BI-WEEKLY MEETING
11 October 2021

Or Hen, Tanja Horn, John Lajoie

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

ECCE 11 October Meeting Agenda

49 days to go

- ❑ Introduction and overview
  - ❑ Status
  - ❑ Starting the **End Game**
- ❑ The Teams will present their updates
- ❑ Discussion about the end game: steps and timeline towards the final proposal

15th ECCE Bi-Weekly Meeting

Monday 11 Oct 2021, 16:00 → 21:20 US/Eastern

Description **Connection Information:**

Please click this URL to start or join. https://iastate.zoom.us/j/96324237001?pwd=aU14M0twQ3FrWjFkd2dSSUFzSk43dz09
Or, go to https://iastate.zoom.us/join and enter meeting ID: 963 2423 7001 and password: 730009

16:00 → 16:30 **ECCE News and Status** — 30m
Speaker: Tanja Horn (Cath)

16:30 → 17:00 **Computing Team**

- 16:30 **Computing Team Report** — 15m
  Speakers: Cristiano Fanelli (MIT) , David Lawrence (Jefferson Lab)

17:00 → 17:30 **Detector Team**

- 17:00 **Detector Team Report** — 15m
  Speakers: Douglas Higinbotham (Jefferson Lab) , Kenneth Read (Oak Ridge National Laboratory)
- 17:15 **Discussion** — 15m

17:30 → 17:45 **Editorial Team**

- 17:30 **Editorial Team Report** — 15m
  Speakers: Peter Steinberg (BNL) , Richard Milner (MIT) , Tom Cormier (ORNL)

17:45 → 18:00 **Diversity, Equity and Inclusion**

- 17:45 **DE&I Report** — 15m
  Speakers: Christine Nattrass (University of Tennessee, Knoxville) , Narbe Kalantarians (Virginia Union University)

18:00 → 18:30 **Physics Benchmark Team**

- 18:00 **Physics Benchmark Team Report** — 15m
  Speakers: Carlos Munoz Camacho (IJCLab-Orsay (France)) , Rosi Reed (Lehigh University)
- 18:15 **Discussion** — 15m

Physics Drivers and EIC Science

- ❑ Selected plots will demonstrate that ECCE can do the NAS/EIC WP Science
  - ➢ Implicitly Illustrate 1.5 T field suffices
- ❑ Analysis of 2nd simulation campaign
- ❑ Technical Notes are in preparation

NAS topics:	
1) Tomographic Imaging of Quarks and Gluons	MASS
2) Heavy-quarkonia exclusive production at threshold	MASS
3) 3D imaging in Momentum Space	MASS
4) Gluon spin and orbital motion	SPIN
5) Transverse motion in polarized nucleons	SPIN
6) Propagation of energetic quarks through matter	DENSE GLUONS
7) Properties of Nuclei in QCD	DENSE GLUONS
8) Diffraction	DENSE GLUONS

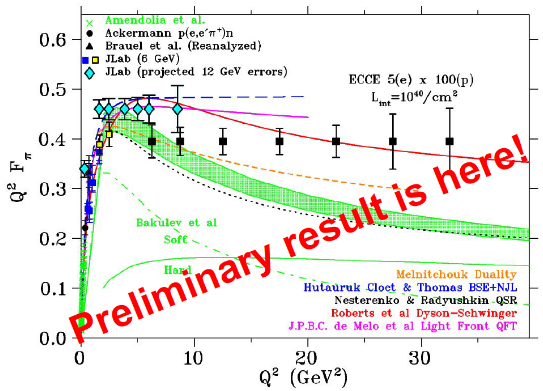
Plot		NAS topic	Additional NAS topic	Person in charge	WG
Dihadron azimuthal angle correlation: delta phi distribution		1		Nathan Grau	Jets & HF
DVCS (ep) cross section vs t, Q2 and xB		1		Igor	Exclusive
DVCS (He4) cross section vs t, Q2 and xB		1	7	Gary	Exclusive
Exclusive J/Psi cross section vs t, Q2 and xB		1	4	Nathaly, Stuart	Exclusive
Exclusive phi (eA) cross section (or asymmetries) vs t		1	8	Justin	Exclusive
TCS cross section (or asymmetries) vs t, Q2 and xB		1		Kayleigh	Exclusive
Pion form factor vs Q2		1		S. Kay, G. Huber	Diffractive & Tagging
Pion structure function vs x		1		R. Trotta	Diffractive & Tagging
A_UT Sivers sin(\phi_h - \phi_S) or Collins sin(phi_h + phi_S) asymmetry moments for pi+ and pi- vs z		3	5	Ralf	SIDIS
Up and down quark Sivers functions as a function of k_T in several bins of x (YR Fig 7.53)		3	5	Ralf	SIDIS
Jet eta vs. jet					
Reconstructed					
Distribution of					
Proton double-					
Helium-3 doub					
Proton double-					
A1p, A1He3, A					
Constraints on					
A_LL double h					
Expected impa					
Nuclear modifi					
Projected unce					
Jet ReA vs jet					

Inclusive NC e+P cross section vs. xB, for bins of Q2		7		Tyler	Inclusive
Inclusive NC e+D cross section vs. xB, for bins of Q2		7		Tyler	Inclusive
Inclusive NC e+He3 cross section vs. xB, for bins of Q2		7		Tyler	Inclusive
Proton structure functions F2, FL, xF3 vs. xB		7		Sonny, Tyler, Claire	Inclusive
Deuterium structure functions F2, FL, xF3 vs. xB		7		Sonny, Tyler, Claire	Inclusive
Helium-3 structure functions F2, FL, xF3 vs. xB		7		Sonny, Tyler, Claire	Inclusive
Constraints on unpolarized PDFs vs. xB : IMPACT		7		Claire, Eimear	Inclusive
A1n through e-He3 vs x: 5x41 GeV/u		7		D. Nguyen, J. Pybus	Diffractive & Tagging
eA diffraction: d sigma/dt vs t		8		M. Baker. P. Steinberg	Diffractive & Tagging
Electroweak mixing angle vs. Q2 (ep and eD)		N/A		Xiaochao	Electroweak & BSM
An impact plot for tau searching (Receiver Operating Characteristic curve)		N/A		Jinlong Zhang	Electroweak & BSM
xB, Q2 resolution vs. x, Q2 for different reconstruction methods		Detector performance		Claire	Inclusive
Mean Delta z/z values in bins of x and Q2 for the scattered lepton kinematic reconstruction method		Detector performance		Ralf, Charlotte	SIDIS
Jet energy scale and resolution vs jet energy		Detector performance		Tristan Protzman & Rosi Reed	Jets & HF
Dectector acceptance and efficiency for DVCS (ep) vs rapidity		Detector performance		Igor	Exclusive
Dectector acceptance and efficiency for DVCS (He4) vs rapidity		Detector performance		Gary	Exclusive
Dectector acceptance and efficiency for DVCS (J/Psi) vs rapidity		Detector performance		Nathaly, Stuart	Exclusive
Dectector acceptance and efficiency for DVCS (for exclusive phi) vs rapidity		Detector performance		Justin	Exclusive
Dectector acceptance and efficiency for DVCS (for TCS) vs rapidity		Detector performance		Kayleigh	Exclusive
Reconstructed Tau lepton decay length vs. truth decay length		Vertex tracking detector performance		Jinlong Zhang	Electroweak & BSM

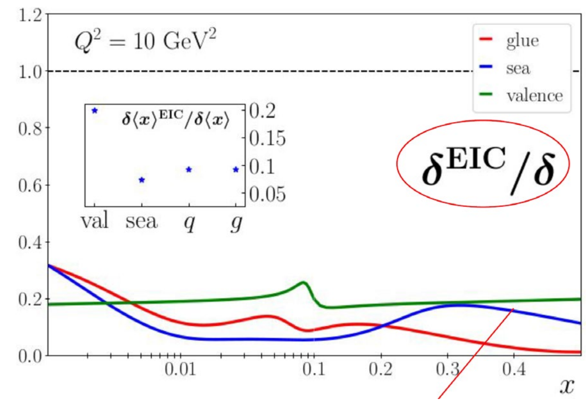
Example: Plots from Diffraction & Tagging

- Most challenging for simulation as require far-forward region in addition to central detector – much progress and simulation data ready now
- Studies of benefits IP6 vs. IP8 ongoing for some of these (e.g., eZr/ePb, meson SF, …)

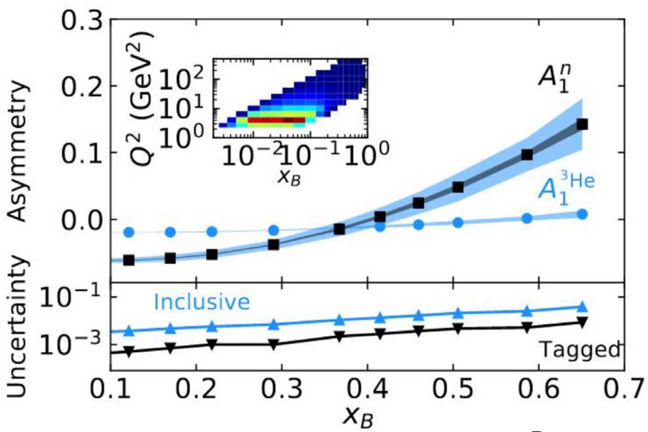
Pion form factor (Stephen & Garth)



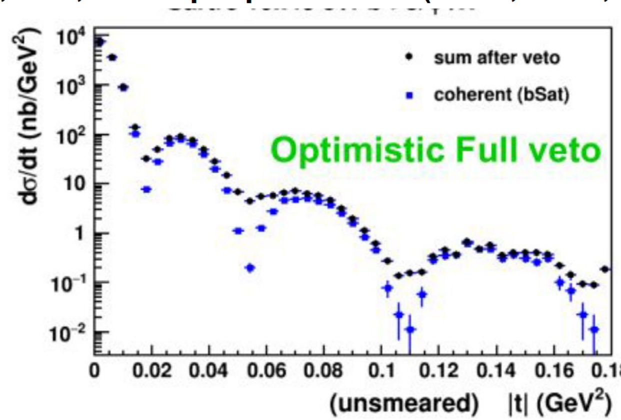
Pion Structure Function (Richard)



A1n through e-^{3}He: 5x41 GeV per nucleon (Dien & Jackson)



eZr, ePb, eAu J/psi production (Peter, Mark, Dhevan)



Proposal goal: 10^{-1} fb integrated luminosity

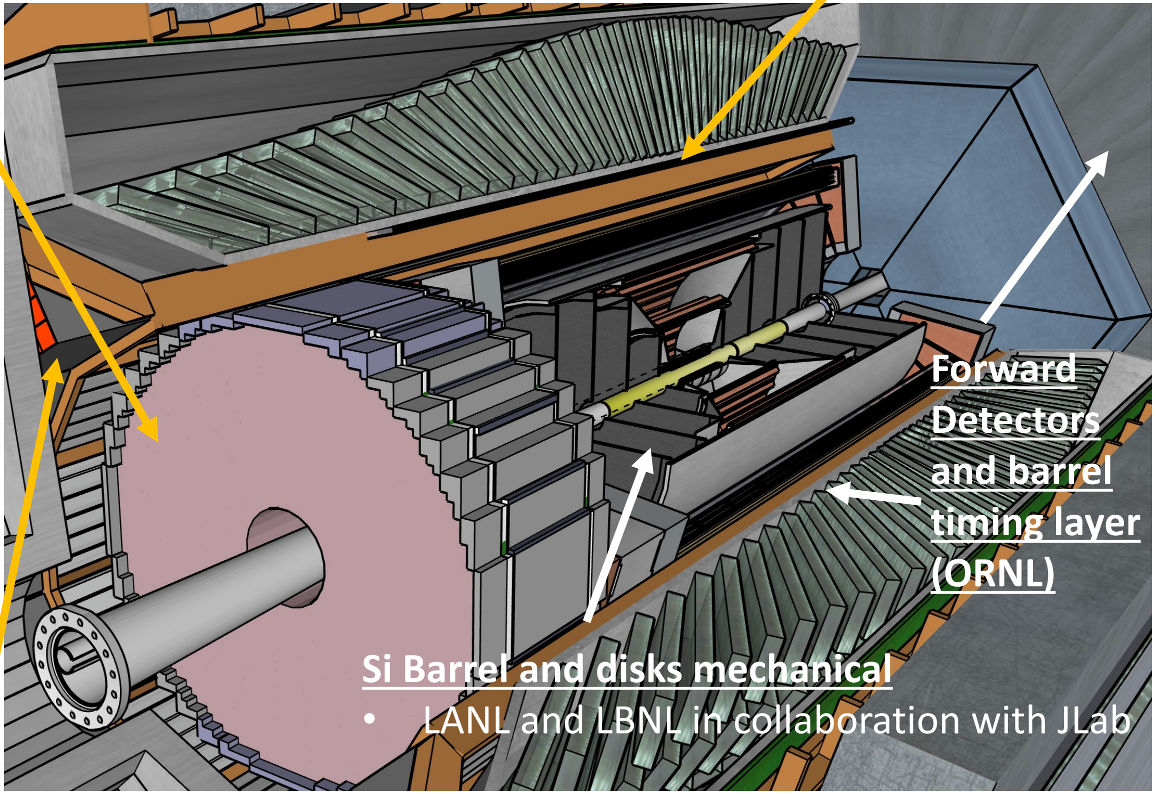
Conveners: B. Li, A. Schmidt

Design/Engineering Activities and Integration

ECCE

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)



Evaluate available space and detector placement and supports

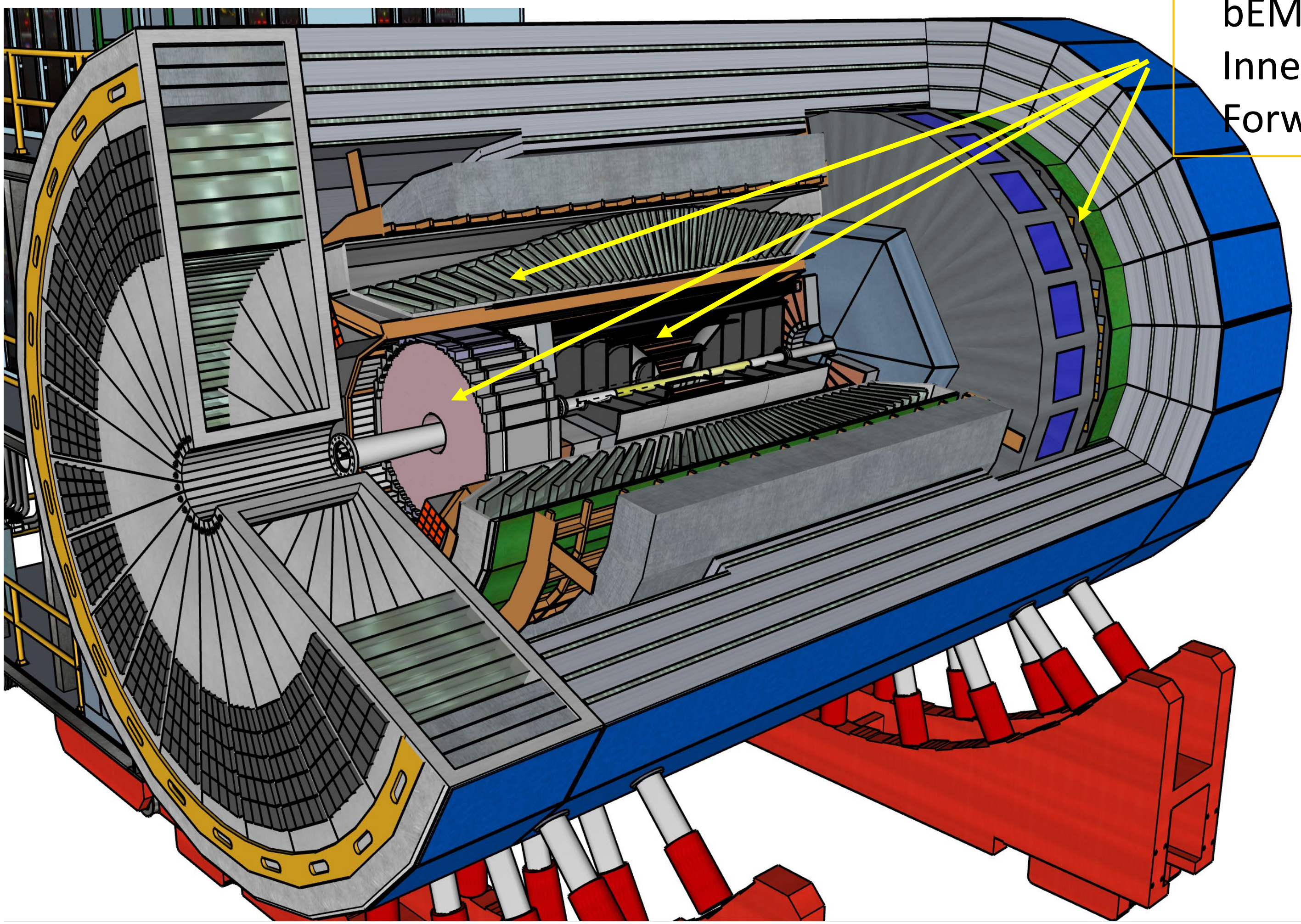
Work started on integration of MPGD between Si and DIRC (e.g. https://userweb.jlab.org/~jfast/EIC/Hybrid_ECCE/Hybrid_Tracker-ECCE.pdf)

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 maintenance mode, looking at similar for the backward HCal side.

ECCE Central Detector Concept

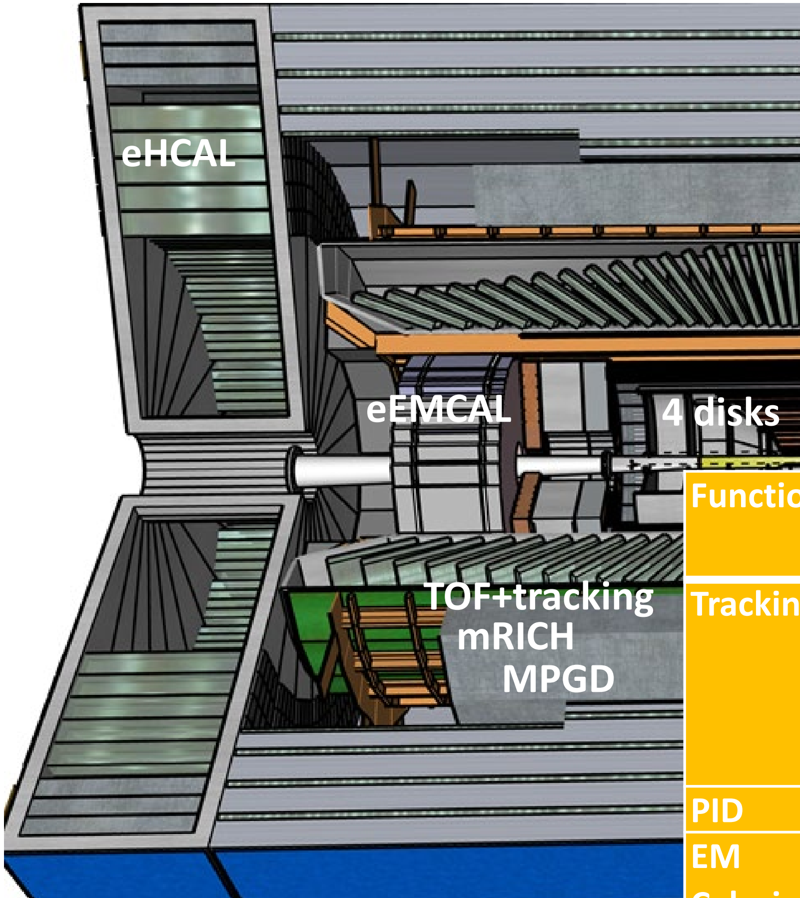
Nearly final ECCE detector image for the proposal



Recent updates to the model:
- eEMCal
- bEMCal
- Inner Tracker
- Forward calorimeter

To do: MRPC, hybrid tracking

ECCE Central Detector ELECTRON ENDCAP

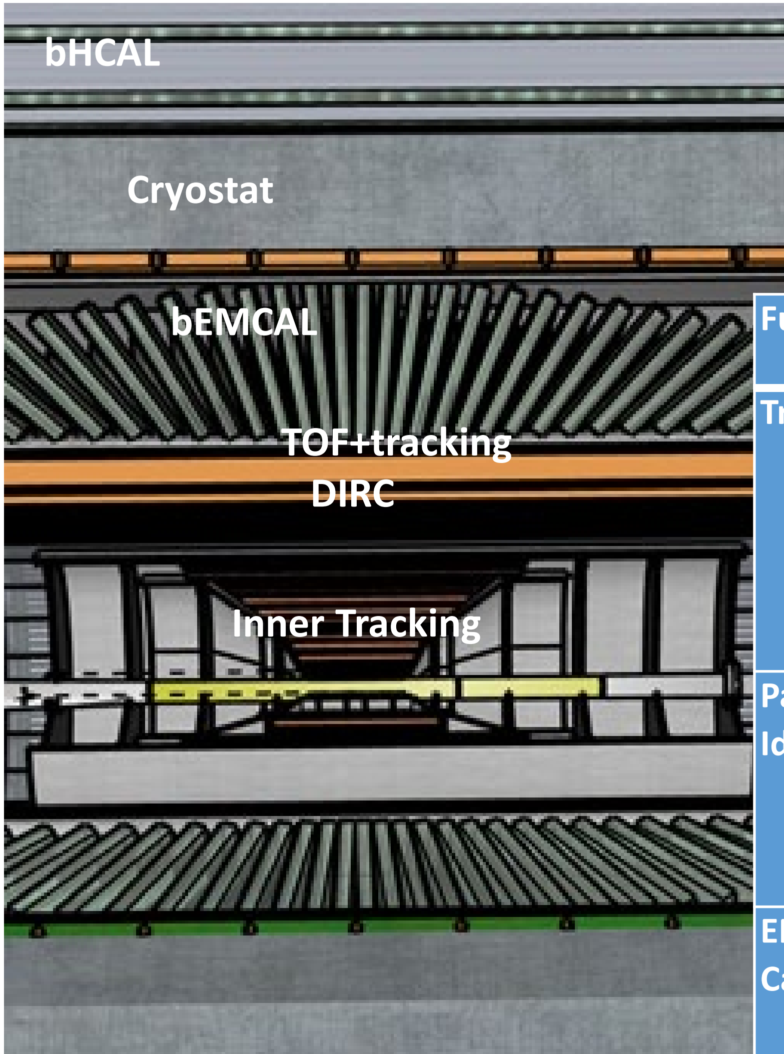


NEW: create table with detector technologies, responsible institutions and key expertise
→ Shows collaboration strength
→ Provides gap analysis

THESE ARE ALL WORK IN PROGRESS

Function	Detector technology	Institutions	Key expertise
Tracking	Si	LANL, ORNL, EIC-China, EIC-Japan	Construction (Phenix, sPhenix)
	MPGD	LANL, UVA, GWU, EIC-Korea, EIC-China	GEM development and construction (SBS, …)
PID	mRICH	GSU	
EM Calorim.	PbWO4	EEEMCAL: AANL, CUA, Charles U./Prague, FIU, IJCLab-Orsay, JLab, JMU, MIT, Lehigh U., UKY	Crystal fabrication and characterization, detector design and construction (Hall C EMCal, Hall C NPS, STAR ECAL, …)
Hadron Calorim.	Steel/Sc Sandwich (fSTAR)	Rutgers U.	STAR forward calorimeter

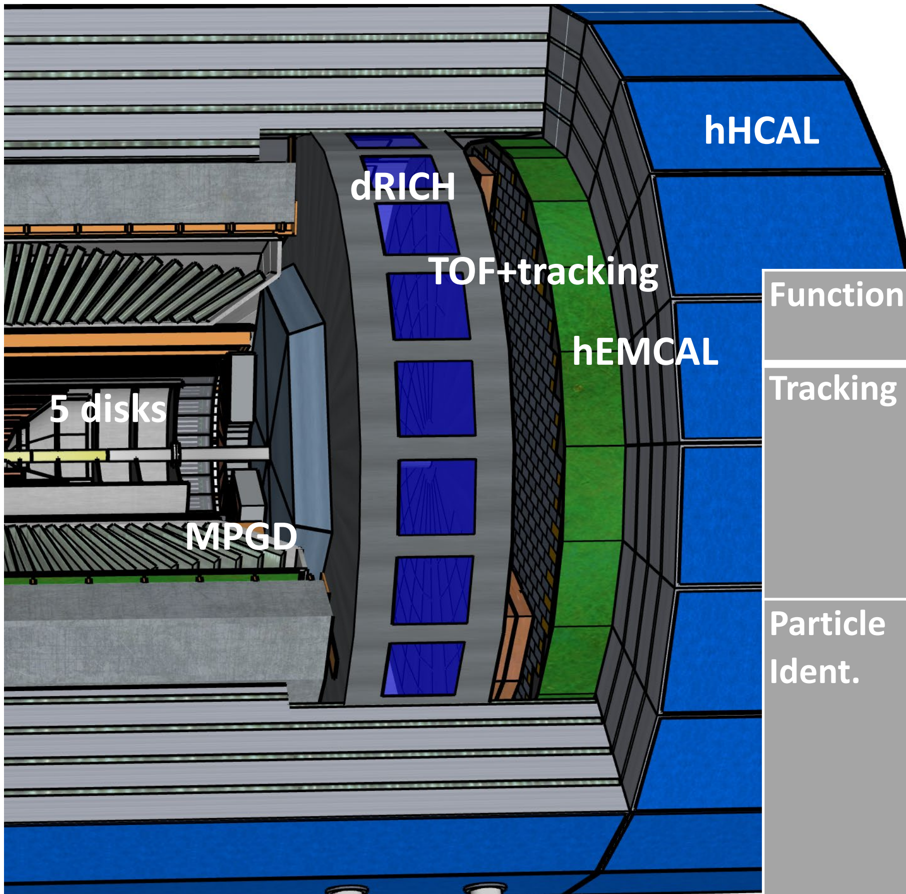
ECCE Central Detector BARREL



THESE ARE ALL WORK IN PROGRESS

Function	Detector technology	Institutions	Key expertise
Tracking	Si (vertex & sagitta)	LANL, ORNL, EIC-China, EIC-Japan	Construction (Phenix, sPhenix)
	mRWell	UVA, GWU, MIT, EIC-China, EIC-Korea	
Particle Ident.	hpDIRC	CUA, GSI-DIRC, ODU	Design and construction, simulations (BaBar, PANDA)
	TOF/MRPC	Vanderbilt U. EIC-China	Construction (PHENIX, STAR, ALICE)
EM Calorim.	SciGlass	CUA, MIT, KU, Giessen U. (TBC)	Glass fabrication and characterization, detector design and construction, technical support, simulations
Hadron Calorim.	Scintillating tiles	ISU	Construction (sPhenix)

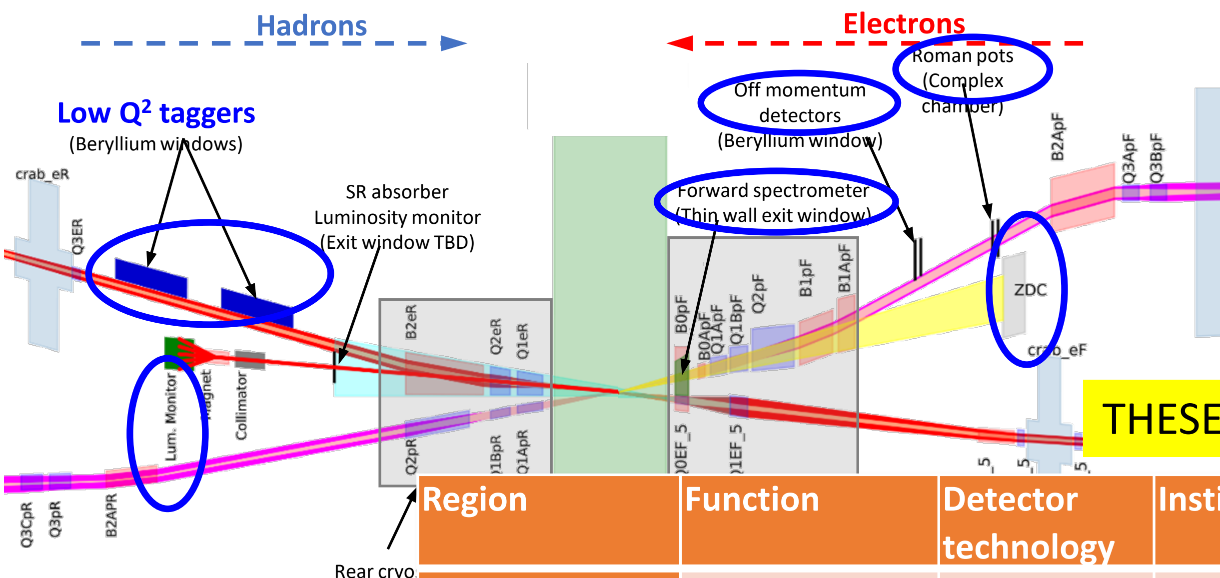
ECCE Central Detector HADRON ENDCAP



THESE ARE ALL WORK IN PROGRESS

Function	Detector technology	Institutions	Key expertise
Tracking	Si	LANL, ORNL, EIC-China, EIC-Japan	Construction (Phenix, sPhenix)
	MPGD	UVA, GWU, EIC-Korea, EIC-China	GEM development and construction (Hall A)
Particle Ident.	dRICH	UTFSM/Chile, UConn, Duquesne, JLab	E&D (strong engineering) Simulations (Hall B RICH, Hall A/SBS RICH)
	TOF	Rice U., MIT, ORNL, Vanderbilt U., EIC-China	
EM Calorim.	Longitudinally-segmented calorimeter	EIC-Japan, EIC-Korea, ORNL, EIC-China, ISU	
Hadron Calorim.		EIC-Japan, EIC-Korea, ORNL, EIC-China, ISU	

Extended ECCE detector integrated in IR



THESE ARE ALL WORK IN PROGRESS

ECCE Far Forward and Backward Scope

Region	Function	Detector technology	Institutions	Key expertise
FAR-FORWARD	Forward Spectrometer (B0 Detector)	Passive pre-shower & Si Trackers	EIC-Israel: BGU, TAU, HUJI, WI	
	Off-momentum Detectors		EIC-Israel: BGU, TAU, HUJI, WI	
	Roman Pots	AC-LGAD	IJCLab-Orsay, BNL	ASIC readout of AC-LGAD (OMEGA, ATLAS)
	ZDC		EIC-Japan, KU	
far-backward	Low-Q2 taggers	Tracker Upgrade: Timepix	York U., Glasgow U.	
	Luminosity Detector		York U. EIC-Israel	

ECCE Timeline

Today, 11 October

Tasks	Duration (months)	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Startup	**1.5**									
Implement ECCE setup in Fun4All										
Agree on technology alternatives to study										
Agree on main physics studies										
Arrange required event generators										
First simulation campain & initial analysis	**1.5**									
Optimize										
Midterm activities	**1**									
Large scale simulations production										
Drafting Collaboration Structure part of the proposal										
Analysis of simulation data	**1.5**									
demonstrate physics extraction										
Start of Proposal Writing	**1.5**									
All physics plots are done										
Agree on technology selection based on physics studies										
Compose narrative around simulation results and selected technologies										
Proposal Review and final edits	**1**									
Review by external colleagues										
Final edits										
Proposal Submission (1 Dec. 2021)										

Endgame!
Starting final activities towards proposal

ECCE Endgame Global Overview

- ❑ Collect Final Input
  - ➢ Various deadlines coming up, e.g., Technical/Analysis Notes *due on 18 October, updated physics plots final due date on 22 October*
  - ➢ Please help to complete various tables *at similar time scale* as they much ease the actual proposal writing (and likely be included)
- ❑ Writing Teams analyze input and write proposal sections
- ❑ Aim for having rough draft ready late October for Teams to review – it may not be 100% complete
- ❑ Aim for sending draft to external colleagues in early November
- ❑ Final edits once feedback received (< November 15?)
- ❑ Proposal submission 1 December

ECCE Proposal - progress

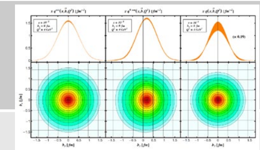
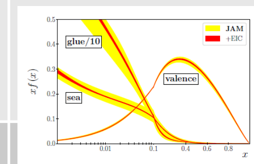
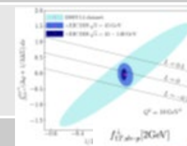
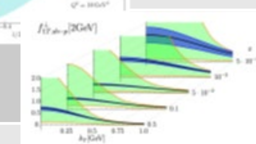
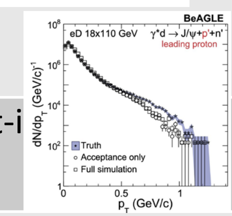
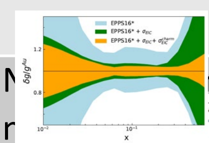
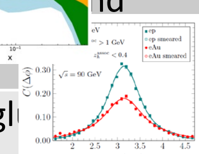
Contents

Physics Drivers and Physics Performance (60% complete):

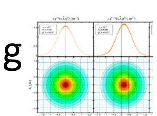
- ❑ Preliminary drafts of technical notes were collected in the WGs
- ❑ Team Conveners and Godparents evaluate the material

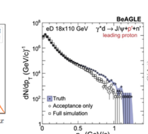
Key Physics Drivers and Connection to EIC WP/YR and NAS Study DRAFT

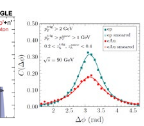
"Experiments must address the EIC White Paper and NAS Report science case"

NAS Report Topics	NAS Report Sub-topics	ECCE Measurements	Yellow Report enhancement
Origin of Mass	Tomographic Imaging Quarks and Gluons		
	Heavy-quarkonia exclusive production at threshold (check NAS report)		π/K structure 
	(mention) 3D Imaging in Momentum Space		
Origin of Spin	Gluon spin and orbital motion		
	Transverse motion in polarized nucleons		
Dense Systems of Gluons	Propagation of energetic quarks through matter		D/D* reconstruction and heavy-flavor in jets. 
	Properties of Nuclei in QCD	N… nd r… 	Light-i…
	Diffraction	Dense gl… saturatio… 	

Science to check performance in IP8: p/K Structure, Light-Ion tagging







ECCE Proposal - progress

Contents

Key Physics Drivers – technical notes in preparation

ECCE resolution studies of DIS and semi-inclusive DIS kinematic variables

Ralf Seidl[1,2] and Charlotte Van Hulse[3]

[1]RIKEN, Saitama-ken, Wako-shi, Hirosawa 2-1, 351-(

[2]Riken BNL Research Center, Upton, NY, 11973

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October 10, 2021

Abstract

This analysis note provides the detailed studies on how deep inel
and the related semi-inclusive kinematic variables get reconstructe
ECCE detector proposal. The various kinematic reconstruction method
and the resolutions in each method are presented. The expected behav
namely that generally the kinematic reconstruction based on the scat
most precise at high virtualities while resolutions suffer significantly
Jaquet-Blondel method, that relies entirely on the hadronic final state, g
from the fact that some hadrons are not detected or have a large smearing
the hadronic calorimeters. It is nevertheless sill more reliable at low y
scattered lepton, particularly at higher Q^2. The hybrid double-angle
relies on both leptonic and hadronic final states combines the best of b
generally works best at lower y and higher x. In the reconstruction of
DIS variables a similar behavior is generally seen, particularly for t
fraction z, however azimuthal angles as well as transverse momenta
virtual photon appear to be more robust and do not suffer quite as m
than some of the DIS variables.

ECCE sensitivity studies for single hadron transverse single spin asymmetry measurements

Ralf Seidl[1,2]

[1]RIKEN, Saitama-ken, Wako-shi, Hirosawa 2-1, 351-01

[2]Riken BNL Research Center, Upton, NY, 11973,

October 10, 2021

Abstract

We performed feasibility studies for various single transverse spin measurements that are related to the Sivers effect, transversity and the tensor charge, and the Collins fragmentation function. The processes studied include semi-inclusive Deep inelastic scattering (SIDIS) where single hadrons (pions and kaons) were detected in addition to the scattered DIS lepton. The single hadron asymmetries were extracted as a function of the DIS variables x and Q^2, as well as the semi-inclusive variables z, which corresponds to the momentum fraction the detected hadron carries relative to the struck parton and P_T, which corresponds to the transverse momentum of the detected hadron relative to the virtual photon. They are obtained in azimuthal moments in combinations of the azimuthal angles of the hadron transverse momentum and transverse spin of the nucleon relative to the lepton scattering plane. In order to extract asymmetries, the initially unpolarized MonteCarlo was re-weighted in the true kinematic variables, hadron types and parton flavors based on global fits of fixed target SIDIS experiments and e^+e^- annihilation data. The expected statistical precision of such measurements is extrapolated to 10 fb^{-1} and potential systematic uncertainties are approximated given the deviations between true and reconstructed yields.

ECCE Exclusive Reactions

ECCE detector performance for DVCS and DVMP ep and eA reactions

October 11, 2021

deliver. It is

@mit.edu) For
p-¿epg no pi0

performance:
s full process

tector perfor-
S2̂ versus full

tector perfor-
S2̂ versus full

process

(d) Detector efficiency as a function of pseudo rapidity (different colors for different particles, vertical axis is %), detector performance and where the particle are detected

(e) xb versus Q2 filled with relative counts, detector acceptance,

(f) t versus Q2 filled with relative counts, detector acceptance,

(g) xb versus t filled with relative counts, detector acceptance,

2. DVCS He4
person in charge Gary Penman (U of Glasgow, g.penman.1@research.gla.ac.uk)
NAS topic 1 & 7
for beam configuration (5*41) on IP6 only.
eHe4-¿eHe4 g (full cross section)

(a) DVCS Differential cross-section vs Momentum transfer t. Detector performance: low pT acceptance in far-forward region.

(b) DVCS Differential cross-section vs Momentum transfer Q2. Detector performance: low pT acceptance in far-forward region.

(c) DVCS Differential cross-section vs Momentum transfer xB. Detector performance: low pT acceptance in far-forward region.

(d) Detector efficiency as a function of pseudo rapidity (different colors for different particles, vertical axis is %), detector performance and where the particle are detected

(e) xb versus Q2 filled with relative counts, detector acceptance,

(f) t versus Q2 filled with relative counts, detector acceptance,

(g) xb versus t filled with relative counts, detector acceptance,

ECCE Proposal - progress

Contents

Detector Design:
60% complete

- ❑ Technology selection final except for TOF barrel – to be decided this week
- ❑ Detector requirements, scope, risks, subsystem plans, cost information collected – material being analyzed
- ❑ Computing plan draft

ECCE Detector Requirements (90% complete)

Topic	Issue	ECCE solution	Comment
Barrel PID – e/π separation: up to 10^{-2}-10^{-4} down to 0.2 GeV	Need good EMcal resolution; need additional e/π below 2GeV	Use SciGlass with 55 cm space as option with good precision; use hpDIRC as π veto down to p = 0.3 GeV/c	Below 0.3 GeV/c can also augment with TOF. Leave 5-10cm for MRPC.
Barrel PID – π/K/p separation down to 0.2 GeV	hpDIRC covers down to 0.6 GeV, need to augment PID below this	Cover 0.2 < p < 0.6 GeV/c with TOF option	Leave 5-10 cm space for this (in region up to forward/backward TOF). Can be MRPC but allows upgrade options (AC-LGAD or LYSO-based TOF)
Hermetic coverage of e- detection	Leave no gaps in e- detection while also folding in PID/hpDIRC need.	hpDIRC readout in backwards region; Moved backward EMCal 15 cm inwards; extended barrel EMCal	Good coverage for negative rapidity needs; performance needs to be verified with simulations.
Backward e- determination, e/π separation up to 10^{-4}	Need highest precision EM calorimetry	Assume all $PbWO_4$	Partial coverage with SciGlass can be scope contingency
Momentum resolution in barrel	Assume 1.5 T field	AI Optimization; base choice is 3 Si vertex layers and 2 intermediate Si outer layer μRwell	Need to work out how to stage such that early beam commissioning starts without Si.
Momentum resolution in forward/backward regions at high η	Assume 1.5 T field	Five disks forward, four disks backward to move EMCal in. Additional MPGD tracking behind dRICH and mRICH	Upgrade options: TRD for PID; AC-LGAD for tracking
Forward Hadronic calorimetry	Forward hadronic calorimetry resolution < 50%/√(E)	Longitudinally separated calorimeter to meet needs in high-η region	Upgrade Option: Dual calorimeter (or can fold in earlier in region of highest need)
Forward Particle Identification	Constrained space in forward region	dRICH based on C4F10; make use of recirculation and gas recovery systems	Recirculation and gas recovery systems for environmentally unfriendly gas use

ECCE Detector Scope (80% complete)

List of Assumptions
1) The accelerator/cryogenics scope will provide a cryogenic distribution can in the experimental Hall at IP6. The remaining scope in the Hall is included in the detector magnet.
2) The IR and vacuum (IR magnets, beam pipes, pumps, valves, windows, etc.) are part of the accelerator/IR scope.
3) The luminosity detector is included in this detector proposal and includes anything that comes behind the conversion/exit window. Up to that window is assumed to be accelerator scope.
4) The polarimetry scope is not included in this detector proposal as it is handled external to the proposals through the across proto-collaborations polarimetry working group.*
5) Any required IP-6 de-installation costs are assumed to be covered as regular laboratory operations costs.
6) The infrastructure scope includes items that are directly related to the ECCE specific detector proposal (support structures, cradle, specific gas handling systems, etc.).
7) ….

**Note that for the CD-1 EIC Project cost estimates the polarimetry and luminosity detector scope was still covered under accelerator/IR scope.*

ECCE Detector Costing

(note that this a simplified version; labor is included)

WBS	EIC Ref Project $M	EIC Ref In-Kind $M	EIC Ref Total $M	ECCE Project $M	ECCE In-Kind $M	ECCE Total $M
10.01 Detector management			7.4	7.4	0.0	7.4
10.02 Detector R&D			12.1	12.3	0.0	12.3
10.03 Tracking			31.1	26.2	4.6	30.8
10.04 Particle Identification			26.5	27.2	4.0	31.2
10.05 EM Calorimetry			36.2	22.1	6.2	28.3
10.06 Hadronic Calorimetry			33.1	15.8	16.0	31.8
10.07 Magnet			29.7	3.0	8.0	11.0
10.08 Electronics			17.1	4.7	0.0	4.7
10.09 DAQ Computing			8.7	1.5	0.0	1.5
10.10 Detector Infrastructure			26.4	26.4	0.0	26.4
10.11 IR Integration & Auxiliary Detectors			8.1	0.6	9.4	10.0
10.14 Polarimetry and Luminosity				1.7	0.0	1.7
Detector Pre-Ops & Commissioning			8.7	8.7	0.0	8.7
TOTAL	**153.1**	**92.0**	**245.1**	**157.6**	**48.2**	**205.8**

Close now to final goal

ORNL team completed information collection on 10/8

ECCE Detector – Risk Items (90% complete)

Brief Overview:

CENTRAL

Magnet

- Reuse presents moderate risk (according to 2020 Jlab Engineering Risk Assessment, engineer: R. Fair); ECCE strategy: minimal changes, check functionality during sPHENIX, carry through E&D as schedule risk mitigation (– see Doug/Ken talk)

Tracking

- MAPS ITS3 risk similar as Si Consortium
- GEM μRwell with capacitive couplig – ongoing JLab/CLAS12 and EIC R&D

Calorimetry

- SciGlass – validation of large-scale glass, part of ongoing project R&D
- Forward Calorimeter

Particle ID

- hpDIRC
- mRICH
- dRICH – no expertise in collaboration → increasing expertise in ECCE

FAR FORWARD – FAR BACKWARD

- AC-LGAD – technical risk, part of project R&D
- No further obvious risks in FF/FB detectors

ECCE Detector R&D Needs (60% complete)

Plus a GANTT chart visualization with milestones

Topic	What R&D is needed to realize the ECCE Detector	What are the milestones to validate R&D for the ECCE Detector
mRICH (eRD101)	Demonstrate that the mRICH compact design works and will provide the necessary performance for the EIC.	Analyze Fall 2021 beam test data to extract single-photon characterization performance Build small realistic prototype and t[illegible] beam
dRICH (eRD102)		PLEASE FILL IN
hpDIRC (eRD103)	Validation with particle beam of performance and fast timing readout with small pixel MCP-PMTs in full system hpDIRC prototype.	PLEASE FILL IN
Si Service (eRD104)	Require desgin how the silicon will be supported and cooled.	[illegible]ILL IN
SciGlass (eRD105)	Prove that SciGlass is a viable cost-[illegible] solution	Beam test with small prototype (2021/22) Scale-up from 20 cm to 45 cm (2022/23 Test different geometries (2024)
Forward Calorimeter (eRD106/eRD107)	(Not directly appli[illegible]2) REPURPOSE t[illegible]ard calorimeter?	TBD
MPGD (eRD108)	Prove[illegible] with capacitive readout [illegible]	PLEASE FILL IN
ASICS (eRD109)	[illegible]re ASICS compatible with streaming readout exist for all detector technologies, with as many common ASICS as possible.	PLEASE FILL IN
Si-Vertex (e[illegible]111)	Design for how the Si can be put together to form layers and held in position.	PLEASE FILL IN
AC-LGAD (eRD112)	Sensor prototypes that meet space resolution specifications of the various sub-systems	FY22 achive 30 picosec. timing, FY23 design cooling and light weight mechical structure, FY24 build prototype

See also https://wiki.bnl.gov/conferences/index.php/ProjectRandDFY22

In-Kind Contributions – International Interest

85% complete – collecting expression of intent letters

CENTRAL DETECTOR

Tracking:
- Silicon: Japan, Czech Republic; LANL LDRD, China
- MPGD: Korea, China

Calorimetry
- PWO and SciGlass: Czech Republic, Armenia, France
- Forward Calorimeter: Japan, South Korea, Taiwan

Particle ID
- DIRC: GSI/Germany contribution
- dRICH: Chile
- mRPCs: China

FAR FORWARD – FAR BACKWARD
- Roman pots: France
- Forward Spectrometer/Off momentum: Israel
- ZDC: Japan
- Luminosity monitors: Israel
- Low Q2 tagger: UK

ECCE Proposal - progress

Contents

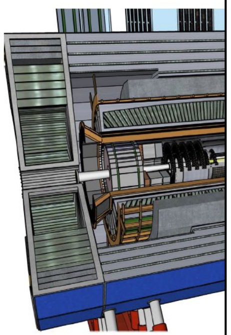
2. The ECCE Collaboration
Rough drafts exist,
~60% complete

ECCE Collaboration – rough draft

The ECCE Detector Proposal

A full-acceptance detector at th

Augu



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

At present ECCE is setup as a consortia, consenting of 80 member institutions (see Tabled **??**). Of those institutions ∼ 45% are international and ∼ 55% are U.S. based. The latter include graduate universities (∼ 70%), undergraduate and minority serving institutions (∼ 15%), and national labs (∼ 15%). The groups are approximately evenly distributed between those that have background in electron scattering and in heavy-ion collisions which gives the consortia a broad scientific foundation to maximize the physics output of the EIC.

The consortium is managed by a steering committee, consisting of O. Hen (MIT), J. Lajoie (Iowa State), and T. Horn (CUA). They serve the institutional board (IB) and lead five 'Teams' that focus on the different areas of study that went into this proposal:

- **Detector Team:** D. Higinbotham (JLab) and K. Read (ORNL),
  Oversee the technology selection studies, including their Geant4 implementation and performance studies. Consist of seven working groups, each focused on different detector elements (Tracking, Calorimetry, PID, Far-forward / Far-backward, Magnet, DAQ Electronics and Readout, and Infrastructural reuse).
- **Physics Benchmark Team:** C. Munoz-Camacho (IJCLab-Orsay) and R. Reed (Lehigh U.),
  Studies the detector performance in terms of sensitivity of concrete physical observables, based on full Geant4 simulation studies. Consist of seven working groups, each focused on different reaction type (Inclusive, Semi-Inclusive, Exclusive, Diffraction and Tagging, Jets and Heavy Flavor, BSM and Precision Electroweak, and simulation integration and support).
- **Computing Team:** C. Fanelli (MIT) and D. Lawrence (JLab),
  Setup the ECCE simulation infrastructure to run on different clusters using various event generators and support the implementation of analysis tools.
- **Diversity Equity and Inclusion Team:** N. Kalantarians (VUU) and C. Nattarass (UTK),
  Develop the ECCE code of conduct (see details in section xxx) and handle miss conduct complaints.
- **Project and Editorial Team:** T. Cormier (ORNL), R. Millner (MIT), and P. Steinberg (BNL)
  will add text here later.

The individual working group are lead, by large, by postdocs and junior faculty that we are confident will grow into leaders of the EIC project. **Or: will add more here on our advantages in terms of many young people, diversity in members etc.**

Once selected as the project detector, the ECCE consortium will evolve into a formal collaboration. This process will include the likely addition of new groups and the appointment of a collaboration leadership team and formulation of collaboration bylaws.

We envision that the successful realization of an on-time and on-budget project detector will require a collaboration leadership structure that consists of an elected IB chair and spokesperson, and a spokesperson appointed leadership team consisting of two deputy spokespersons and a series of coordinators (technical, detector resources, physics, diversity equity and inclusion, and software and computing). Below we detail the expected responsibilities of each function in the leadership team:

- **Spokesperson and deputies** are expected to manage and coordinate the collaboration. This include, e.g. arrangement of regular collaboration meetings, oversee scientific priorities, run plans and needs, solicit new groups, etc. We envision for the Spokesperson to be elected by the entire collaboration for a two year term and for a significant onsite presence to be required of either the Spokesperson or one of the deputies.
- **Institutional Board (IB) chair** is expected to set the agenda for IB meetings, handle any issues raised by collaboration members, setup IB votes, and manage the spokesperson election. In contrast to the deputy spokespersons and technical coordinators, who are appointed by the spokespersons, the IB chair is envisioned to be elected by the IB for a two year term.
- **Technical Coordinator** is expected to oversee and coordinate the day-to-day technical aspects of the experimental equipment and any upgrades the collaboration is planning. The Technical Coordinator is expected to have 100% on-site residency.
- **Detector Resource Coordinator** is expected to oversee and coordinate the user-provided in-kind contributions to the ECCE detector. The detector resource coordinator works hand-in-hand with both the collaboration and the EIC Project to help ensure the user commitments stay on track, and to help resolve potential issues. With time as the detector construction progresses we expect for the Detector Resource Coordinator role to evolve in an Upgrade Coordinator.
- **Software and Computing Coordinator** is expected to oversee and manage development and implementation of software tools to expedite physics analysis, coordinate the calibration and physics simulation tasks, and oversees and coordinates the distributed computing tasks and needs.
- **Physics Coordinator** is expected to oversee and manage the physics analysis tasks between the various physics working groups, and ensures the physics data, as well as results from relevant technical studies, are analyzed and published in a timely fashion.

Announcements

Godparents

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

Upcoming Events

- DNP and ECCE meeting (11 – 14 Oct)
- Artificial Intelligence for Nuclear Technology and Applications (25 – 29 Oct)