




**Help Needed With ePIC Reconstruction and Physics Analysis.
And Of Course Closely Connected With Detector Design Effort.**


Four Activities: Electron Finder, Vertexing and PID, Particle Flow, Low- Q^2 .

Interplay between Software & Computing and Physics



Physics Working Groups: For the physics analysis of simulated data, the reconstruction needs to be improved.

Software & Computing Effort: We need physics benchmarks for the continuous assessment of the physics reach of the ePIC detector.



Let's Meet and Discuss Together

ePIC Software, Computing and Physics Discussion

Wednesday May 17, 2023, 11:00 AM → 12:30 PM US/Eastern

Markus Diefenthaler (Jefferson Lab), Rosi Reed (Lehigh University), Salvatore Fazio (University of Calabria and INFN-Cosenza), Sylvester Joosten (Argonne National Laboratory), Torre Wenaus (BNL), Wouter Deconinck (University of Manitoba)

Description We will discuss the priorities of reconstruction tasks required for the physics analysis of simulated data, as well as the priorities of physics benchmarks needed for the continuous assessment of the ePIC detector's physics reach. The meeting aims to assign tasks to the workforce in the Physics and Software & Computing WGs and set goals for the next simulation campaigns.

We will use Zoom for the remote meeting:

- <https://jlab-org.zoomgov.com/j/1614875218?pwd=RFRRPcGINM3BaS0pQaDhxS3JURkdJZz09>
- Meeting ID: 1614875218
- Password: 925723

Live Notes

11:00 AM → 11:15 AM Update from ePIC Analysis Effort

- 11:00 AM List of outstanding task and priorities by the PWGs** (10m)
Speakers: Rosi Reed (Lehigh University), Salvatore Fazio (University of Calabria and INFN-Cosenza)
Attachment: RReedEPIC0517202...
- 11:10 AM Questions** (5m)

11:15 AM → 11:45 AM Update from the ePIC Software & Computing Effort

- 11:15 AM ePIC Reconstruction Status and Plans** (10m)
Speakers: Andrii Verbytskyi (MPP), Derek Anderson (Iowa State University), Sylvester Joosten (Argonne National Laboratory)
Attachments: 2023-05-17-Recons..., EPIC_May_2023_An..., Google slides
- 11:25 AM Questions** (5m)

11:30 AM ePIC Physics Validation Status and Plans (10m)
Speakers: Dmitrii Kalinkin (University of Kentucky), Torri Jeske (Jefferson Lab), Wouter Deconinck (University of Manitoba)
Attachment: validation_0517202...

- 11:40 AM Questions** (5m)

11:45 AM → 12:30 PM Reconstruction and Physics Benchmarks Tasks and Priorities

- 11:45 AM Tasks assigned to the Reconstruction WG (Workforce, Coordination)** (30m)
- 12:15 PM Tasks assigned to the PWGs (Workforce, Coordination)** (15m)

SC-AC meeting: <https://indico.bnl.gov/event/19473/>

Detailed minutes [available](#).

Rosi and Sal: Key priorities for the reconstruction from the perspective of the PWGs.

Sylvester: Thorough update on the reconstruction status and plans. **Andrii:** Update on DIS lepton finder.

Torri: Validation strategy and the need for physics benchmarks.

Excellent discussion, mainly on the reconstruction.

Reconstruction Priorities for Physics Analyses

Electron Finder: Developing an efficient and accurate algorithm for identifying electrons and identifying the scattered electron of the DIS process.

Vertexing and PID: Enhancing the vertexing capabilities and particle identification techniques to study heavy flavor physics.

Particle Flow: Improving the jet reconstruction using particle flow information.

Low- Q^2 : Integration of the low- Q^2 tagger into the reconstruction framework for precise measurements of photo production and vector mesons.

Electron Finder Activity

We have identified a concrete task for the next simulation campaign:

- **Task: Implement an e/p cut for electron-pion separation**
- **Task: Integrate existing DIS lepton identification algorithm in reconstruction**

We will also work on three tasks to improve the electron identification:

- **Task: Replace e/p cut with advanced electron-pion separation**
- **Task: DIS lepton identification**
- **Task: Realistic matching for projecting tracks to clusters**

How to get involved? Reach out to **Daniel Brandenburg** via brandenburg.89@osu.edu.

Vertexing and PID Activity

We have identified a concrete task for the next simulation campaign:

- **Task: Integrate primary vertexing in reconstruction**

We will also work on two tasks to improve the vertexing:

- **Task: Represent vertex information in the ePIC data model EDM4eic**
- **Task: Survey common packages for the reconstruction of the secondary vertex**

To improve the work on the hadron identification, we will support the PID WGs and the relevant DSCs.

How to get involved? Reach out to **Barak Schmookler** and via baraks@ucr.edu. After May 30, reach out to **Shujie Li**, the Reconstruction WG convener, via shujieli@lbl.gov.

Particle Flow Activity

We have identified two prerequisites to work on particle flows:

- **Task: Track matching**
- **Task: Understand cluster matching and cluster splitting**

We will also work on two tasks to explore particle flow:

- **Task: Survey existing implementations of particle flow**
- **Task: Explore necessity of custom approach for barrel and backwards regions**

How to get involved? Reach out to **Derek Anderson**, the Reconstruction WG convener, via dmawxc@iastate.edu.

Low- Q^2 Activity

We will also work on two tasks for the reconstruction of low- Q^2 events in the far backward region:

- **Task: Develop an integration strategy with the Far Forward/Far Backward WG**
- **Task: Validation of far-backward integration**

We will also work on tasks on the combined low- Q^2 coverage of the low- Q^2 tagger and the tracking system and the study of a possible gap between these detector systems:

- **Task: Study of the acceptance coverage by the low- Q^2 tagger and the tracking system**
- **Task: Study of the impact of the possible gap between the low- Q^2 tagger and the tracking system on physics observables**

How to get involved? Reach out to **Simon Gardner**, the Far Forward / Far Backward WG convener, via simon.gardner@glasgow.ac.uk.

Help Needed

If you or your group are able to **help with the four activities**, please **get in touch** with the respective **POCs**.

Electron Finder: Developing an efficient and accurate algorithm for identifying electrons and identifying the scattered electron of the DIS process.

POC: Daniel Brandenburg (brandenburg.89@osu.edu)

Vertexing and PID: Enhancing the vertexing capabilities and particle identification techniques to study heavy flavor physics.

POC: Barak Schmookler (baraks@ucr.edu), after May 30: Shujie Li (shujieli@lbl.gov)

Particle Flow: Improving the jet reconstruction using particle flow information.

POC: Derek Anderson via dmawxc@iastate.edu

Low- Q^2 : Integration of the low- Q^2 tagger into the reconstruction framework for precise measurements of photo production and vector mesons.

POC: Simon Gardner via simon.gardner@glasgow.ac.uk