magnet Flux Return Discussion 13:00 Software and Computing Meeting 21:00 Electroweak Physics Weekly Meeting 2	07:30 ECCE Forward/Backward Working Group 08:30 ECCE Diffractive and Tagging Working Group 11:00 Detector Working Group Meeting	10:00 ECCE Exclusive Reactions
14	15	16	17	18
09:30 ECCE Physics Meeting 12:00 ECCE Team Convenor Meeting 21:00 ECCE Physics Meeting	08:00 ECCE Calorimetry Working Group Meeting 09:00 SIDIS WG meeting 09:30 Electroweak Physics Weekly Meeting 1/ 10:00 EIC/ECCE Computing bi-weekly +2 more	12:00 ECCE PID Detector Simulation Discussion 12:00 Diffractive and Tagging Working Group I 13:00 Software and Computing Meeting 21:00 Electroweak Physics Weekly Meeting 2	11:00 A.I. WG Meeting 12:30 Detector Working Group Follow-up Meeting 20:00 ECCE Forward/Backward Working Group	09:55 ECCE Exclusive Reactions 10:00 ECCE Tracking Working Group Meeting 13:00 ECCE PID Working Group Meeting
21	22	23	24	25
05:00 7th ECCE Bi-Weekly Meeting 09:30 ECCE Physics Meeting 12:00 ECCE Team Convenor Meeting 20:00 Simulation Office Hours 21:00 ECCE Physics Meeting	08:00 ECCE Calorimetry Working Group Meeting 09:00 SIDIS WG meeting 09:30 Electroweak Physics Weekly Meeting 1/ 11:00 ECCE Jets and HF Meeting	21:00 Electroweak Physics Weekly Meeting 2	07:30 ECCE Forward/Backward Working Group	10:00 ECCE Exclusive Reactions
28	29	30	1	2

32 ECCE meetings since last bi-weekly meeting!

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

ECCE Consortium



Computing Working Groups:

- Artificial Intelligence
William Phelps (CNU/JLab)
- Computing and Software
Joe Osborn (ORNL)

Detector Team

Doug Higinbotham (JLab)
Ken Read (ORNL)

Detector Working Groups:

- IP8/Equipment Re-use
John Haggerty (BNL)
- Far Forward/Far Backward*
Michael Murray (KU),
Yuji Goto (RIKEN), Igor Korover (MIT)
- Tracking
Xuan Li (LANL),
Nilanga Liyanage (UVA)
- Calorimetry
Friederike Bock (ORNL), Yongsun Kim (Sejong U.)
- Particle ID
Greg Kalicy (CUA),
Xiaochun He (GSU)
- Magnetic Field
Paul Brindza (JLab),
Renuka Rajput-Ghoshal (JLab)
- DAQ/Electronics/Readout
Chris Cuevas (JLab),
Martin Purschke (BNL)

*Alex Jentsch, Yulia Furlitova
(far-forward/backward POC)

Physics Benchmarks Team

Carlos Munoz-Camacho (IJCLab-Orsay)
Rosi Reed (Lehigh U.)

Physics Working Groups:

- Simulations
Cameron Dean (LANL), Jin Huang (BNL)
- Inclusive Processes
Tyler Kutz (MIT), Claire Gwenlan (Oxford)
- Semi-Inclusive
Ralf Seidl (RIKEN), Charlotte Van Hulse (Orsay)
- Exclusive
Rachel Montgomery (Glasgow), Julie Roche (OU)
- Diffractive and Tagging
Wenliang Li (W&M), Axel Schmidt (GWU)
- Jets and Heavy Flavor
Cheuk-Ping Wong (LANL), Wangmei Zha (USTC)
- BSM and Precision Electroweak
Sonny Mantry (UNG), Xiaochao Zheng (UVA)

Institutional Board

Diversity, Equity and Inclusion

Narbe Kalantarians (VUU, co-chair)
Christine Nattrass (UTK, co-chair)
Simonetta Liuti (UVA)
Elena Long (UNH)

Editorial Team

Tom Cormier (ORNL)
Richard Milner (MIT)
Peter Steinberg (BNL)

Editorial Working Groups:

- Proposal Editing, Verification and Version Control
- Costing and Management

Website:

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

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

Indico:

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

Defining the ECCE Detector

- Focus in the past two weeks has been with the Detector and Physics Teams working to define ECCE for the first simulation campaign:
- Full Detector Team Meetings:
 - Jun 10th: <https://indico.bnl.gov/event/12079/>
 - Jun 17th: <https://indico.bnl.gov/event/12199/>
- Implementation of simulation geometry, test samples underway
- Will hear more from the Teams today!

Evolution of ECCE Detector Concept



Global optimization to address physics requirement on both e/π and $\pi/K/p$.

❑ Optimization EEEMCal and DIRC

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

❑ Barrel detector configuration

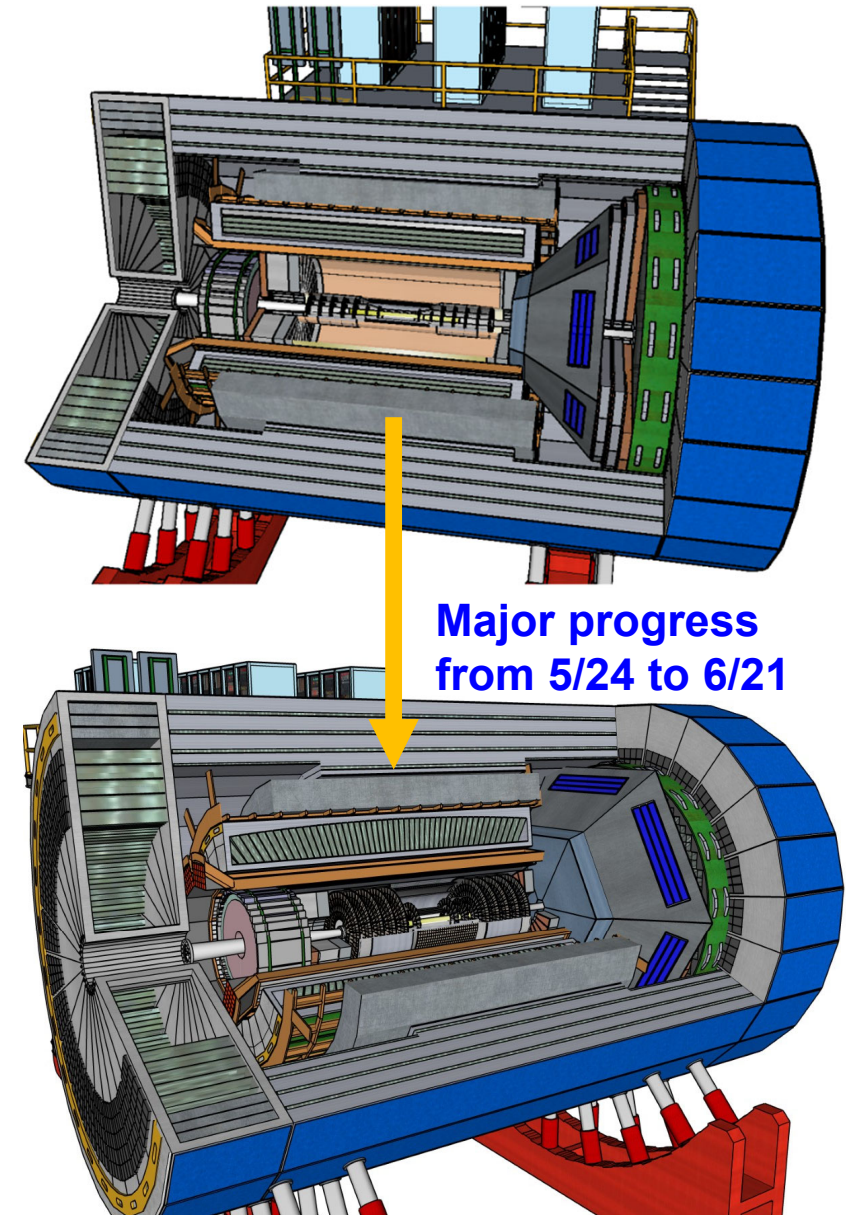
- Tracking: best use of space for all-Si option; MPGD alternatives in barrel on outside
- AC/LGAD to augment DIRC/PID with TOF; location *inside* DIRC to ensure e^- detection

❑ Optimization barrel EMCal

- Allows homogeneous and projective solutions, important for rapidities close to transition of barrel to endcap

❑ Optimization DIRC

- At a radius that “just” allows for 12 segments → optimizes azimuthal coverage (~97% as at BABAR?)



Evolution of ECCE Detector Concept



Global optimization to address physics requirement on both e/π and $\pi/K/p$.

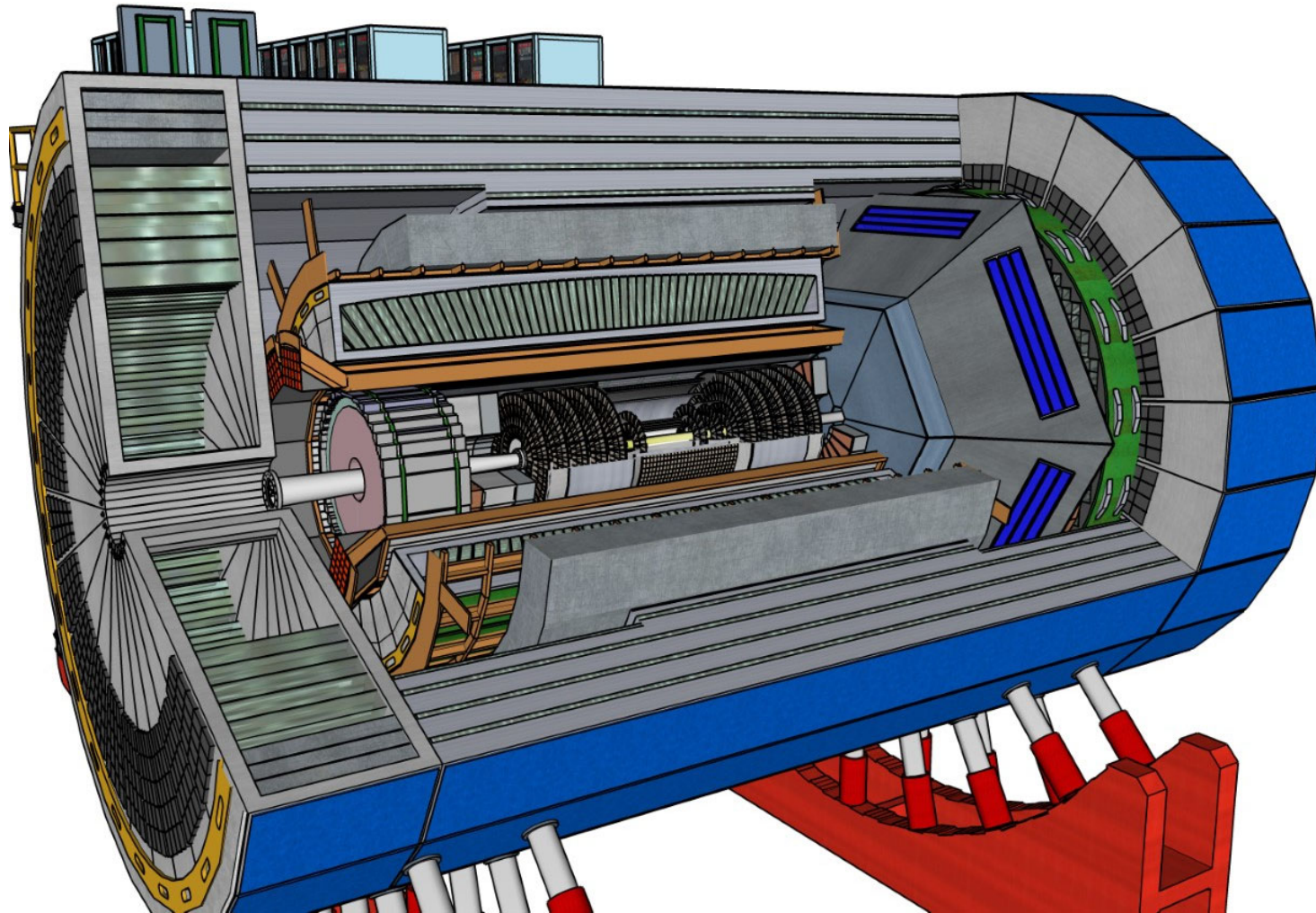
Barrel configuration that may fulfill requirements and has some flexibility

System	Function	Thickness	Inner Radius	Outer Radius
Silicon	Vertex/Tracking	47		50
MPGD	Tracking	7	50	57
TOF/AC-LGAD	Timing/Tracking	8	57	65
DIRC (includes support frame)	PID	12	65	77
Outer support DIRC, EEEMCal		4	77	81
Barrel EMCal	EMCal, e/p separation	50	81	134
Support for barrel EMCal (instrumented)		6	134	140

☐ **Maintain Flexibility**

- Do not over-constrain space yet as engineering designs of supports require refinement and service needs not quite known yet.
- Leave few-cm “slop” in tracking, PID and barrel EM Calorimetry space assignments.

ECCE Detector (W.I.P.)



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)

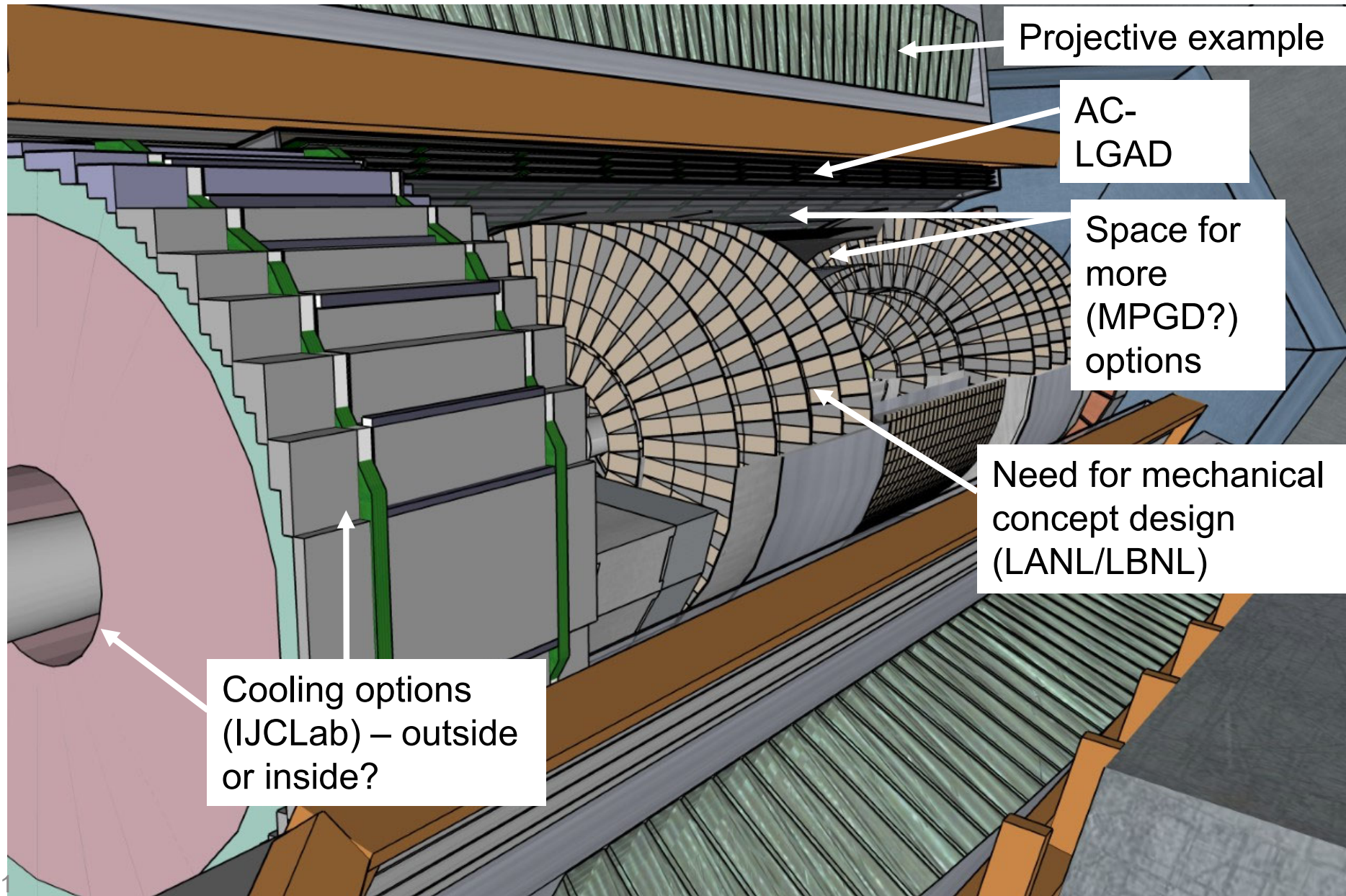
HADRON ENDCAP

Tracking: Large area μ RWELL

PID: dual-RICH & AC-LGAD

Calorimetry: (option A)
standard Pb/ScFi shashlik (PHENIX re-use)
long. sep. HCAL
(other options under study)

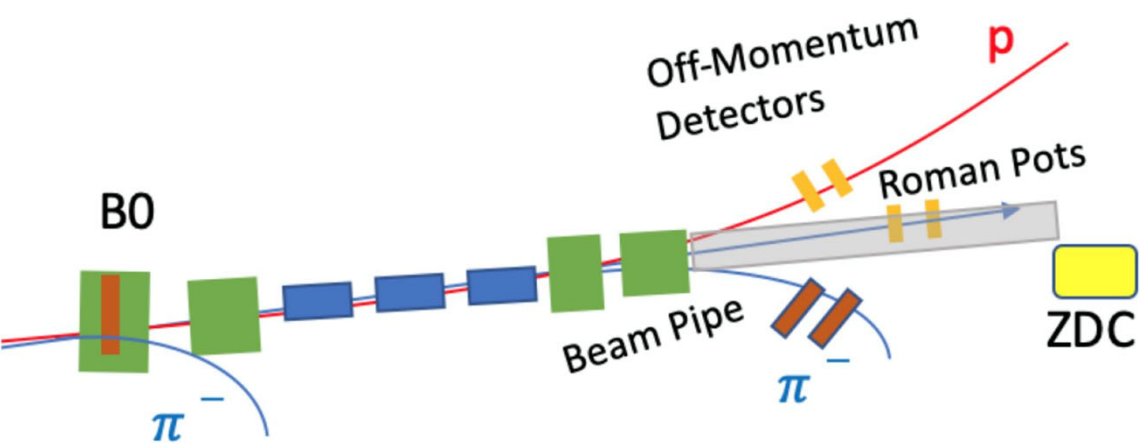
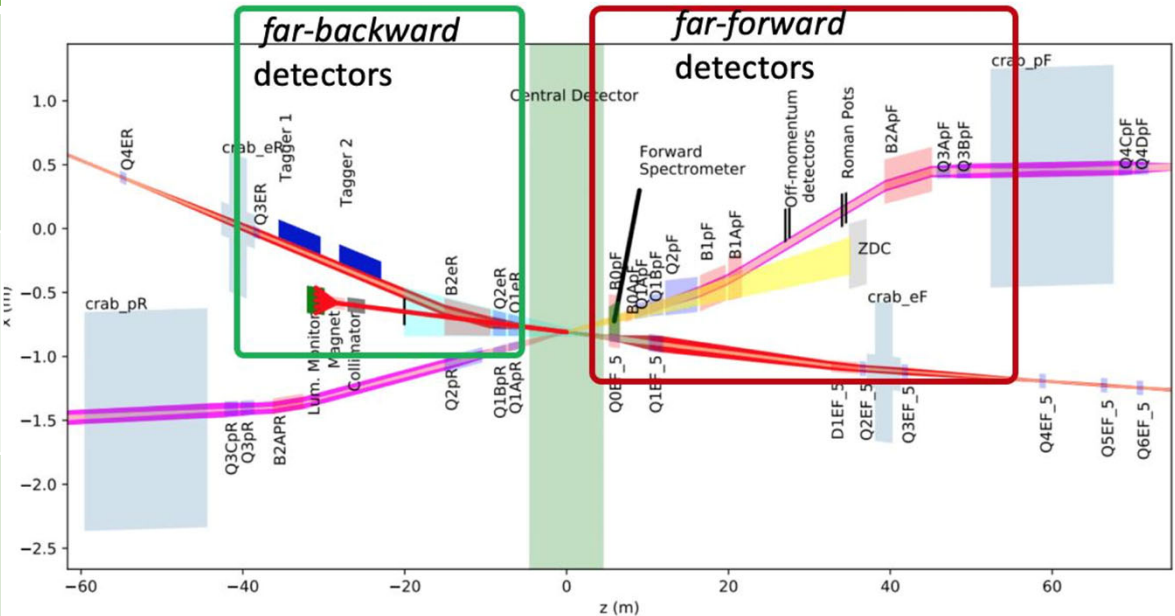
ECCE Barrel Configuration



Far Forward/Backward



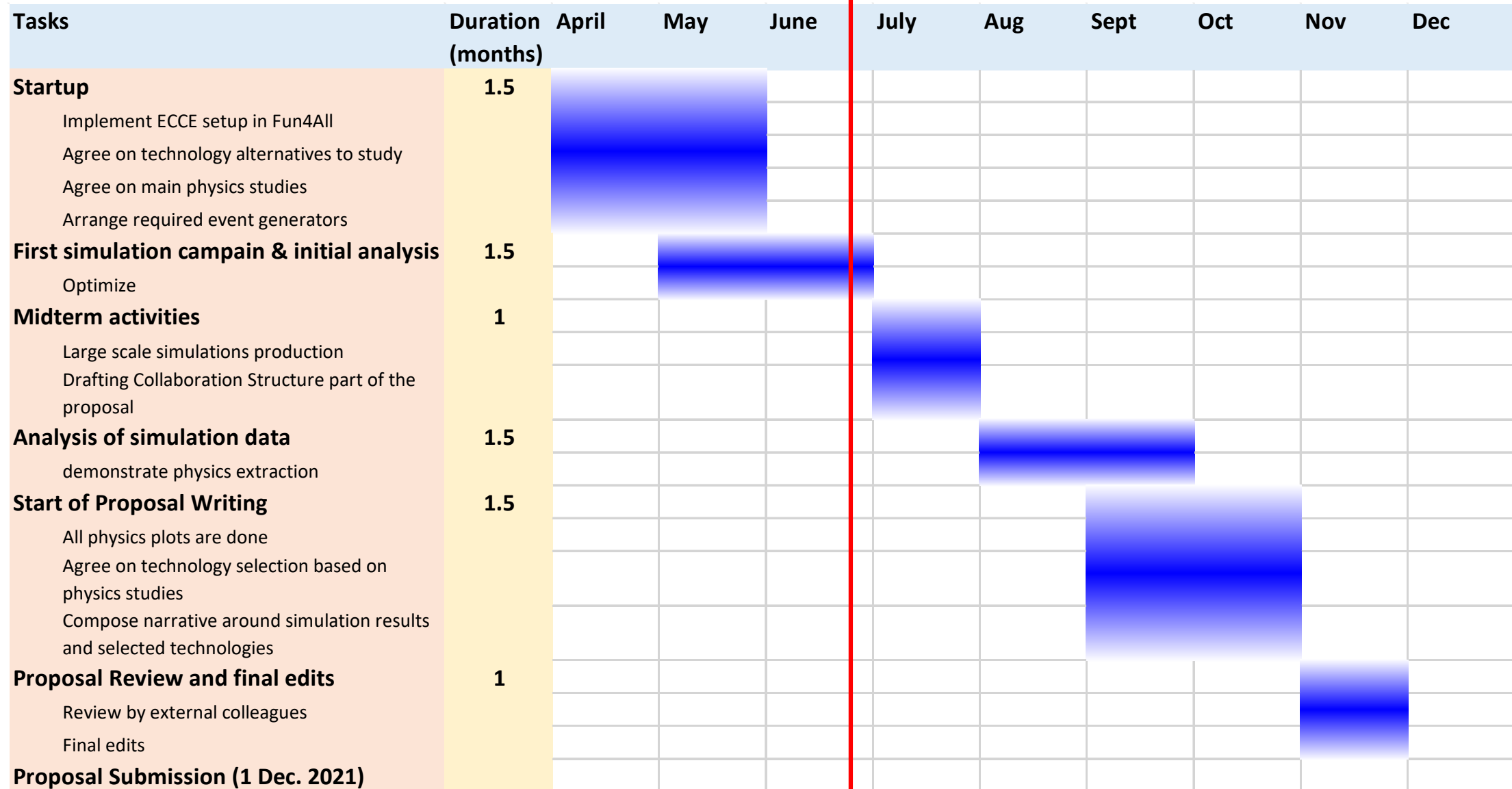
Detector	Proposed Technology	What R&D is needed	Interested groups	Costing
Zero-Degree Calorimeter (ZDC)	Combined function EMCal+HCAL based on ALICE FoCal*	More detailed simulations with realistic considerations	EIC-Japan , Kansas U.	Leverage experience from ALICE FoCal for baseline estimates
Roman Pots	AC-LGADs	Mostly engineering considerations (cooling structural support, impact of material on other detectors)**	IJC-Orsay , Rice U., LGAD consortium, ...	Preliminary estimate available from eRD24 (for silicon and ASICs)
Off-Momentum Detectors	AC-LGAD	Optimal placement – possible dual implementation as horizontal RP system near B1apf, and outside beam pipe near B2pf**	LGAD consortium, ...	Same as for RP
B0 Spectrometer	Fine granularity silicon for tracking (MAPS or similar); silicon preshower, compact EMCal		LANL on the silicon sensors,, PWO crystals may be available	See project template spreadsheet/BOE
Low Q2 Tagger	EMCal, Timepix telescope		U. Glasgow	See project template spreadsheet/BOE



Timeline



Today, June 21st

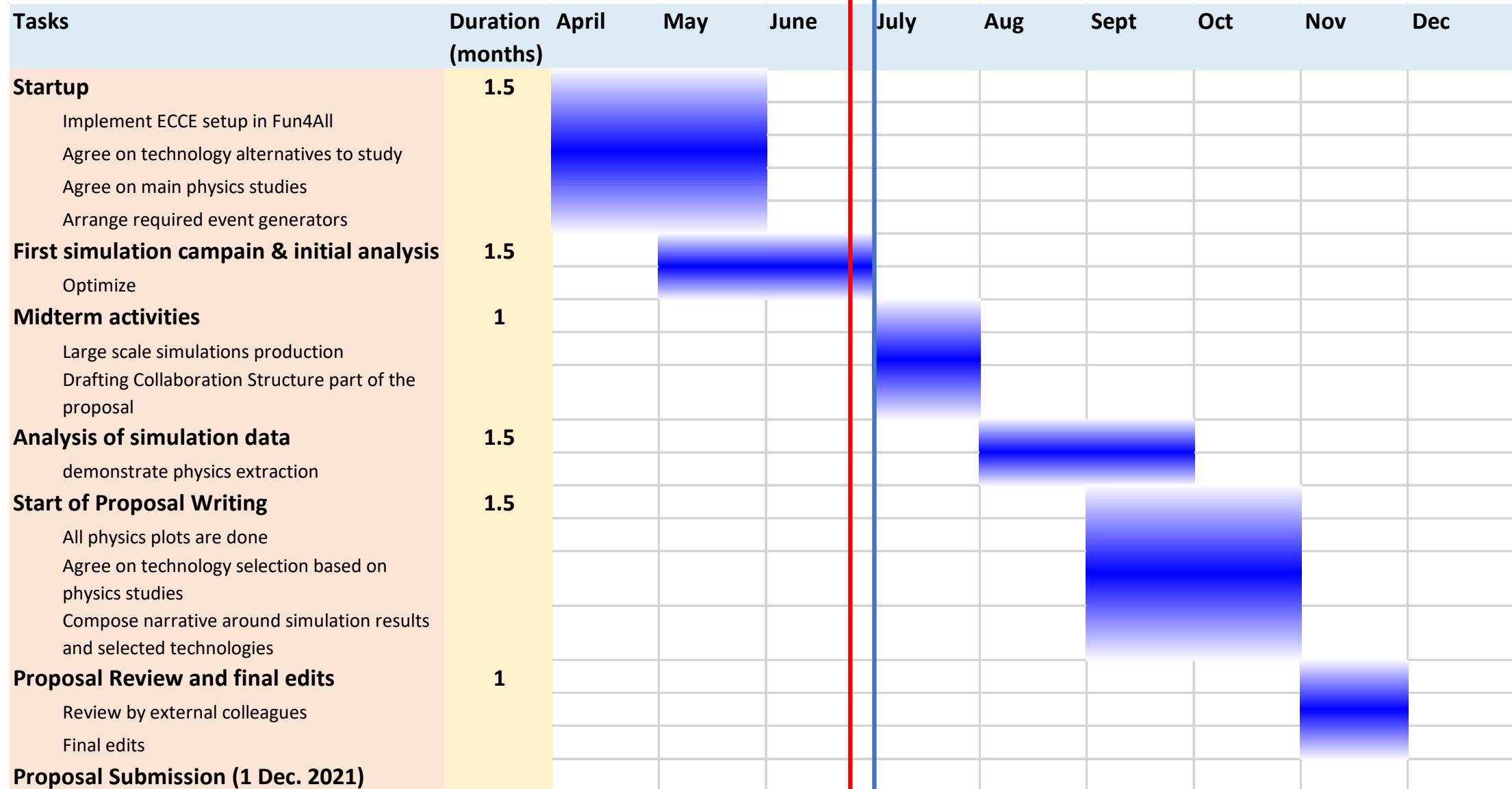


Timeline



Today, June 21st

July 1'st: Second Campaign



Goals of First Simulation Campaign



- Need to exercise the ECCE simulation machinery
 - Detector configuration may have open issues, or partial implementation of detector response
 - Important to quantify – keep a list of issues to be addressed!
 - “Shake down” detector geometry
 - Quality implementations, overlaps, etc.
 - Begin to provide simulation samples with ECCE design that can be used by the PWG’s to develop analysis code.
 - [Simulations Status Tracker](#)
- Expect changes as we evolve to second (full) simulation campaign
 - A data-driven process:
 - Physics input and evaluation
 - Engineering input on frames, etc., as they impact design/performance

Simulations Status

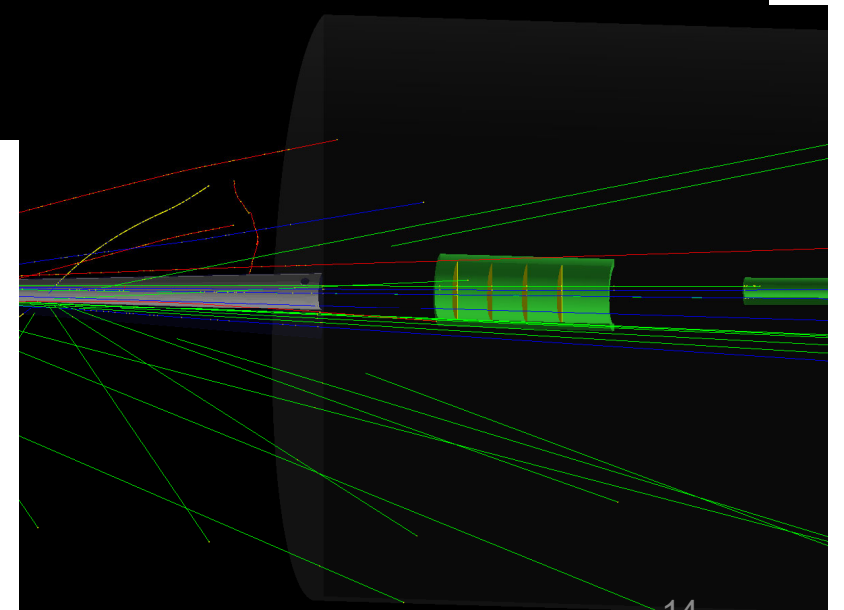
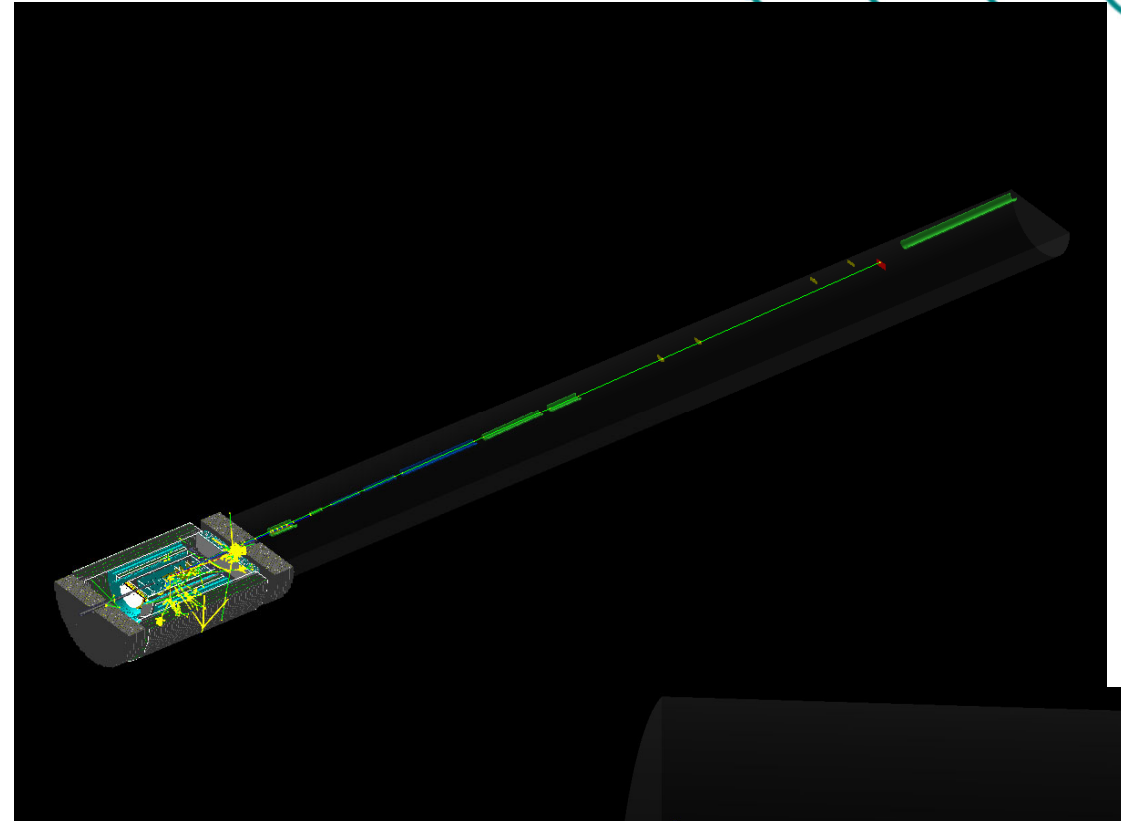
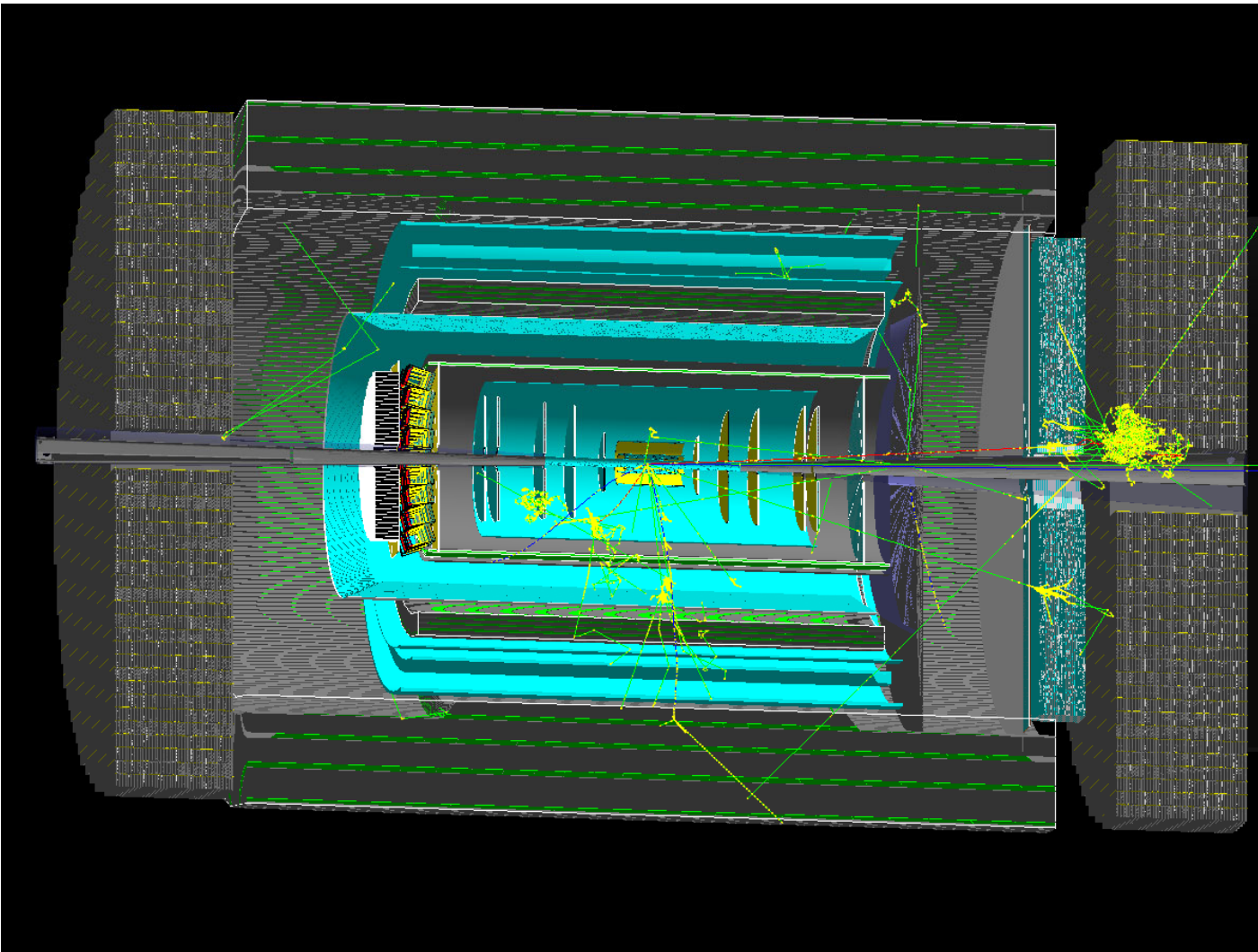


Simulations Timeline

Simulation Timeline Detector Configuration - Jun2021 PID reference layout Tracking reference layout Far-Forward reference layout						
Item	Task	Required by	Assignee	Status	Goal	More information
1	Create top-level submission scripts	27/5/21	Cameron	Complete	The creation of a single submission script allows PWGs to submit simulation requests in a single style and we take care of the rest	This is a repo to initialise simulation setups at different production sites. We have a simple ASCII file with ECCE build, macro tag, PWG etc which can be read in along with a production site input to create the required builds and submissions scripts specific to that location
2	Add site-specific production scripts	1/6/21	Cameron & co.	Complete	Requirements for each site can be set from one argument at the top-level	BNL Condor: Done, JLab Slurm: Done, Bates: Done, JLab/BNL OSG: Done
3	Beta-test production scripts at each site	14/06/21	Cameron & co.	In progress	Ensure we can copy files around as needed	Requires previous item. BNL, JLab and Bates have been tested, OSG 2nd test is pending
4	Debug zombie files	14/06/2021	Cameron & co.	Complete	Every file we produce must be produced correctly and openable	Some output files are corrupt, as if job didnt finish successfully. Looks like EventEval has been patched
5	Complete detector subsystem simulation setup	14/06/2021	Detector WG	In progress	Each subsystem for ECCE has either a macro or a class we can import	For the detectors decided on for the first campaign, each DWG must supply either a detector class or macro to the simulations team, preferably via github For DWGs: Minimum Requirements: Your detector must compile with gcc and make sense for what you wish to achieve Your detector must have no internal overlaps Complete requirements: Your detector must compile with clang (./autogen.sh --prefix=\$MYINSTALL CXX=clang++ CC=clang) Your detector must have no significant issues when running cppcheck or valgrind
5.1	tracking	14/06/2021	Xuan and Nilanga	In progress		
5.2	PID	14/06/2021	Greg and Xiaochun	In progress		
5.3	Calorimeter	14/06/2021	Friederike and Yongshu	In progress		
5.4	Far forward	14/06/2021	Michael, Igor and Yuji	In progress		
6	Discuss implementation/placement of ECCE	17/6/21	All	Complete	A meeting to finalise final placement of sub-detectors	We predict that there will be some overlap between detectors that requires discussing where to put them now
7	Relay production requirements for Campaign 1	17/6/21	Physics WG	In progress	Each PWG knows what generator they are using, they have files with generated events and they know how many events they want	Hopefully there is some overlap between PWGs here
8	Full detector integration in simulation and reconstruction	18/6/21	Simulations WG	In progress	Each subdetector compiles without complaint and is placed in ECCE with no overlap	Debugging predictions: Clang will dislike something (unused variable or something), cppcheck will find something out of scope, some subdetectors will overlap in ECCE, a namespace could be defined twice and we get ambiguities
9	Update top-level submissions with PWG info	18/6/21	Cameron	Not started	Each simulation will have their own ASCII file with production parameters.	These lists will be a part of our productions repository that each site will clone. This way we can distribute the tasks without problems
10	Define production site tasks	21/6/21	Prod. Managers	Not started	Each site knows what their productions responsibilities are	We should understand the capabilities of each site, BNL and JLab are equal on storage and cores but maybe one site is locally faster due to other jobs running. Bates can likely run small scale production in the few million for subdetector exchanges (i.e. different calos)
11	Start 10M particle gun and/or SIDIS events	22/6/21	Prod. Managers	Not started	Particle gun gives a quick check of some performance (i.e. tracking), SIDIS gives us global acceptance and more tracks per event	Purpose: Detector WG: Can check subsystem response Physics WG: Can ensure all required information for physics analysis is written or stored in DSTs Simulation and Computing WG: We can find the 1-in-a-million crash conditions
12	Analyse 10M particle gun events and SIDIS events	25/6/21	Physics, Computing WG	Not started	See "More information" for "Start 10M particle gun and/or SIDIS events" task	
13	Meet with PWGs regarding particle gun and SIDIS simulation	29/6/21	Detector & Physics WG	Not started	See "More information" for "Start 10M particle gun and/or SIDIS events" task	
14	Physics Generation Campaign 1	31/6/21	Simulations WG	Not started	Full scale, production of Multi-100M event set	

(as of 6/20 @ 2PM EDT...)

G4 Implementation



Very close to a full G4 Implementation of ECCE w/IP6 beamline

6/21/2021

ECCE 7th IB Meeting

Additional Reports

- DE&I Working on Code of Conduct
- Proposal Committee:
 - Tools for handling collaborative documents
 - Cost and Risk evaluation
 - IP6/8 Infrastructure and re-use
- Physics Team:
 - Generator inputs for simulation campaigns
 - Analysis and evaluation code
- Computing Team:
 - Preparation for additional AI optimization studies
 - Managing the simulation infrastructure



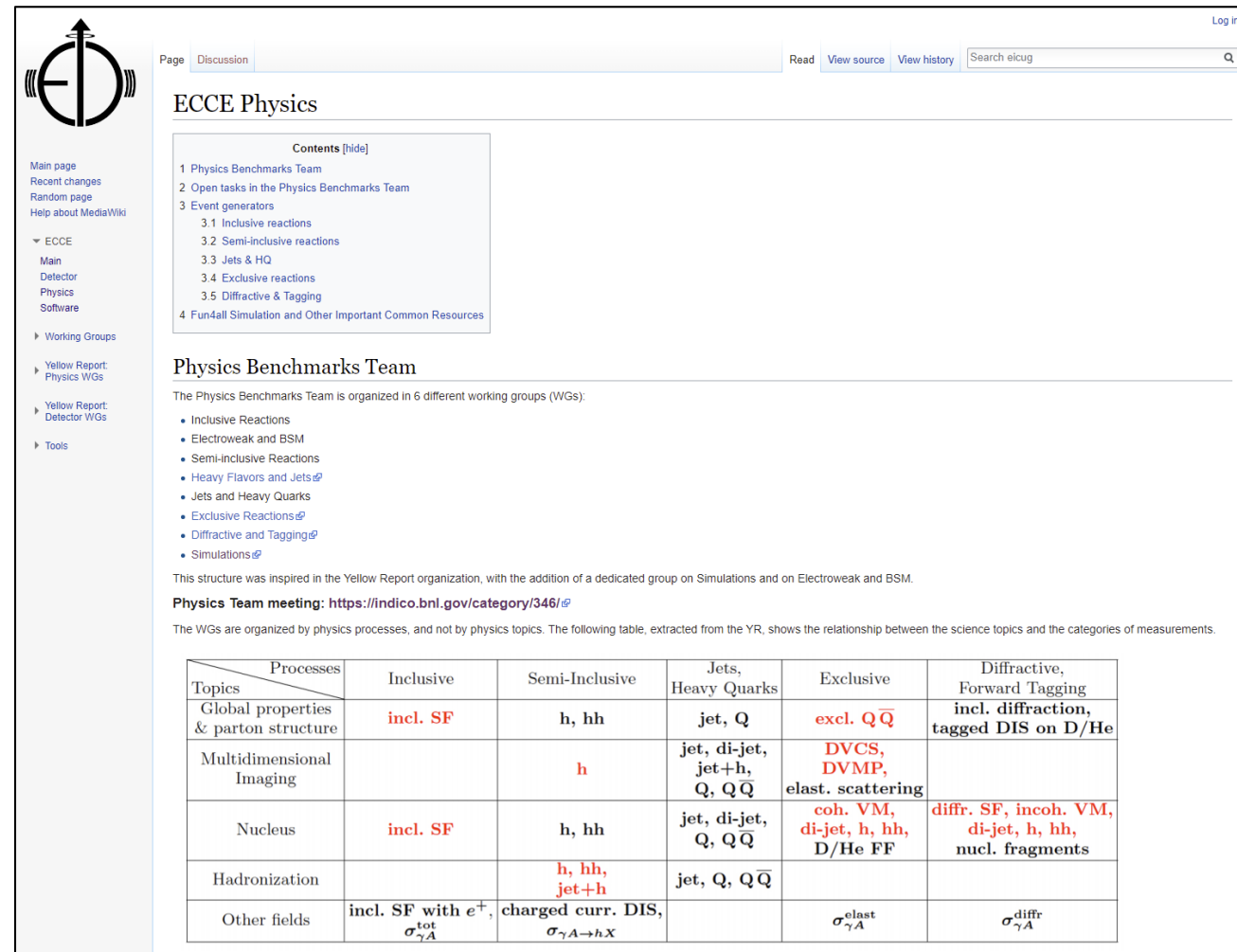
Wiki and Open Task Lists

- WG's asked to maintain a list of open tasks in the ECCE Wiki:

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

- This is the place to start when looking to get postdocs/students started in ECCE

- WG's will keep lists updated as new opportunities arise



The screenshot shows the ECCE Physics Wiki page. The left sidebar contains navigation links: Main page, Recent changes, Random page, Help about MediaWiki, ECCE (Main, Detector, Physics, Software), Working Groups, Yellow Report (Physics WGs, Detector WGs), and Tools. The main content area is titled "ECCE Physics" and includes a "Contents [hide]" section with a numbered list of topics. Below this is the "Physics Benchmarks Team" section, which describes the team's organization into six working groups (WGs) and provides a list of topics. A table at the bottom shows the relationship between science topics and measurement categories.

Contents [hide]

- 1 Physics Benchmarks Team
- 2 Open tasks in the Physics Benchmarks Team
- 3 Event generators
 - 3.1 Inclusive reactions
 - 3.2 Semi-inclusive reactions
 - 3.3 Jets & HQ
 - 3.4 Exclusive reactions
 - 3.5 Diffractive & Tagging
- 4 Fun4all Simulation and Other Important Common Resources

Physics Benchmarks Team

The Physics Benchmarks Team is organized in 6 different working groups (WGs):

- Inclusive Reactions
- Electroweak and BSM
- Semi-inclusive Reactions
- Heavy Flavors and Jets
- Jets and Heavy Quarks
- Exclusive Reactions
- Diffractive and Tagging
- Simulations

This structure was inspired in the Yellow Report organization, with the addition of a dedicated group on Simulations and on Electroweak and BSM.

Physics Team meeting: <https://indico.bnl.gov/category/346/>

The WGs are organized by physics processes, and not by physics topics. The following table, extracted from the YR, shows the relationship between the science topics and the categories of measurements.

Processes Topics	Inclusive	Semi-Inclusive	Jets, Heavy Quarks	Exclusive	Diffractive, Forward Tagging
Global properties & parton structure	incl. SF	h, hh	jet, Q	excl. Q \bar{Q}	incl. diffraction, tagged DIS on D/He
Multidimensional Imaging		h	jet, di-jet, jet+h, Q, Q \bar{Q}	DVCS, DVMP, elast. scattering	
Nucleus	incl. SF	h, hh	jet, di-jet, Q, Q \bar{Q}	coh. VM, di-jet, h, hh, D/He FF	diff. SF, incoh. VM, di-jet, h, hh, nucl. fragments
Hadronization		h, hh, jet+h	jet, Q, Q \bar{Q}		
Other fields	incl. SF with e^+, $\sigma_{\gamma A}^{\text{tot}}$	charged curr. DIS, $\sigma_{\gamma A \rightarrow hX}$		$\sigma_{\gamma A}^{\text{elast}}$	$\sigma_{\gamma A}^{\text{diff}}$


ECCE Physics Godparents

- Steering committee discussing potential physics godparents
- Not too late for nominations!
- Hope to have this settled by next Bi-Weekly meeting

Agenda

Looking forward to reports from the teams and working groups – lots of things happening!

7th ECCE Bi-Weekly Meeting

 Monday Jun 21, 2021, 5:00 AM → 10:20 AM US/Eastern

Description

Connection Information:


Please click this URL to start or join. <https://iastate.zoom.us/j/94085126268?pwd=UTRLZWtsRjFMYYXpubEEvdVhjWVJQdz09>
Or, go to <https://iastate.zoom.us/join> and enter meeting ID: 940 8512 6268 and password: 897327

5:00 AM → 5:30 AM

ECCE News and Status

Speaker: John Lajoie (Iowa State University)

30m



5:30 AM → 5:45 AM


Diversity, Equity and Inclusion

5:30 AM

DE&I Report

Speakers: Christine Nattrass (University of Tennessee, Knoxville) , Narbe Kalantarians (Virginia Union University)

15m



5:45 AM → 6:15 AM


Detector Team

5:45 AM

Detector Team Report

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


15m



6:00 AM

Discussion

15m



6:15 AM → 6:45 AM


Editorial Team

6:15 AM

Editorial Team Report

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

15m



6:45 AM → 7:15 AM


Physics Benchmark Team

6:45 AM

Physics Benchmark Team Report

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


15m



7:00 AM

Discussion

15m



7:15 AM → 7:45 AM


Computing Team

7:15 AM

Computing Team Report

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


15m



7:45 AM → 8:00 AM

Further Discussion

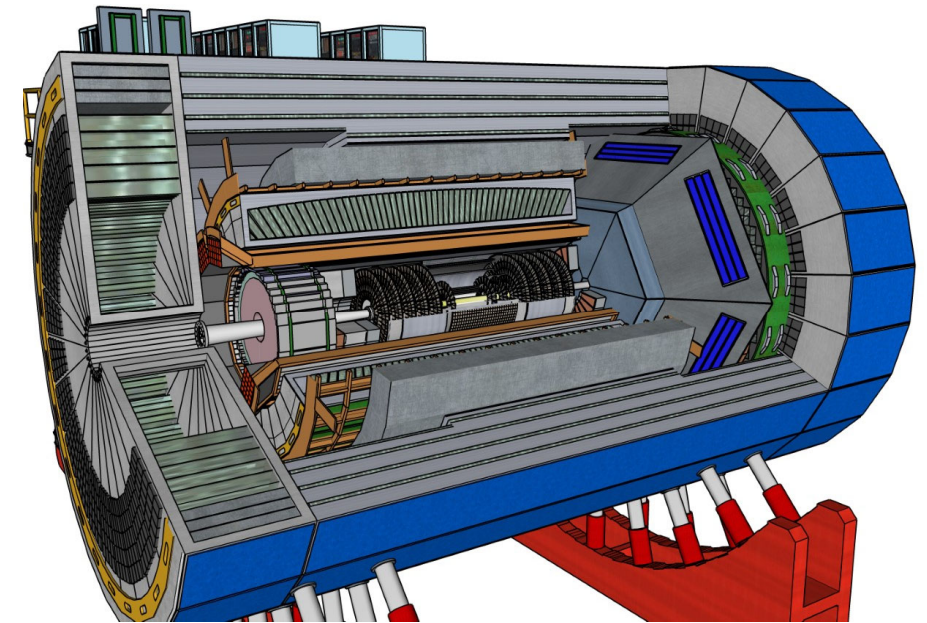
15m





ECCE Resources

- ECCE Website
 - <https://www.ecce-eic.org/>
- ECCE Indico
 - <https://indico.bnl.gov/category/339/>
- ECCE Indico Calendar
 - <https://indico.bnl.gov/category/339/calendar>
- ECCE Wiki
 - <https://wiki.bnl.gov/eicug/index.php/ECCE>





BACKUP