

Update: Diffractive ep @ EIC

Generator & Reconstruction Status & Requests

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August 25, 2025

Outline

- RAPGAP v3.208 Generator Setup
- HERACLES/QED-Rad Settings
- Truth-level issues & MC validation
- Reconstruction-level resolutions
- Today: document what is *validated*, what is *in flight*, then **ask for official production.**

RAPGAP v3.208 Setup

- Version: **RAPGAP v3.208**
- Generator validated: QED-rad vs no-rad
- HERACLES + radiative settings carefully tuned
- Sample stats: $2 \times 1\text{M}$ for testing
- 'PPIN': 130.0 (proton beam momentum in GeV)
- 'PLEP': -10.0 (electron beam momentum in GeV)
- 'QMIN': 5.0 (Q2MIN of electron in GeV2)
- 'QMAX': — (should not be used with HERACLES)
- 'YMIN': 0.001 (YMIN of electron)
- 'YMAX': 1.0 (YMAX of electron)

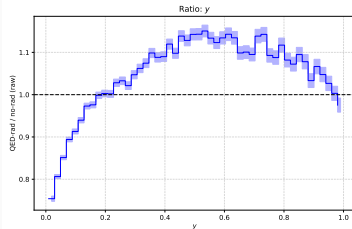
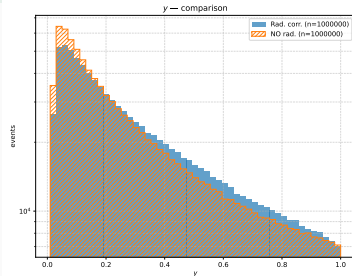
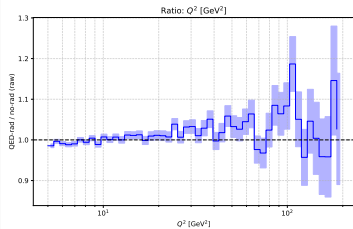
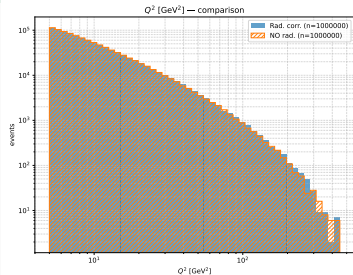
HERACLES Steering: QED Radiation On

- 'LPIN': 2 = 1 (include xsec corrections),
4 = 1 (leptonic QED),
7 = 2 (fermionic contr. param.)
- 'ISM2': 1 (NC), 1 (CC) (sampling non-rad)
- 'ISM3': 1 (IS NC), 2 (FS NC), 3 (Compton NC), 7 (IS CC) (radiative sampling enabled)

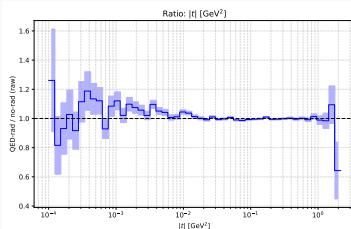
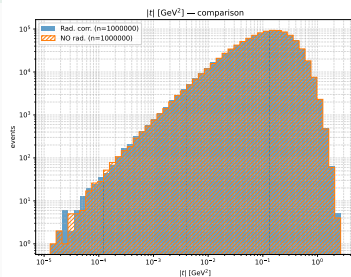
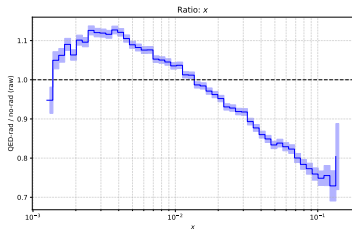
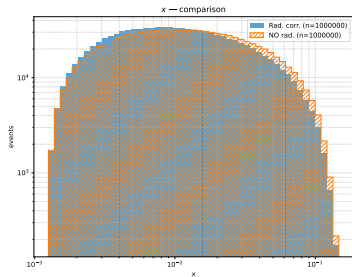
Issues Addressed

- **Detector mismatch:** 10×130 optics used with 10×100 events (**invalid**)
- **OMD matrix unavailable** at $10 \times 100 \rightarrow$ no momentum reco
- **CKF tracking errors** on 10×100 config $\rightarrow$ switch to base reco (?)
- **Preset mismatch** in Afterburner $\rightarrow$ fixed with valid beam name

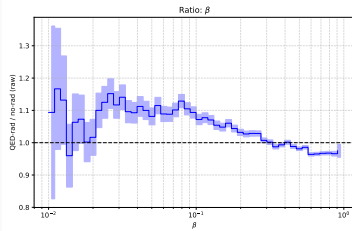
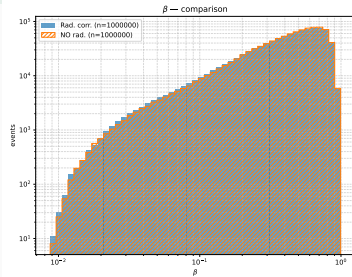
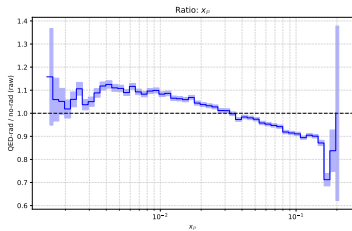
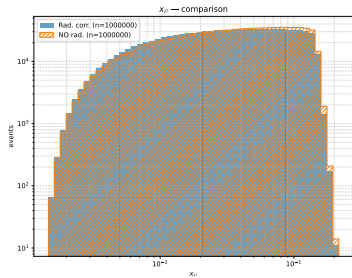
MC-Level Validation



MC-Level Validation



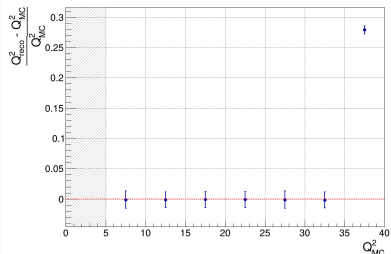
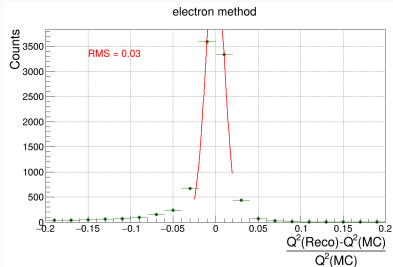
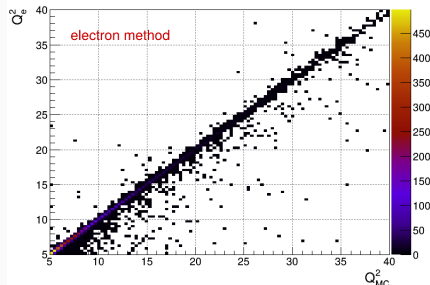
MC-Level Validation



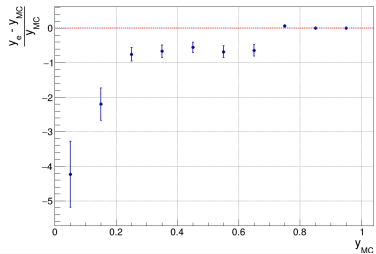
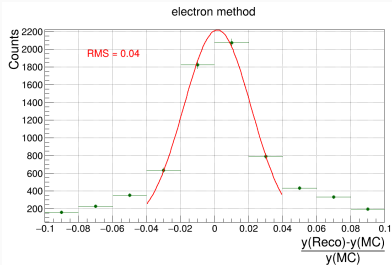
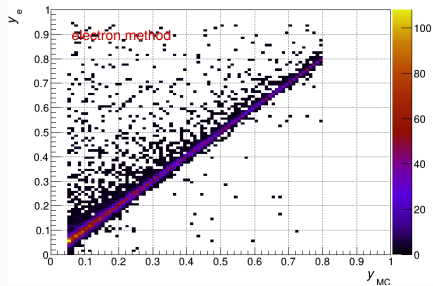
Discussion on Deliverables

Kinematic reconstructions	quantity	Reco	Truth	Response (2D)	Purity/bin migration	detector acceptance-only corrected	Unfolding/full correction
(electron, JB, DA, sigma, e-sigma)	Q2	☐	☐	☐	☐	☐	☐
	x	☐	☐	☐	☐	☐	☐
	y	☐	☐	☐	☐	☐	☐
	dQ2/Q2	☐	☐	☐	☐	☐	☐
	dx/x	☐	☐	☐	☐	☐	☐
	dy/y	☐	☐	☐	☐	☐	☐
	e' energy	☐	☐	☐	☐	☐	☐
	e' theta	☐	☐	☐	☐	☐	☐
	HFS (E-pz)	☐	☐	☐	☐	☐	☐
	HFS (pT)	☐	☐	☐	☐	☐	☐
Event level		☐	☐	☐	☐	☐	☐
	E-pz (e'+HFS)	☐	☐	☐	☐	☐	☐
	E/p for calorimeter	☐	☐	☐	☐	☐	☐
	Calo clusters	☐	☐	☐	☐	☐	☐
Observable of interest		☐	☐	☐	☐	☐	☐
	e.g., t,u,etc.	☐	☐	☐	☐	☐	☐
Detector specific variables	Depends	☐	☐	☐	☐	☐	☐
PID quantities:	Add when it comes	☐	☐	☐	☐	☐	☐

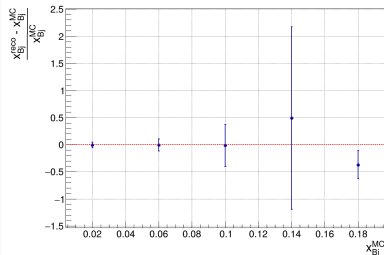
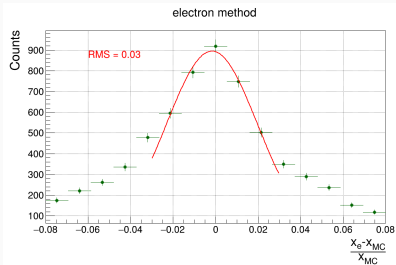
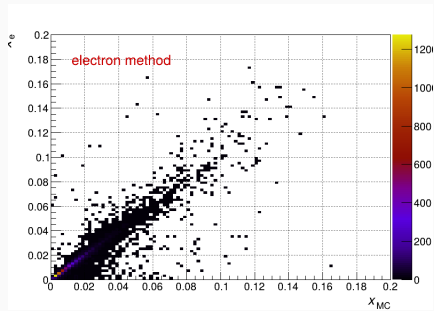
Reco: Q^2 Resolution and Correlation



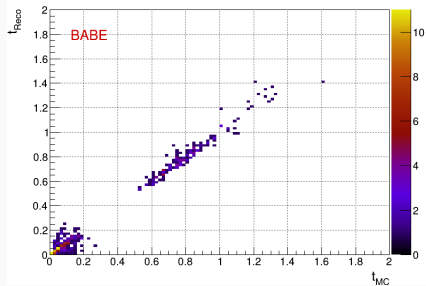
Reco: γ Resolution and Correlation



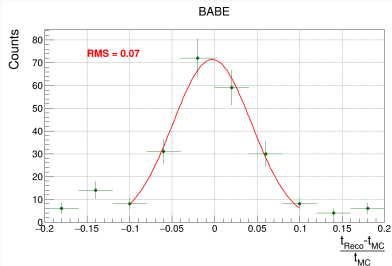
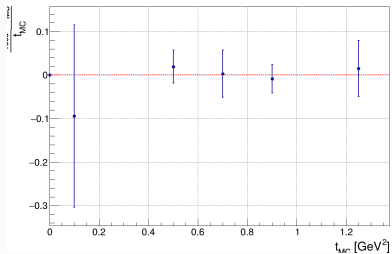
Reco: x Resolution and Correction



Reco: $|t|$ Resolution and Correlation



BABE method



Simulation Campaign Request

Pseudodata

- Target statistics: 42M events at for **diffractive inclusive** with/without QED rad.
Rationale: considering a luminosity of $10fb^{-1} = 10^7nb^{-1}$ this corresponds to a number of events of: $4.22(nb) \times 10^7(nb - 1) \simeq 4.2 \times 10^7$ events
Therefore, we propose to generate:
 - **40 M** events for pseudodata

MC for acceptance/efficiency

- Request: **twice** the pseudodata: 80M events.
 - **40 M** events for MC, for start.

Thank you!

Comments, suggestions welcome.

Errors:

ep 10x130

```
[2/2] eic_shell

1: Yazi: ~/eic-scripts × 2: eic_shell × +

[e:80] [tracking:CentralTrackerMeasurements] [warning] WARNING: vol_id (16789819) not found in m_surfaces.
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[e:81] [tracking:B0TrackerCKFTrajectories] [info] Last trajectory is empty
[e:81] [tracking:B0TrackerCKFTracksUnfiltered] [warning] Empty multiTrajectory.
```