

EIC UGM Debrief | Overall Thoughts



- **Collaboration Focus:** work be ready for technical baseline by end of 2025 (see [John's talk](#) and [integration discussion](#))
 - i.e. complete pTDR, be ready for TDR
 - ☞ Push towards integrating *all* aspects of ePIC
- **What does that mean for this WG?**
 - Focus on fulfilling 2025 priorities (set in Frascati)
 - Continue to **improve collaboration with PWGs (and DSCs)** on shared priorities
 - ☞ TDR ⇒ **demonstration of physics performance in realistic conditions**
 - › LOTS of development needs to happen!

Reconstruction Framework and Algorithms

- **Charge:**
 - Development of a holistic and modular reconstruction for the integrated ePIC detector.
- **Priorities for 2025:**
 - Drive the **development of the reconstruction framework to meet ePIC needs**, e.g., on modularity or streaming data processing.
 - Host collaboration-wide discussions on all aspects of reconstruction, driving the **work toward holistic reconstruction**.
 - Enable reconstruction algorithms to **handle physics events with background**.
 - Collaborate with **PWGs on shared reconstruction priorities**, which currently include:
 - Secondary vertexing
 - Hadron identification
 - Particle flow algorithms for jet reconstruction
 - Event kinematics
- Integrate continued development of **web-based event display** in reconstruction efforts.

And DSCs!

From Markus' Talk

EIC UGM Debrief | Jet/HF Workfest



Particle Flow Update | Current Status and To-Do's

Immediate task: Complete PFA0 (EiCrecon#1699)

- Track-Protocluster Links now implemented (EDM4eic#108)
- Began integrating into merge/splitter, but Link Collections seemingly don't play nicely with Omnifactories...
- Discussed with Nathan (now investigating), need to circle back

Current Status: work paused for a while, now resuming

- Pause due to professional transitions, conferences, etc.

Want to restart semi-regular PF technical meetings after EIC UGM!

- Look for emails & time polls soon

Next Steps: after PFA0

- Implement "promotion" algorithm to convert Track-Protocluster Links to Track-Cluster Matches
- Revive and finish PFA1 (EiCrecon#1627)
- PFA2 (calo remnant combiner) on hold until PFA1 is merged

Related tasks

- Make sure all relevant algorithms are using track-cluster matches
- Implement algorithm to convert track-cluster matches to reco particles (for eID)
- Upgrade Track-Cluster Matches from *associations* to *links*

July 15th, 2025 Derek Anderson (JLab), EIC UGM 2025 8/20

Jet EDM Proposal | Proposal

Right: the proposed jet type

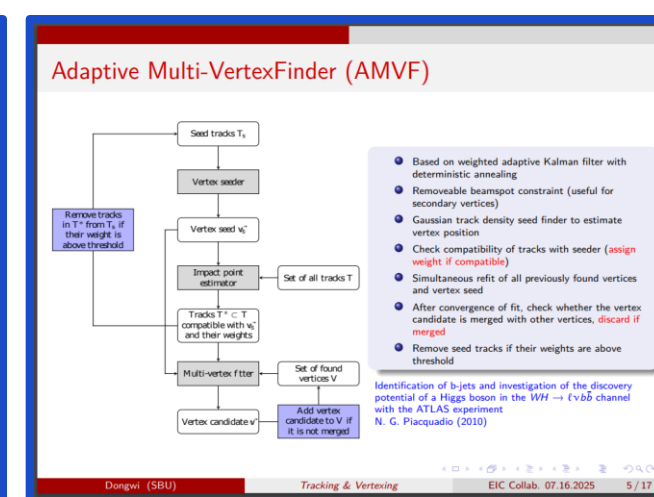
- Energy, momentum fields identical to Reconstructed Particle
- Adds field for area, background energy density

Note 3 design choices:

- Only relations to reconstructed particles allowed
 - Places jet reco at the final stages of reconstruction
- Jet substructure *not* included
 - Deferred to analysis
- Relation to other jets allows for indication of sub-jets, seed jets, or background jets

```
529 + ## =====
530 + ## Jets
531 + ## =====
532 +
533 + edm4eic::Jet:
534 +   Description: "A reconstructed jet, inspired by the FastJet PseudoJet"
535 +   Author: "D. Anderson"
536 +   Members:
537 +     - float          area          // jet area
538 +     - float          energy        // jet energy [GeV]
539 +     - float          backgroundEnergy // background energy density * area [GeV]
540 +     - edm4eic::Vector3f momentum // jet 3-momentum [GeV]
541 +   OneToManyRelations:
542 +     - edm4eic::Jet          jets          // jets that have been combined to form this jet
543 +     - edm4eic::ReconstructedParticle constituents // constituents of this jet
```

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- I presented status report on PF (& jet) reco in Jet/HF Workfest (left, middle)
 - PF status report same as 07.07.2025 report here
 - Renee had great suggestion:** Jet/HF PWG meeting is biweekly, so alternate PF technical discussion with PWG
 - Also presented proposal for jet datatype

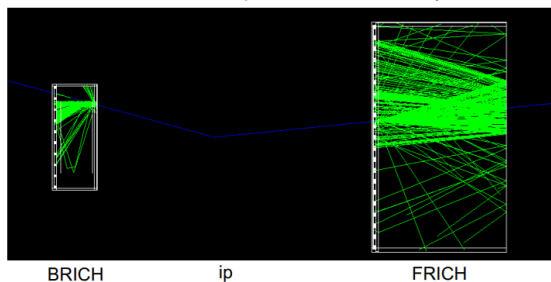
- Bishoy presented update on status of the AMVF implementation in EiCrecon (right)
 - Performance is looking good, and PR is moving towards merge!

EIC UGM Debrief | PID CCWG Workfest



Next step: QRICH -> BRICH & FRICH

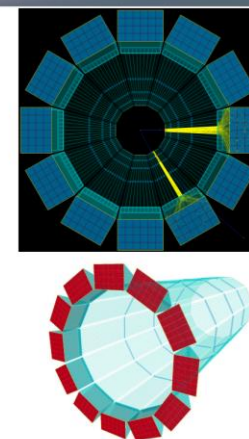
- QRICH sandbox geometry description split into BRICH and FRICH source files
 - Became impractical to keep pfRICH-like and dRICH-like geometry in one code
- Modified FRICH geometry to a dRICH-like one (added a reflection)
- Made sure BRICH & FRICH can be served by a unified RICH-IRT plugin at once
 - Appeared to be a bit trickier than expected, but eventually works fine



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SUMMARY

- Stand-alone hpDIRC simulation, [validated in particle beams in 2018](#), still essential for many studies
- Important progress in understanding [realistic tracking resolution](#) and its [impact on hpDIRC performance](#)
- Effort on finishing integration of hpDIRC into the ePIC simulation [software](#) restarted



Greg Kalicy, CIAA • hpDIRC Simulation Status • ePIC Collaboration Meeting • July 15th 2025

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○ Very productive workfest w/ PID CCWG!

- Thomas led discussion of role of CCWG moving forward
- Alexander gave an update on IRT2, pfRICH integration (left)
- Greg gave update on hpDIRC status (right)
- Tommy gave update on TOF software implementation

👉 **Update following this talk!**

○ **Key takeaways/impressions:** (from my perspective...)

- General consensus was to maintain PID CCWG, and continue/improve coordination w/ software team
- IRT2 integration making *impressive* progress, **need support to help with *holistic* PID reconstruction**
- Bill (Llope) now investigating status of hpDIRC software & will report back, **may need support based on status**

EIC UGM Debrief | SRO Workfest



Jefferson Lab

JANA2 Updates for Streaming Computing
Good news! We've already built a lot of this!

Timeframe sources with multilevel splitting

- Scenario: Begin-of-run and control events are bundled inside of timeframes
- Requires a multilevel unfold analog to the multilevel source
- Splitter produces either $\bar{P} := P(T, R, C)$ or $\bar{P} := P(T, R(T), C(T))$ as needed

Nathan Brei (nbrei@jlab.org)

Readout Data Flow

- The continuous signal is segmented by the Heart Beat Clock (common clock).
- The digital signals are sent to servers.
- Integrate all detector data.

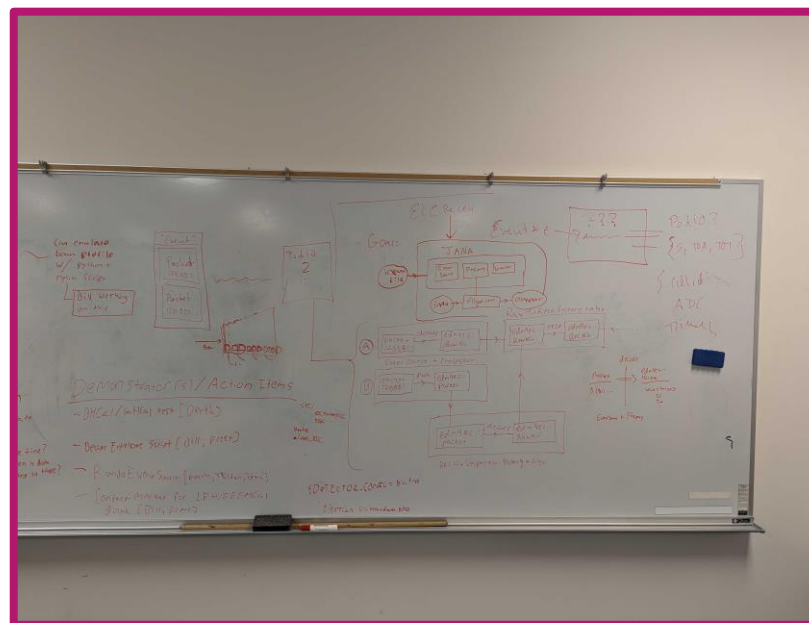
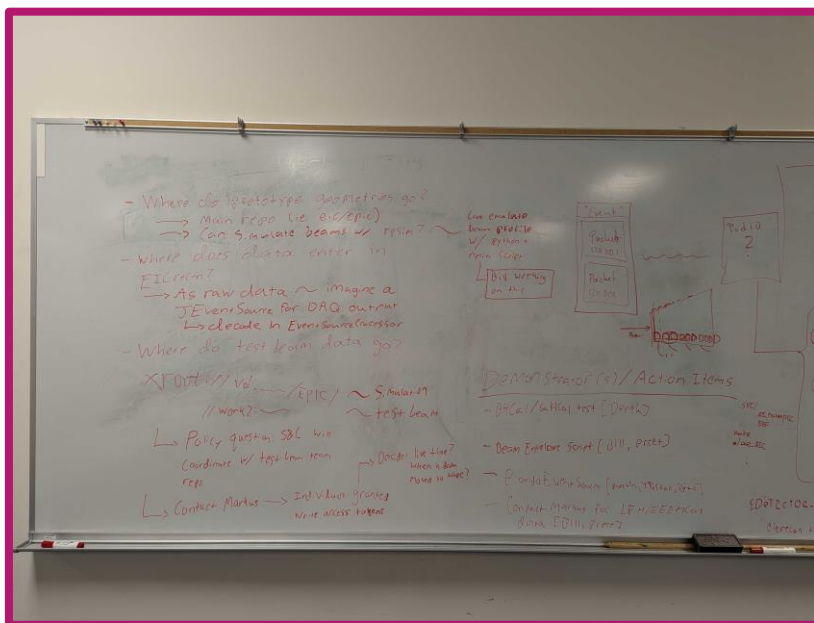
- There are extraneous data.
- By building events, the data can be compact.

My study
Event extraction from streamed data and reconstruction into event data.

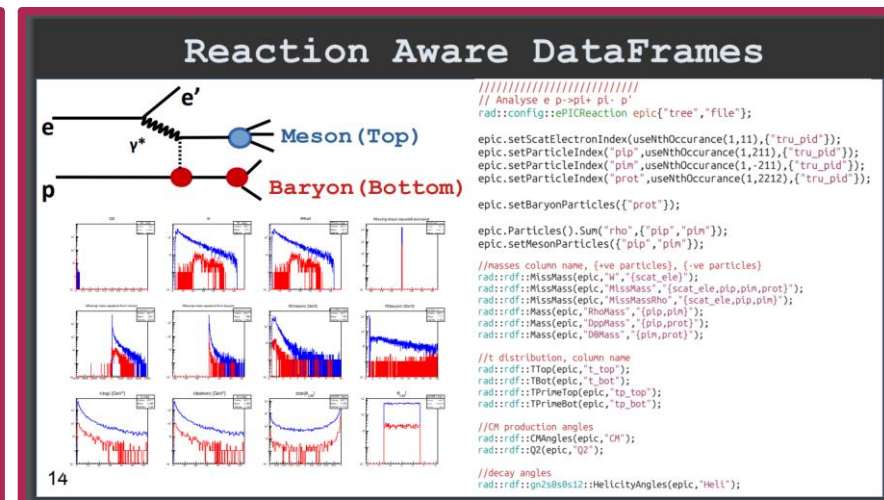
T.Kumaoka 2025/07/15 EICUG & ePIC Joint Meeting @ JLab 3 / 23

- Wasn't able to attend [SRO Workfest](#), but Nathan ([left](#)) and Takuya ([right](#)) gave very intriguing talks on JANA2 updates for streaming
 - ☞ Should touch base with them soon!

EIC UGM Debrief | Data-Software Interface Workfest



- 2-part workfest on interfacing our software environment with (test beam/bench/etc) readouts
 - **Part 1 [joint w/ E&DAQ Workfest]:** talks on test beam & DAQ (RCDAQ, CODA/ERSAP, NestDAQ) experience
 - **Part 2:** hackathon on getting test beam data into EICrecon
- **Above:** whiteboard notes from hackathon
 - No code written (as per tradition), but **extremely productive**
 - Some concrete tasks for framework & simulation development
 - ☞ Expect more detailed report soon!



- **A few highlights:**
 - Barak showed some very good documentation of tracking in part 1
 - Shujie led a great discussion of background vs. tracking in part 2
 - Derek gave update on low-Q2 analyses using a very cool analysis framework (epic-rad)