

# ECCE Physics Benchmarks Team

April 9, 2021

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# Agenda

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- Review of the Physics Team Charge
- Simulation workshop
- Timeline
- Organizational tools, meetings, etc
- Initial steps

# Charge

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From the steering committee:

The Physics Benchmarks Team is responsible for the **realistic simulation** of **key physics observables** for the proposal and evaluation of ECCE performance through the Physics Working Groups.

## Physics Working Groups:

- Inclusive reactions
- Electroweak and BSM
- Semi-inclusive reactions
- Jets and Heavy Flavor
- Exclusive Reactions
- Diffractive & Tagging
- Simulation

# Simulation workshop (April 2)

- Slides and recordings available
- Ideas of future dedicated workshops welcome

<https://indico.bnl.gov/event/11112/>

## ECCE Simulation Workshop

vendredi 2 avr. 2021 à 07:00 → 16:45 US/Eastern

**Description** This is the first ECCE simulations workshop. It is intended as a workshop for students and postdocs who will be actively engaged in ECCE simulations.

We ask that participants please register for the workshop so we have a list of contacts for future announcements and information. This will also be used to invite participants to a Mattermost channel.

### Connection Information:

Please click this URL to start or join: <https://iastate.zoom.us/j/99332568893?pwd=SGtDMzBYRUN6SFIPYnJYNFZXtUdxZz09>  
Or, go to <https://iastate.zoom.us/join> and enter meeting ID: 993 3256 8893 and password: 762800

### Mattermost

Please join the Mattermost channel for Fun4All discussions based around ECCE: <https://chat.sdcc.bnl.gov/eic/channels/fun4all-ecce>  
If you do not have a BNL account, email Jin Huang ([huang@bnl.gov](mailto:huang@bnl.gov)) for an invitation.

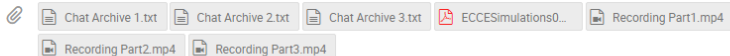
### Pre-workshop Tutorials

Some instructions for setting up Fun4All and EIC Smear that would be useful to look at prior to the start of the workshop can be found at: [Tutorials](#)

Singularity container instructions: <https://github.com/ECCE-EIC/Singularity>

Simulation and Fun4All EIC Yellow Report Tutorial: <https://indico.bnl.gov/event/7281/#b-4588-detector-full-simulatio>

Recorded tutorials on Fun4All: <https://indico.bnl.gov/event/7254/>



Inscription

Participants

Inscription

09:30	→ 10:00	<b>Introduction to ECCE and call for proposals</b> Orateur: John Lajoie (Iowa State University) ECCE First Software...	0 30m
10:00	→ 10:30	<b>Fun4All Fundamentals</b> Orateur: Chris Pinkenburg (BNL) Fun4ECCE.pdf	0 30m
10:30	→ 11:00	<b>Tutorial: From Simulation to Reconstruction to Analysis</b> Orateur: Joe Osborn (Oak Ridge National Laboratory) AnaTutorial.pdf	0 30m
11:00	→ 11:15	Coffee	0 15m
11:15	→ 11:45	<b>Simulation towards ECCE proposal</b> Orateurs: Cameron Dean (LANL), Dr Jin Huang (Brookhaven National Lab) ECCE Simulation.pdf	0 30m
11:45	→ 12:15	<b>EIC Smear to Fun4All</b> Orateur: Dr Kolja Kauder (Brookhaven National Laboratory) Kauder_eicsmear_g...	0 30m
12:15	→ 14:00	Lunch	0 1h 45m
14:00	→ 14:30	<b>Detector Configurations in Simulations</b> Orateurs: Dr Friederike Bock (Oak Ridge National Laboratory), Nicolas Schmidt (Oak Ridge National Laboratory) ECCE_Oml.pdf	0 30m
14:30	→ 15:00	<b>Far-Forward region in Simulations</b> Orateur: Ciprian Gal (Stony Brook University) 210402_F4A_hBee...	0 30m
15:00	→ 15:15	Tea	0 15m
15:15	→ 16:15	<b>QA</b> Orateurs: Chris Pinkenburg (BNL), Cristiano Fanelli (MIT), Dr Jin Huang (Brookhaven National Lab)	0 1h

# Timeline: short!!

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From Cameron and Jin's talk last Friday:

- Dec 1<sup>st</sup> : proposal submission
- Nov 1<sup>st</sup>: final proposal for editing
- Sept 1<sup>st</sup> : all major simulation plot done. After this date, we just do polishing, composing narratives around the figures in the performance chapter of the proposal.
- Aug 1<sup>st</sup> : Final simulation production done
- July 1<sup>st</sup> : Final simulation production start
- May 1<sup>st</sup>: First simulation campaign, followed by first round of analysis. From May – July, many studies probably need another iteration of simulation-analysis to advance detector design.
- Entire Apr: develop simulation setup to run.
- Today: 1<sup>st</sup> simulation workshop

# Team organization

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- **Mailing list:** [ecce-eic-phys-l@lists.bnl.gov](mailto:ecce-eic-phys-l@lists.bnl.gov)
- **Mattermost channel:** <https://chat.sdcc.bnl.gov/eic/channels/fun4all-ecce>
- **Wikipage:** under construction
- **Office hours:** Tuesdays 2PM-4PM EDT (One or several simulation expert will be online)  
<https://ijclab.zoom.us/j/94840187278>
- **Team meetings:** weekly/bi-weekly ? (time TBD)

# Initial steps

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- Yellow report simulation samples are being collected:
  - Generator used
  - Steering cards
  - MC files (when available)
- Initial ECCE configuration available at:  
[https://github.com/ECCE-EIC/macros/blob/master/detectors/EICDetector/Fun4All\\_G4\\_EICDetector.C](https://github.com/ECCE-EIC/macros/blob/master/detectors/EICDetector/Fun4All_G4_EICDetector.C)  
(based on BABAR magnet and YR reference detector) **Obviously: to be optimized**
- Each WG should select a few (1-2) key processes from WP/NAS/YR
- Tentative goal for end of April:
  - Setup the simulation + analysis chain to evaluate the performance of the initial ECCE configuration in one particular key process for each WG
  - In practice: try to reproduce one plot of WP, produce one key plot for proposal (with low statistics)

# In the meantime: the DWG...

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- The DWG will work on developing different detector configurations (“options”) for ECCE
- This will be done in collaboration with the PWG
- In May/June full simulation of the different setup will be run, followed by physics analysis to evaluate each one...



# Simulation TODO's: volunteers needed

From Cameron and Jin's talk last Friday:

Detector	Status / link to code	Help needed
Silicon trackers	<a href="#">Full model for ALPIDE</a> , fast model for <a href="#">ITS3</a> , <a href="#">FST</a>	Update ECCE setup
TPC	<a href="#">Full model</a> , <a href="#">fast model</a>	EIC setup, dE/dx
MPGD tracker	<a href="#">Fast model</a>	Update ECCE setup
Barrel Calorimeter	Full model for <a href="#">SPACAL</a> , <a href="#">sPHENIX HCals</a> , fast model for <a href="#">Shashlyke</a>	Update ECCE setup
Forward calorimeter	Full model for <a href="#">Shashlyke</a> , <a href="#">PbScifi</a> , fast model for <a href="#">crystal calorimeter</a>	Light collection uniformity
PID / TOF	Full model for <a href="#">MRPC</a> and Fast model for <a href="#">LGAD</a>	Update ECCE setup
PID / RICH	Full model for <a href="#">mRICH</a> , <a href="#">Gas RICH</a> ; missing DIRC and dual RICH (material placeholder)	dRICH, RICH reco
Far forward	Fast model [Talk: Ciprian]	Beamline material

## ▶ Tracking:

- Use [GenFit2 for fast prototyping \(PHG4TrackFastSim\)](#), widely used in YR tracking studies
- sPHENIX switched to ACTS: fast to fit but long development time for adopting new tracker set **Not** suited for ECCE at this stage [help needed: pattern reco. with ACTS]

## ▶ Calo reco:

- [Clusterizers](#), [FastJet](#), Particle flow jet ([prototype](#), need volunteer)

## ▶ PID reco:

- GenFit2 for TOF, e.g. track length and timing smearing
- RICH has to rely on fast smearing (help needed: full reco of RICH need major development)

# How to form your groups



*EIC Comprehensive  
Chromodynamics  
Experiment*

[Home](#)

[Structure & Members](#)

[Meetings](#)

[EOI](#)

[Contact us](#)

[Internal](#)

## Member Institutions

- AANL/Armenia (contact: Ani Aprahamian)
- AUGIE (contact: Nathan Grau)
- BGU/Israel (contact: Zvi Citron)
- BNL (contact: Peter Steinberg)
- Charles U./Prague (contact: Miroslav Finger)
- Columbia (contact: Bill Zajc)
- CUA (contact: Tanja Horn)
- Duke (contact: Anselm Vossen)
- FIU (contact: Lei Guo)
- Georgia State (contact: Xiaochun He)
- Glasgow/Scotland (contact: Daria Sokhan)
- GSI/Germany (contact: Joe Schwiening)
- GWU (contact: Axel Schmidt)
- HUJI (contact: Guy Ron)
- IJCLab-Orsay (contact: Carlos Munoz-Camacho)
- Iowa State (contact: John Lajoie)
- IPAS (contact: Wen-Chen Chang)
- JLab (contact: Doug Higinbotham)

- LANL (contact: Ming Liu)
- Lehigh University (contact: Rosi Reed)
- LLNL (contact: Ron Soltz)
- MIT (contact: Or Hen)
- NCKU (contact: Yi Yang)
- NCU (contact: Chia-ming Kuo)
- NMSU (contact: Stephen Pate)
- NRNU MEPhI/Russia (contact: Vitalii A. Okorokov)
- NTHU (contact: Jennifer Hsu)
- NTU (contact: RS Lu, Stathes Paganis, Jack Chen)
- ODU (contact: Charles Hyde)
- Ohio U (contact: Justin Frantz)
- ORNL (contact: Kenneth Read)
- PNNL (contact: Lynn Wood)
- Rice (contact: Wei Li)
- RIKEN/Japan (contact: Yuji Goto)
- Rutgers (contact: Sevil Salur)
- Saha / India (contact: Debasish Das)
- SBU (contact: Klaus Dehmelt)
- TAU (contact: Igor Korover)
- Tsukuba U./Japan (contact: Tatsuya Chujo)
- CU Boulder (contact: Dennis Perepelitsa)
- UConn (contact: Kyungseon Joo)
- UH (contact: Rene Bellweid)
- UTUC (contact: Anne Sickles)
- UKY (contact: Renee Fatemi)
- UNH (contact: Karl Slifer, Elena Long)
- UTK (contact: Christine Nattrass)
- UTSM (contact: William Brooks)
- UVA (contact: Nilanga Liyanage)
- Vanderbilt (contact: Julia Velkovska)
- Virginia Tech (contact: Marie Boer)
- Virginia Union (contact: Narbe Kalantarians)
- Wayne State (contact: William Llope)
- WI / Israel (contact: Sasha Milov)
- York (contact: Nick Zachariou)
- Zagreb University (contact: Ivica Friscic)