

ECCE Status

The End Is Near!

On behalf of the ECCE Steering Committee

Or Hen, Tanja Horn, John Lajoie

and all ECCE collaborators!



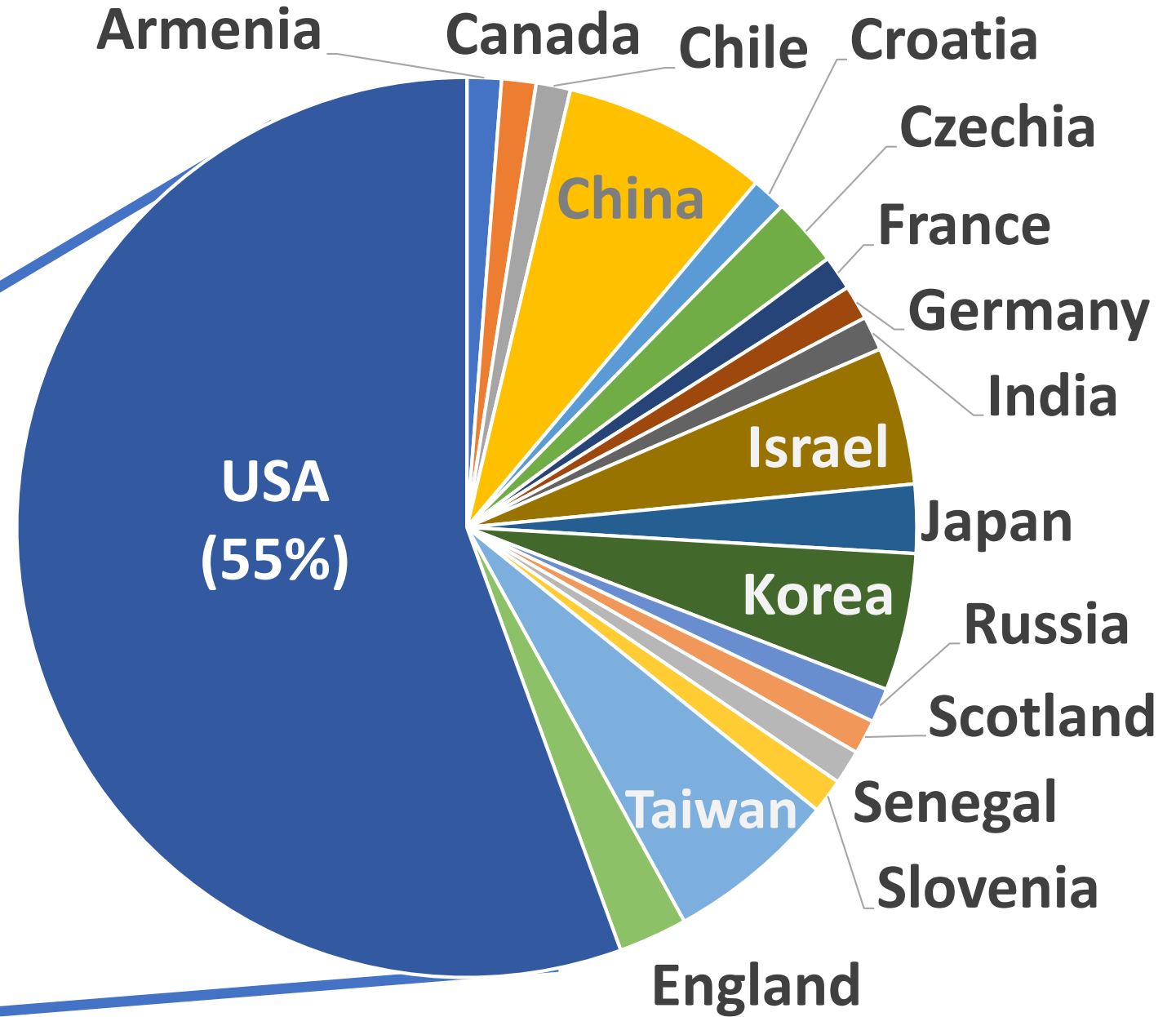
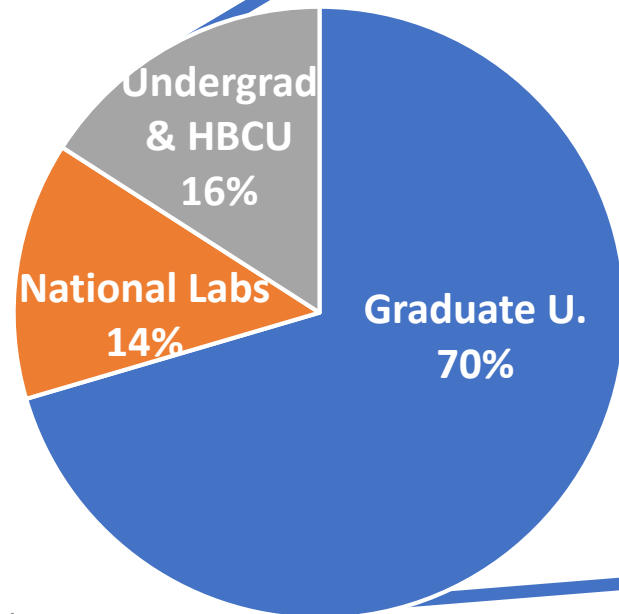
Status of the ECCE Proposal

- Completed the ECCE detector design and technology selection
 - Technology selection is complete
 - Final optimization studies underway
 - First pass optimization of inner tracker supports (AI)
 - Optimization studies to eliminate redundancies
- Physics Evaluation
 - Second simulation campaign complete!
 - Performance plots selected; analysis notes underway
- Completing cost and schedule
 - Finalizing international in-kind contributions
 - Scrubbing cost, integrating schedule
- And of course, writing the proposal...

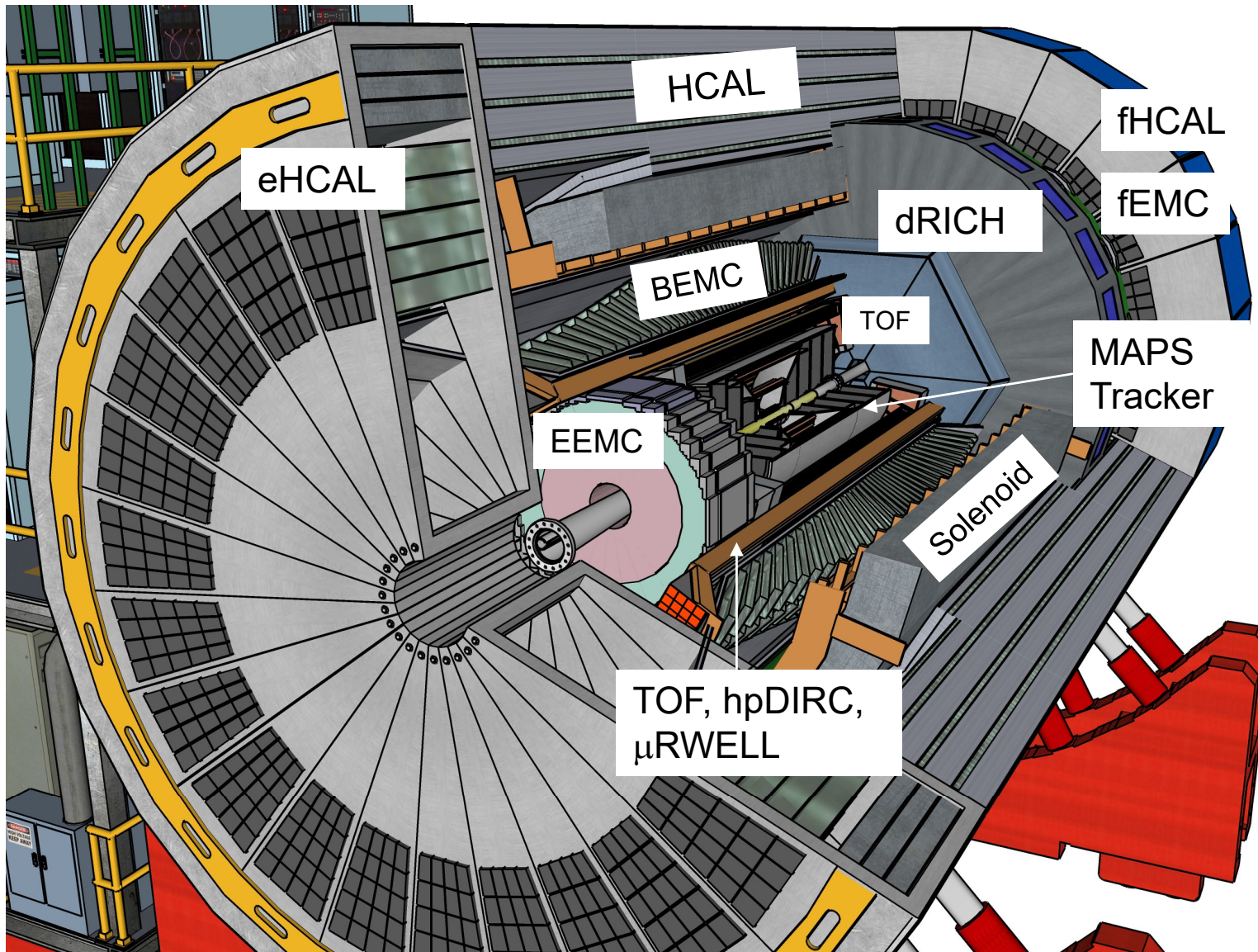
CCCE Consortium

81 Institutions

High engagement from all collaborating institutions!



ECCE Central Detector



CENTRAL BARREL

Tracking: ITS3 based MAPS Si for vertexing, sagitta, and endcap discs;

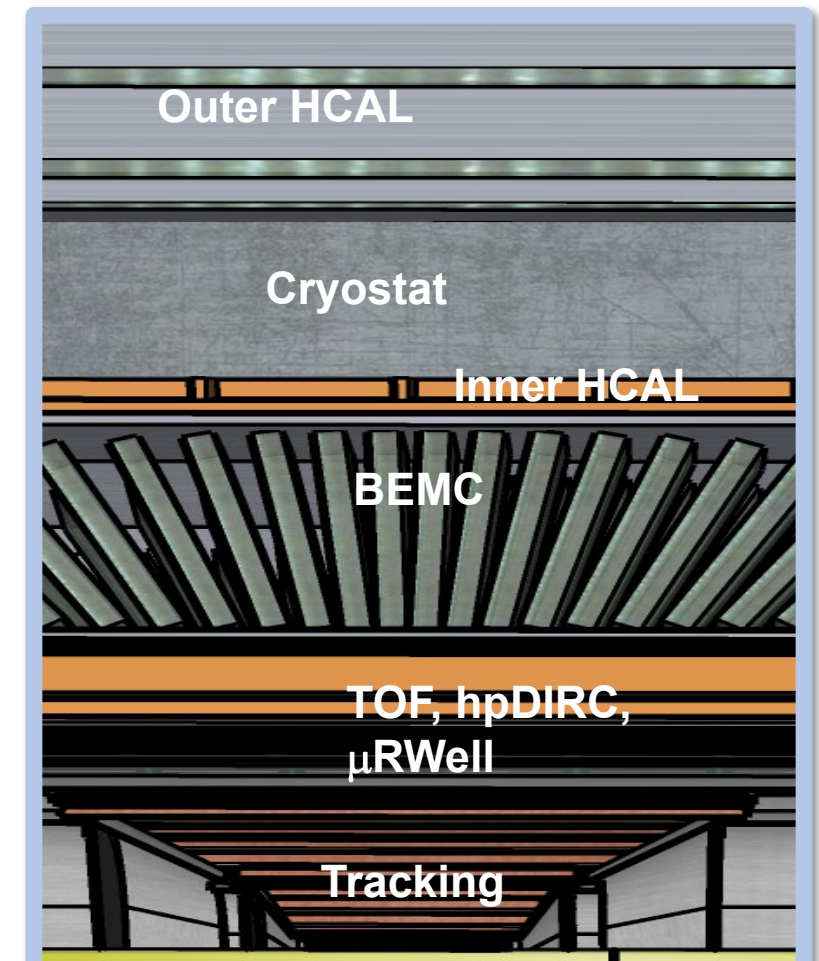
μ RWell outer (double) layer

h-PID: hpDIRC & TOF (AC-LGAD)

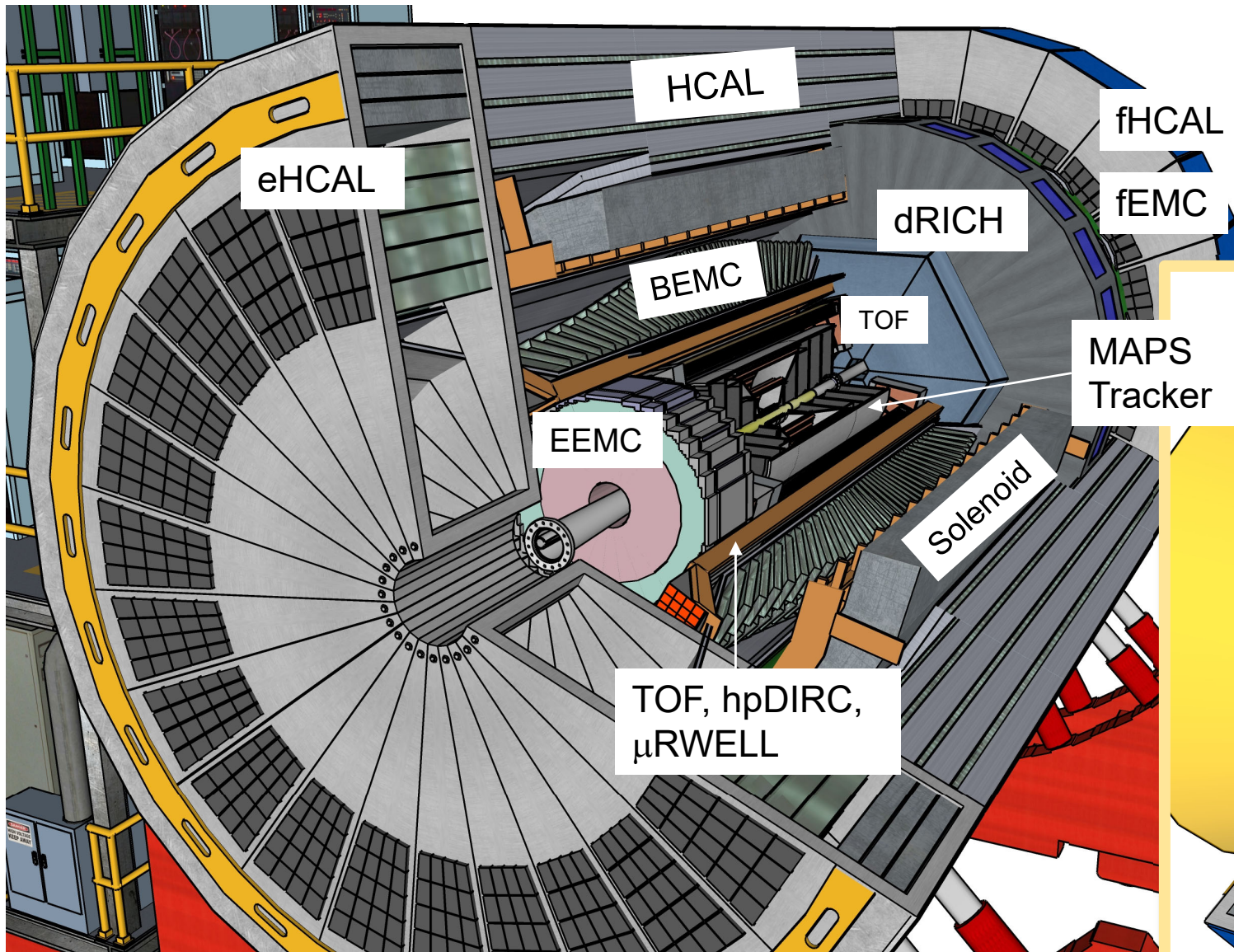
Electron ID: SciGlass

(plus instrumented frame)

HCAL: Fe/Sc (sPHENIX re-use)

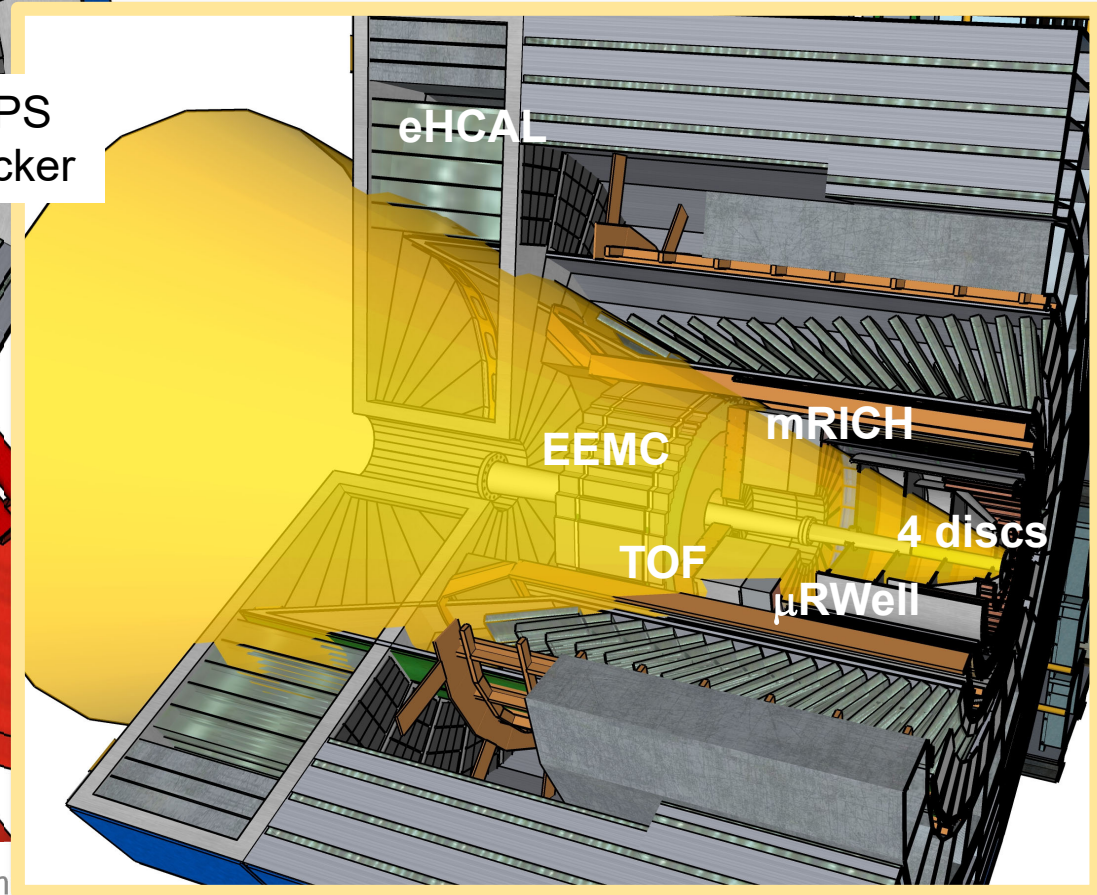


ECCE Central Detector

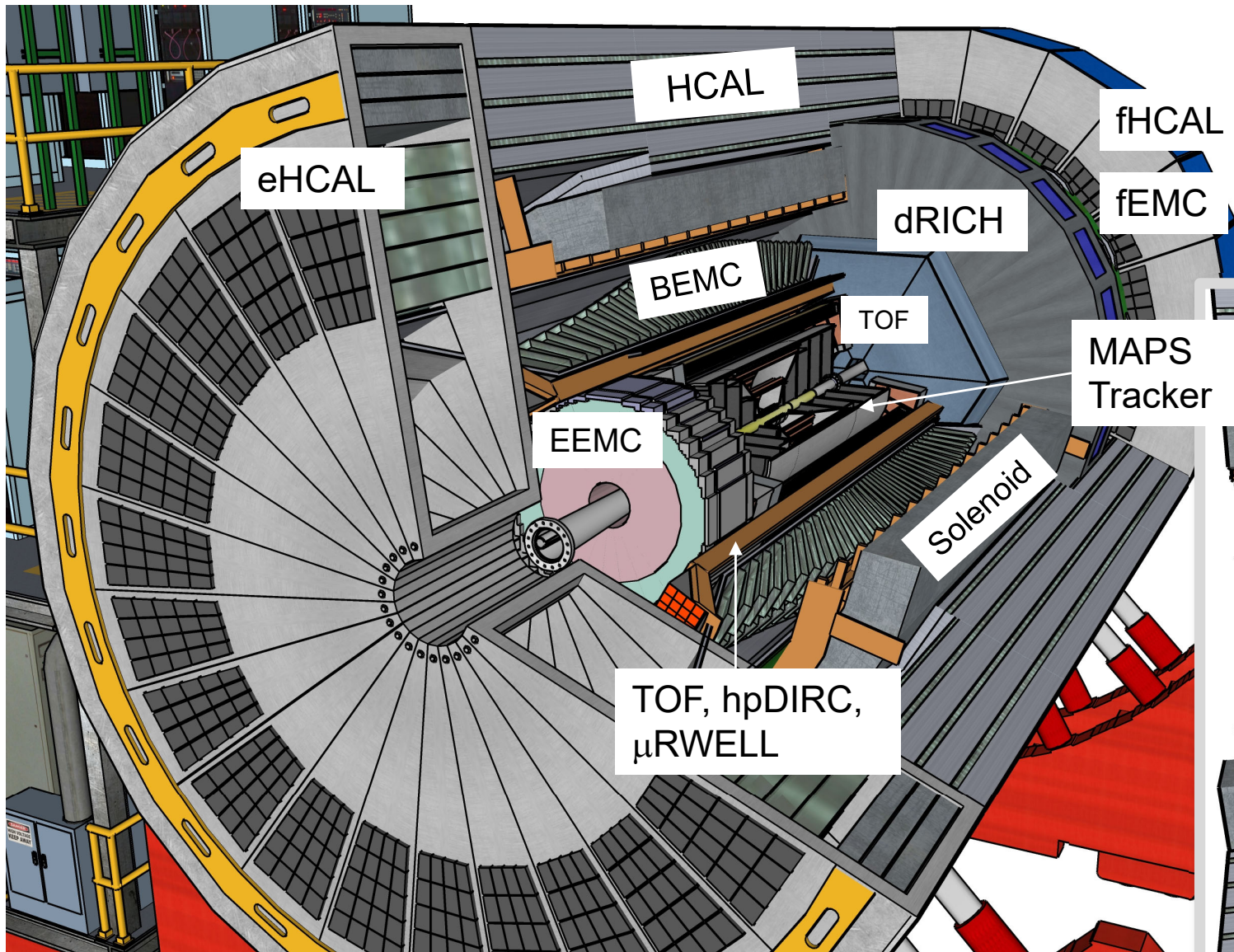


ELECTRON ENDCAP

Tracking: MPGD (μ RWell)
h-PID: mRICH & TOF (AC-LGAD)
Electron ID: PbWO₄ crystals (some reuse)
HCAL: Fe/Sc (STAR re-use)

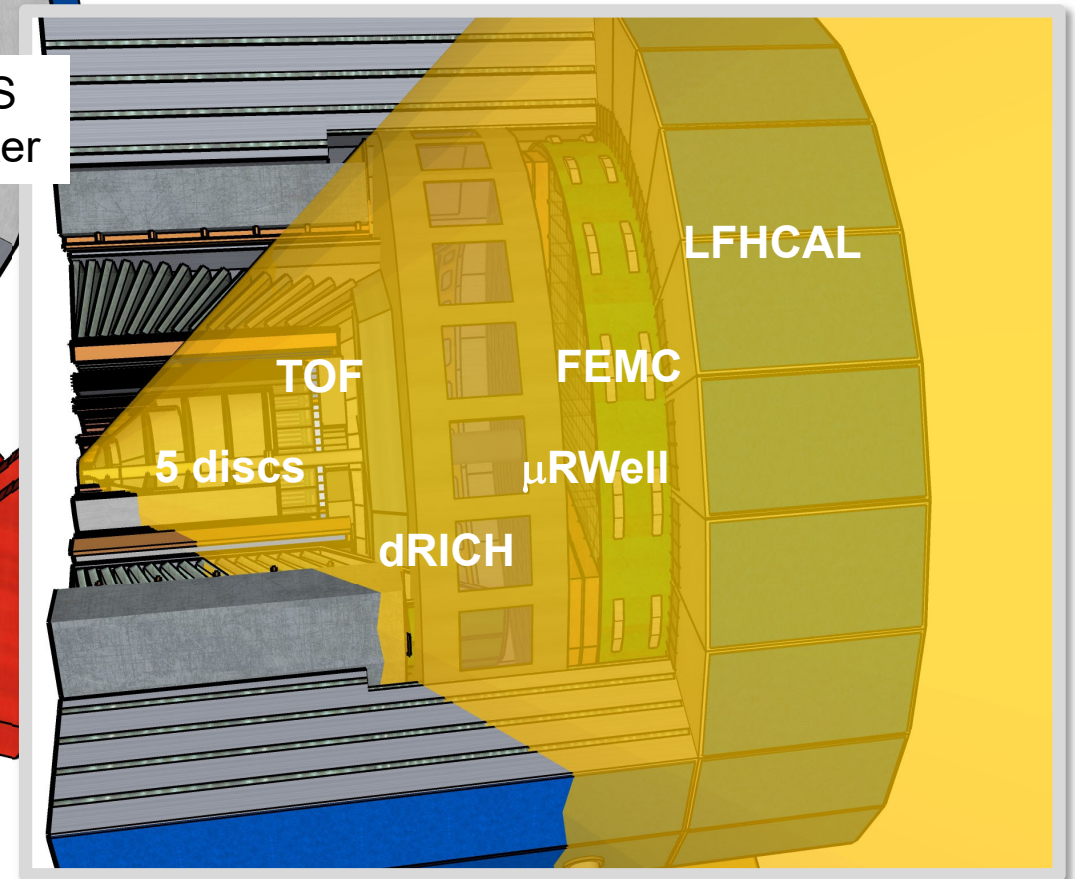


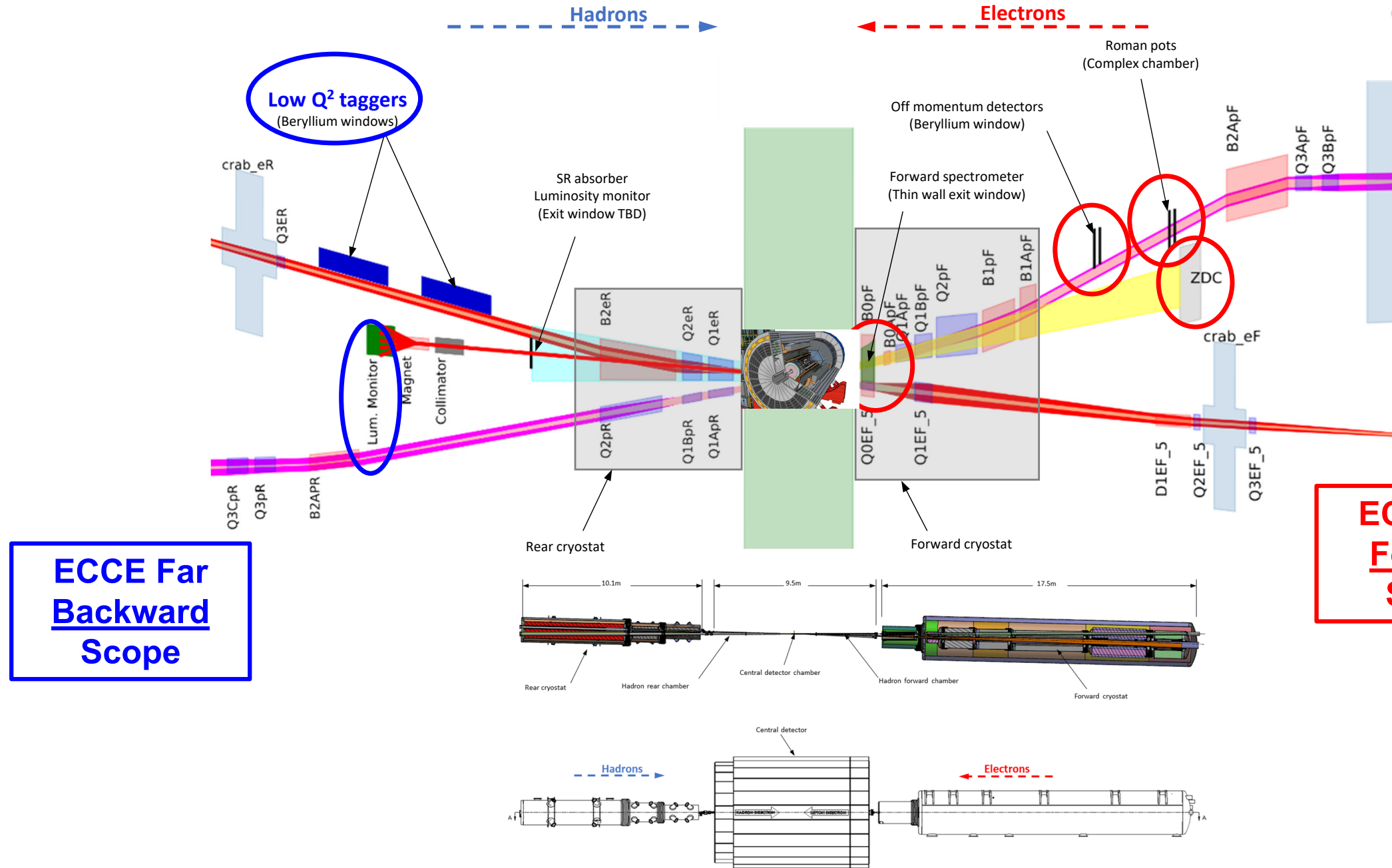
ECCE Central Detector



HADRON ENDCAP

- Tracking:** MPGD (μ RWELL)
PID: dual-RICH & TOF (AC-LGAD)
Calorimetry:
- Pb/ScFi shashlik (EMCal)
 - Long. separated HCAL





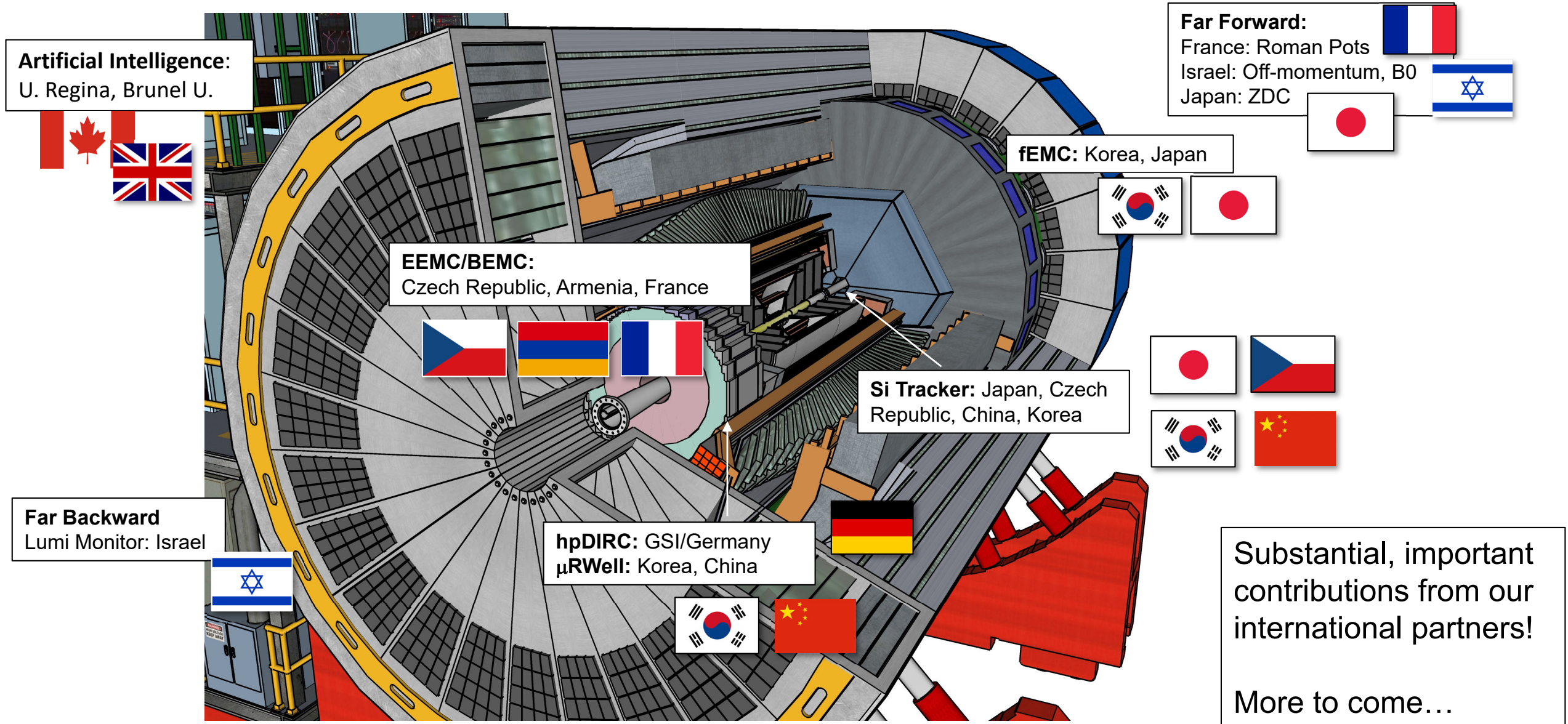
ECCE Far Backward Scope

ECCE Far Forward Scope

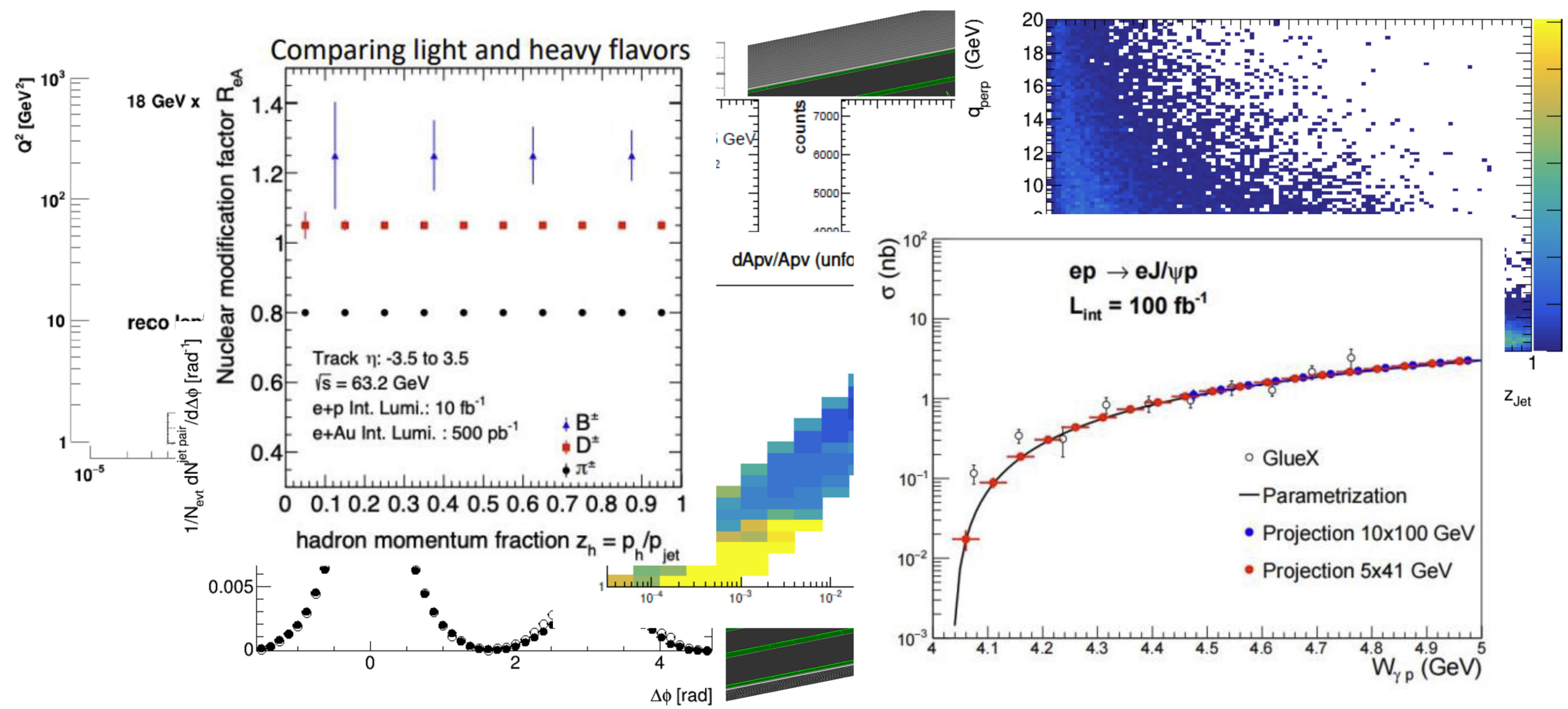
ECCE Upgrade Options

- Dual-readout forward calorimeter
 - Strong interest from Korean HEP colleagues
 - Cutting edge performance for forward jets
- Muon chambers
 - In-kind contribution from Israel (S. Milov)
 - Expand physics program with muon detection
- Small AC-LGAD layer in forward arm at large-z
 - Capture very high rapidity tracks that come into acceptance for calorimeters

International In-Kind Contributions



ECCE Physics Simulations



ECCE Notes



14 PWG Notes
6 DWG Notes
Computing Plan

ECCE sensitivity studies for single hadron
transverse single spin asymmetry measurements

Ralf Seidl^{1,2}

EW&BSM PWG

ECCE document DB			
File Edit View Insert Format Data Tools Add-ons Help			
100% View only			
H1	A	B	C
1	ECCE ID	Topic	Responsible
2	ecce-note-phys-2021-01	Jet performance note	Tristan Protzman
3	ecce-note-phys-2021-02	Diffraction and tagging group note	Bill Li, Axel Schmidt
4	ecce-note-phys-2021-03	Exclusive processes group note	Julie Roche, Rachel Montgomery
5	ecce-note-phys-2021-04	ReA for D&B	Xuan Li
6	ecce-note-phys-2021-05	SIDIS kinematics	Ralf Seidl & Charlotte van Hulse
7	ecce-note-phys-2021-06	SIDIS spin asymmetries with single hadron	Ralf Seidl & Charlotte van Hulse
8	ecce-note-phys-2021-07	SIDIS unpolarized TMD measurements	Ralf Seidl & Charlotte van Hulse
9	ecce-note-phys-2021-08	Jet ReA	Raymond Ehlers
10	ecce-note-phys-2021-09	Inclusive processes group note	Tyler Kutz & Claire Gwenlan
11	ecce-note-phys-2021-10	Centrauro jets (JL)	John Lajoie
12	ecce-note-phys-2021-11	SIDIS (unspecified topic)	Ralf Seidl & Charlotte van Hulse
13	ecce-note-phys-2021-12	Spectroscopy	Derek Glazier@glasgow.ac.uk
14	ecce-note-phys-2021-13	Dihadrons	Nathan grau
15	ecce-note-phys-2021-14	BSM group note	xiaochao@jlab.org
16	ecce-note-phys-2021-15		
17			
18			
19			
20	ecce-note-det-2021-01	Magnet	John Lajoie
21	ecce-note-det-2021-02	Calorimetry	Friederike Bock & Yongsun Kim
22	ecce-note-det-2021-03	Tracking	Xuan Li & Nilange Liyanage
23	ecce-note-det-2021-04	PID	Greg Kalicy & Xiaochun He
24	ecce-note-det-2021-05	Readout/DAQ	Chris Cuevas & Martin Purschke
25	ecce-note-det-2021-06	Far forward/Far backward	Michael Murray, Yuji Goto
26	ecce-note-comp-2021-01	Computing plan	David Lawrence & Cristiano Fanelli
27			
28	ecce-proposal-eic-cfp	Main proposal	John Lajoie, Tanja Horn, Or Hen

¹RIKEN, S...
²Rike

114 Compare to the case of no bin migration, where the uncertainties in the count and the
115 asymmetry are $\sqrt{N_i}$ and $1/\sqrt{N_i}$, respectively, one can see that the uncertainty is larger due
116 to the unfolding procedure.

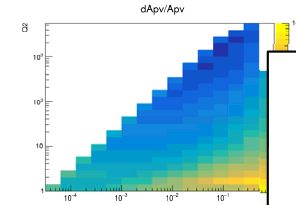


Figure 2: Projection of dA_{PV}/A_{PV} for initially unpolarized hadron types and e^+e^- annihilation extrapolated to the deviations. For a full illustration, a kinematic cut was applied. Ten million (10M) fast-smearing events were used to produce this plot.

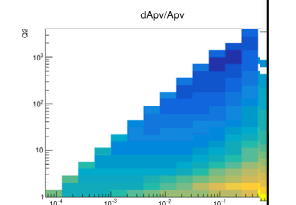


Figure 3: Projection of dA_{PV}/A_{PV} for initially unpolarized hadron types and e^+e^- annihilation extrapolated to the deviations after unfolding (right). For a full illustration, a kinematic cut was applied and an idealized million (10M) fast-smearing events were used to produce this plot.

117 In Fig. 2 and 3 we show the projected single spin asymmetries for
118 eD 18 x 137 GeV, respectively. In fitting the data, the
119 dA_{PV}/A_{PV} directly determines the longitudinal polarization
120 the highest impact comes from medium impact data are far away from the region
121 impact data are far away from the region of low y). In our final projection analysis,

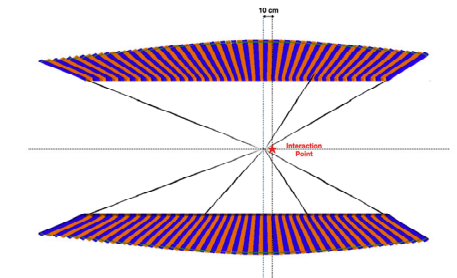


Figure 4: BECAL towers layout in η . The towers are centered at $z = -10$ cm.

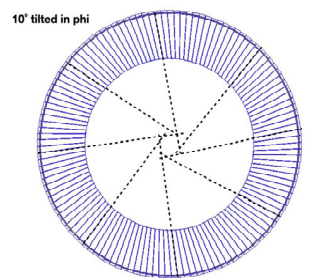


Figure 5

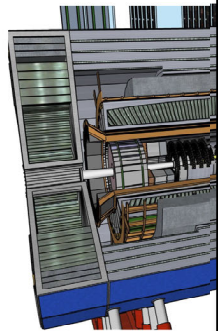
120 sampling in azimuth and gives some information on the longitudinal shower development.
121 The current design uses tapered plates for the Outer HCal. The Inner HCal would not
122 require tapered plates as studies showed that tapering the shorter Inner HCal plates was
123 not necessary, and tapering them increased the machining cost. Extruded tiles of plastic
124 scintillator with an embedded wavelength shifting fiber are interspersed between the

Proposal Writing Progress



The ECCE Detector Proposal

A full-acceptance detector at the EIC based on the BaBAB solenoid
October



Contents

1	1 EIC science with the ECCE detector (40 pages)	1
2	1.1 Key physics drivers (3 pages) and connection to EIC WP/YR and NAS report (3 pages)	2
3	1.2 Detector design (21 pages)	3
4	1.3 Physics performance of ECCE detector (15 pages)	8
5	1.4 Computing plan (1 page)	9
6	2 The ECCE Collaboration (20 pages)	11
7	2.1 Collaboration structure, member institutions, and their experience (2 pages)	12
8	2.2 Collaboration Conduct, Diversity, Equity and Inclusion (1 pages)	15
9	2.3 Responsibilities of each institution (2 pages)	15
10	2.4 Construction schedule (5 pages)	15
11	2.5 Potential funding sources (2 pages)	15
12	2.6 Upgrade paths (2 pages)	16
13	3 Internal Notes and Supporting Material	17
14	3.1 Detector	18
15	3.2 Physics	18
16	3.3 DAQ & online computing	20
17	3.4 Offline computing model	20
18	List of Tables	21
19	List of Figures	23
20	References	25

Collaboration structure, member institutions, and their experience (20 pages)

Collaboration structure, member institutions, and their experience (2 pages)

ECCE collaboration is setup to deliver on three main objectives:

Work with the EIC project to deliver an on-time and on-budget project detector.

EIC commissioning using the

to produce physics results as

consortia. This light-weight design and performance studies envision the formation of a full

Table ??). Of those institutions include graduate universities (~ 15%), and national labs between those that have cons. This gives the consortia of the EIC.

consisting of O. Hen (MIT), J. Institutional Board (IB) and lead vent into this proposal:

ORNL), their GEANT4 implementation groups, each focused on different Far-forward / Far-backward, structure reuse).

Lab-Orsay) and R. Reed (Lehigh

ty of concrete physical observ- of seven working groups, each exclusive, Exclusive, Diffraction in Electroweak, and simulation

(JLab), in different clusters using vari- of analysis tools. Responsible

Early Meeting

DWG/PWG analysis notes in review.

Physics performance plots coming available.

Input tables for scope, detector requirements, and R&D collected.

Lots of writing coming to bear in the next 1.5 weeks.

Aiming for draft release to conveners first week of November, followed by external review.

ECCE Physics Godparents

- **Origin of Mass:** Jianwei Qiu (reader), Tanja Horn
- **Spin:** Ralf Seidl
- **Tomography:** Carlos Munoz Camacho
- **Dense Gluons:** Anna Stasto
- **EW & BSM:** Xiaochao Zheng and Christoph Paus

- **Initial input and discussions completed**
 - Input on additional plots/studies
- **Key physics plots selected**
- **Godparents written contributions underway.**



The Endgame ... Just The Beginning!

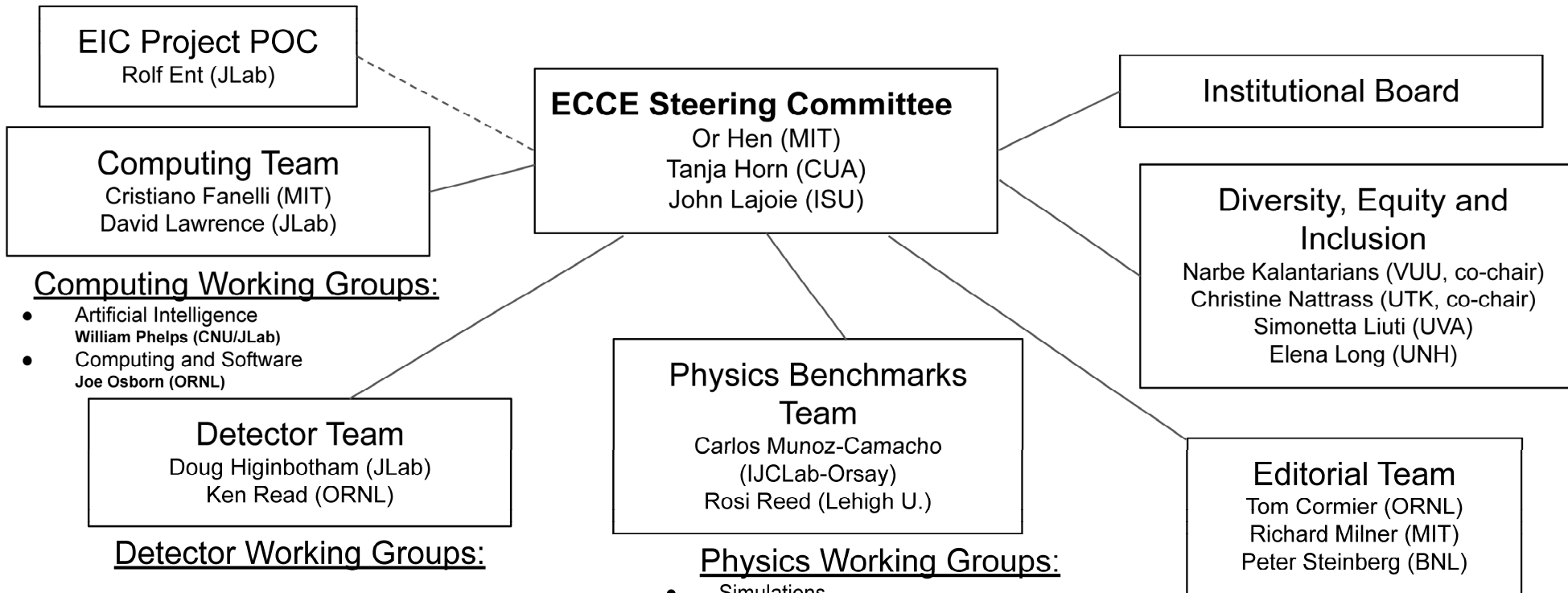
- Lots of thinking in ECCE about what happens after the proposal review process:
 - Evolving the *consortium* to a *collaboration* (bylaws, etc.)
 - DE&I code of conduct approved, build on this moving forward
 - Developing the detector from a *conceptual* design to a *technical* design
- The ECCE consortium is looking forward to showcasing the hard work of all its talented, motivated members!





BACKUP

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 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)

Editorial Working Groups:

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

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

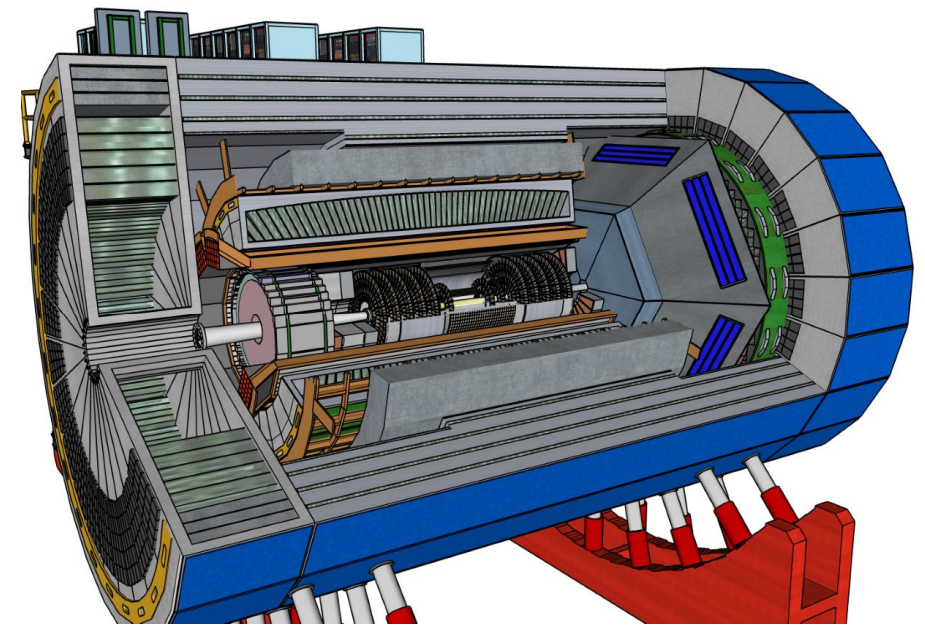
Mailing Lists:
<https://lists.bnl.gov>

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

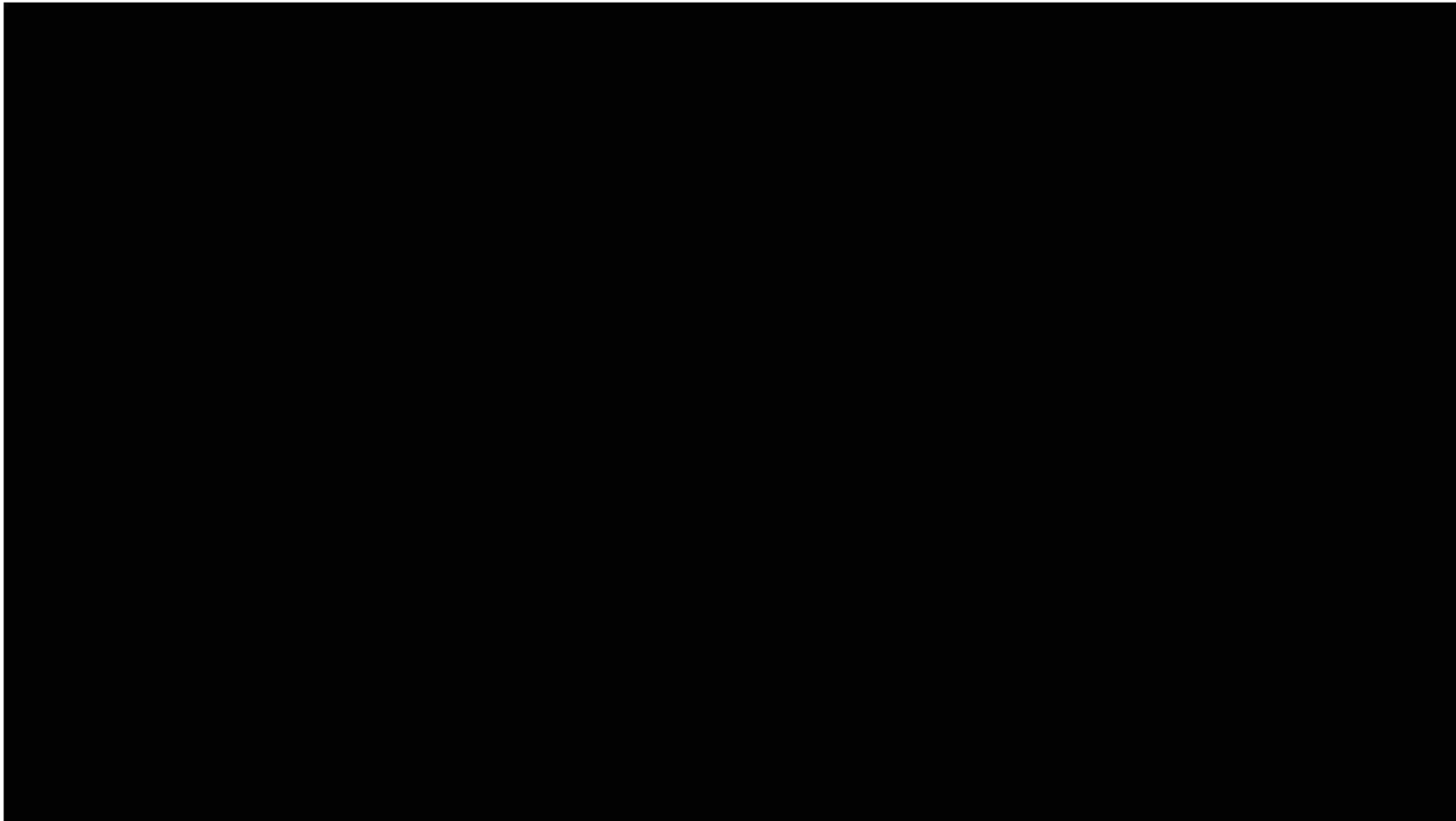
Indico:
<https://indico.bnl.gov/category/339/>

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>



ECCE Under Construction



sPHENIX has reached another milestone in construction – the BaBar solenoid has been installed in the oHCAL barrel.

These components are key ECCE re-use items

Many thanks for sPHENIX for testing/prototyping help and support!