

# SIDIS-EIC and Latest Productions

<https://github.com/eic/sidis-eic>

Christopher Dilks  
20 December 2022

## Production 22.11.2

```
jug_xl> dilks@arcturus:~/e/sidis-eic$ mc tree S3/eicctest/EPIC/REC0/22.11.2/epic_arches/DIS/NC/  
S3/eicctest/EPIC/REC0/22.11.2/epic_arches/DIS/NC/  
├── 10x100  
│   ├── minQ2=1  
│   ├── minQ2=10  
│   ├── minQ2=100  
│   └── minQ2=1000  
├── 18x275  
│   ├── minQ2=1  
│   ├── minQ2=10  
│   ├── minQ2=100  
│   └── minQ2=1000  
└── 5x41  
    ├── minQ2=1  
    ├── minQ2=10  
    └── minQ2=100  
jug_xl> dilks@arcturus:~/e/sidis-eic$ mc tree S3/eicctest/EPIC/REC0/22.11.2/epic_brycecanyon/DIS/NC/  
S3/eicctest/EPIC/REC0/22.11.2/epic_brycecanyon/DIS/NC/  
├── 10x100  
│   ├── minQ2=1  
│   └── minQ2=10  
├── 18x275  
│   ├── minQ2=1  
│   ├── minQ2=10  
│   ├── minQ2=100  
│   └── minQ2=1000  
└── 5x41  
    ├── minQ2=1  
    ├── minQ2=10  
    └── minQ2=100
```

- Pythia 8 (from ATHENA EVGEN?)
- Supported by SIDIS-EIC “s3tools/”
  - Automates downloading, streaming, config files

## Production 22.11.3

```
jug_xl> dilks@arcturus:~$ mc tree S3/eicctest/EPIC/REC0/22.11.3/epic_arches/SIDIS/
S3/eicctest/EPIC/REC0/22.11.3/epic_arches/SIDIS/
├── Lambda_ABCONV
├── pythia6
│   ├── ep_18x275
│   │   ├── hepmc_ip6
│   │   └── radcor
│   └── ep_5x41
│       ├── hepmc_ip6
│       ├── noradcor
│       └── radcor
jug_xl> dilks@arcturus:~$ mc tree S3/eicctest/EPIC/REC0/22.11.3/epic_brycecanyon/SIDIS/
S3/eicctest/EPIC/REC0/22.11.3/epic_brycecanyon/SIDIS/
├── Lambda_ABCONV
├── pythia6
│   ├── ep_18x275
│   │   ├── hepmc_ip6
│   │   └── radcor
│   └── ep_5x41
│       ├── hepmc_ip6
│       ├── noradcor
│       └── radcor
jug_xl> dilks@arcturus:~$ █
```

- Pythia 6, with and without radiative corrections
- Support in SIDIS-EIC “s3tools/” coming soon...
  - Inconsistencies in file tree:
  - similar inconsistency in EVGEN file tree...

# Detector Configurations

- **Version A “Arches”:**

- Standard silicon tracker
- **2 MPGD barrel planes** (second behind DIRC)
- **No MPGD plane behind dRICH**
- Standard dRICH & DIRC
- **mRICH**
- Standard forward/backward calorimetry and barrel HCal
- **SciGlass bECal**
- Standard FF and FB
- Standard TOF?
- **No calorimeter insert**

- **Version B “BryceCanyon”:**

- Standard silicon tracker
- **1 MPGD barrel plane** (no plane behind DIRC)
- **+ MPGD plane behind dRICH**
- Standard dRICH & DIRC
- **pfRICH**
- Standard forward/backward calorimetry and barrel HCal
- **Imaging bECal**
- Standard FF and FB
- Standard TOF? Or no TOF?
- **+Calorimeter insert?**

10

# Test Productions

## ◆ EPIC 22.11.\*

- S3/eicctest/EPIC/RECO/22.11.2/epic\_{arches,brycecanyon}/DIS/NC
- S3/eicctest/EPIC/RECO/22.11.3/epic\_{arches,brycecanyon}/SIDIS/pythia6

## ◆ ECCE 22.1

- S3/eicctest/EPIC/Campaigns/22.1/SIDIS/pythia6

## ◆ ATHENA DeathValley 1.0

- S3/eicctest/ATHENA/RECO/deathvalley-v1.0/DIS/NC

## ◆ Delphes

- HEPMC files from S3/eicctest/ATHENA/EVGEN/DIS/NC
  - to be updated: ATHENA → EPIC
- Run through Delphes (CI job)
- Using [ATHENA card from `delphes\\_EIC`](#) [update needed]

# SIDIS-EIC Updates

## ◆ AnalysisEpic support <https://github.com/eic/sidis-eic/pull/208>

- Merged → Release 0.5.0
- New AnalysisEpic class
- New output tree: ParticleTree
- New S3 support script s3tools/make-epic-config.sh
- New tutorial/analysis\_epic.C

## ◆ Kinematics Reconstruction with ML – in progress: <https://github.com/eic/sidis-eic/pull/214>

- Open PR from Connor
- Roadblocks to adding to CI benchmarks?

## ◆ New S3 endpoint

- Updated in CI, but users need to update locally:

```
mc config host rm S3
mc config host add S3 https://eics3.sdcc.bn1.gov:9000 $S3_ACCESS_KEY $S3_SECRET_KEY
```

## ◆ Licensing under LGPLv3

- Same as `epic` (DD4hep geometry repo)
- Copyright headers added to all files (check your name!)
- Future: follow whatever open source licensing EPIC decides...

# Software Tasks...

◆ Rename to “**epic-analysis**”

◆ “Good first issues”

8 Open ✓ 4 Closed Author ▾ Label ▾ Projects ▾

- AnalysisEpic: validate association between MCParticles and GeneratedParticles** good first issue  
#219 opened 4 days ago by c-dilks
- Duplicated code in Analysis-derived classes should be moved to base class Analysis** good first issue  
#217 opened 3 weeks ago by c-dilks
- Try Q2 Weighting from Charlotte** good first issue  
#193 opened on Oct 18 by c-dilks
- CI: Add additional beam energies to the CI workflow** enhancement good first issue  
#189 opened on Oct 4 by c-dilks
- Test all tutorials with CI** good first issue maintenance  
#185 opened on Sep 29 by c-dilks
- Use ROOT::Math vectors** good first issue  
#175 opened on Sep 1 by c-dilks
- check for memory leaks** good first issue maintenance  
#152 opened on Jul 26 by c-dilks
- tutorial 4 is broken** bug good first issue low priority  
#141 opened on May 25 by c-dilks

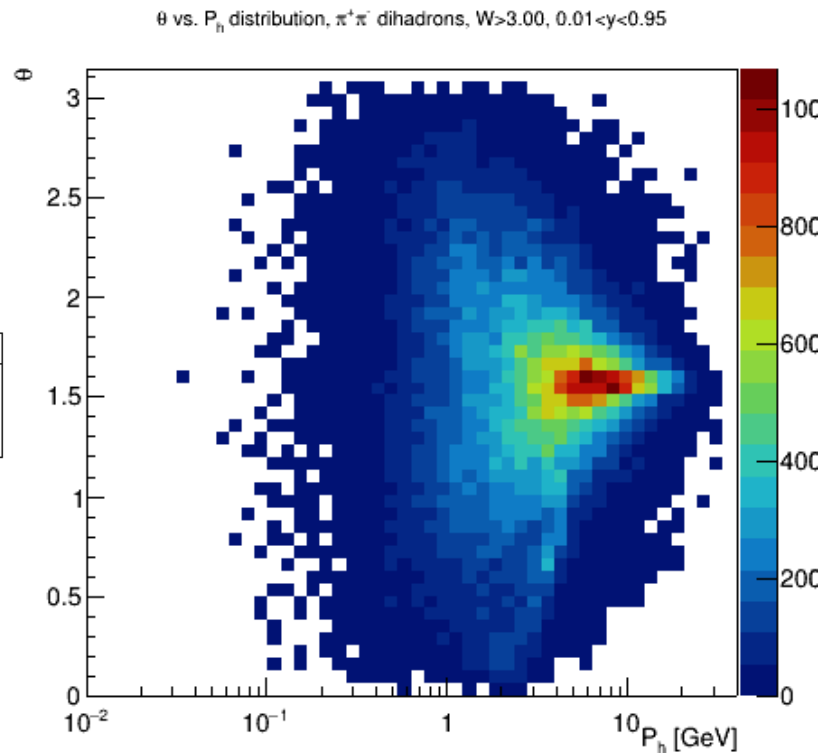
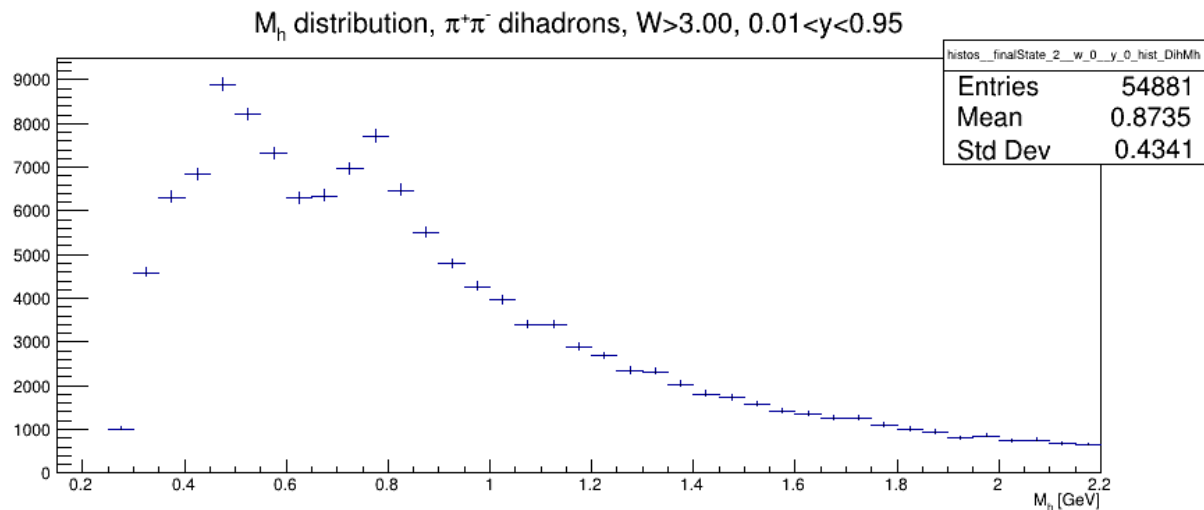
C. Dilks

# Dihadrons

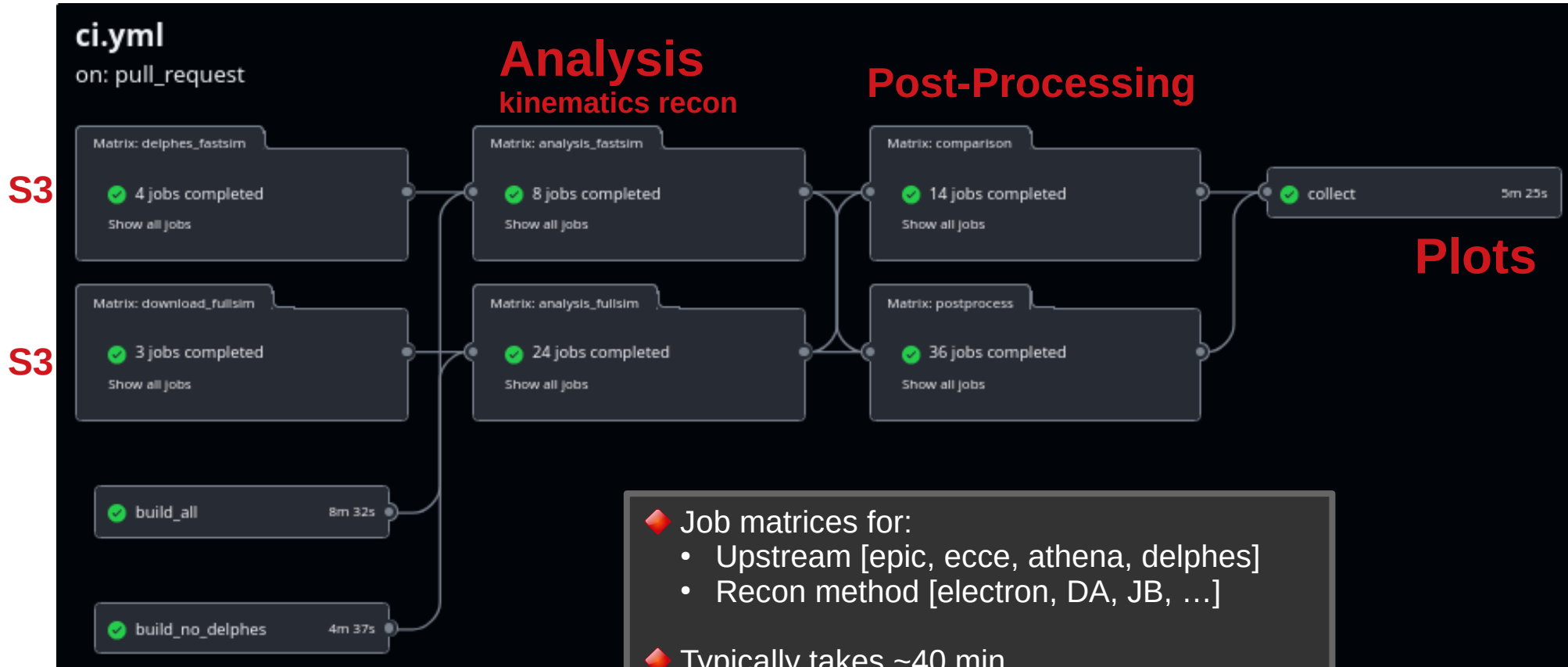
◆ Work in Progress: <https://github.com/eic/sidis-eic/pull/192>

- Kinematics – done, but needs validation / cross check
- Inclusive Pairing – done, but needs validation
- Integrated as an additional “finalState”

◆ Any volunteers to take over?



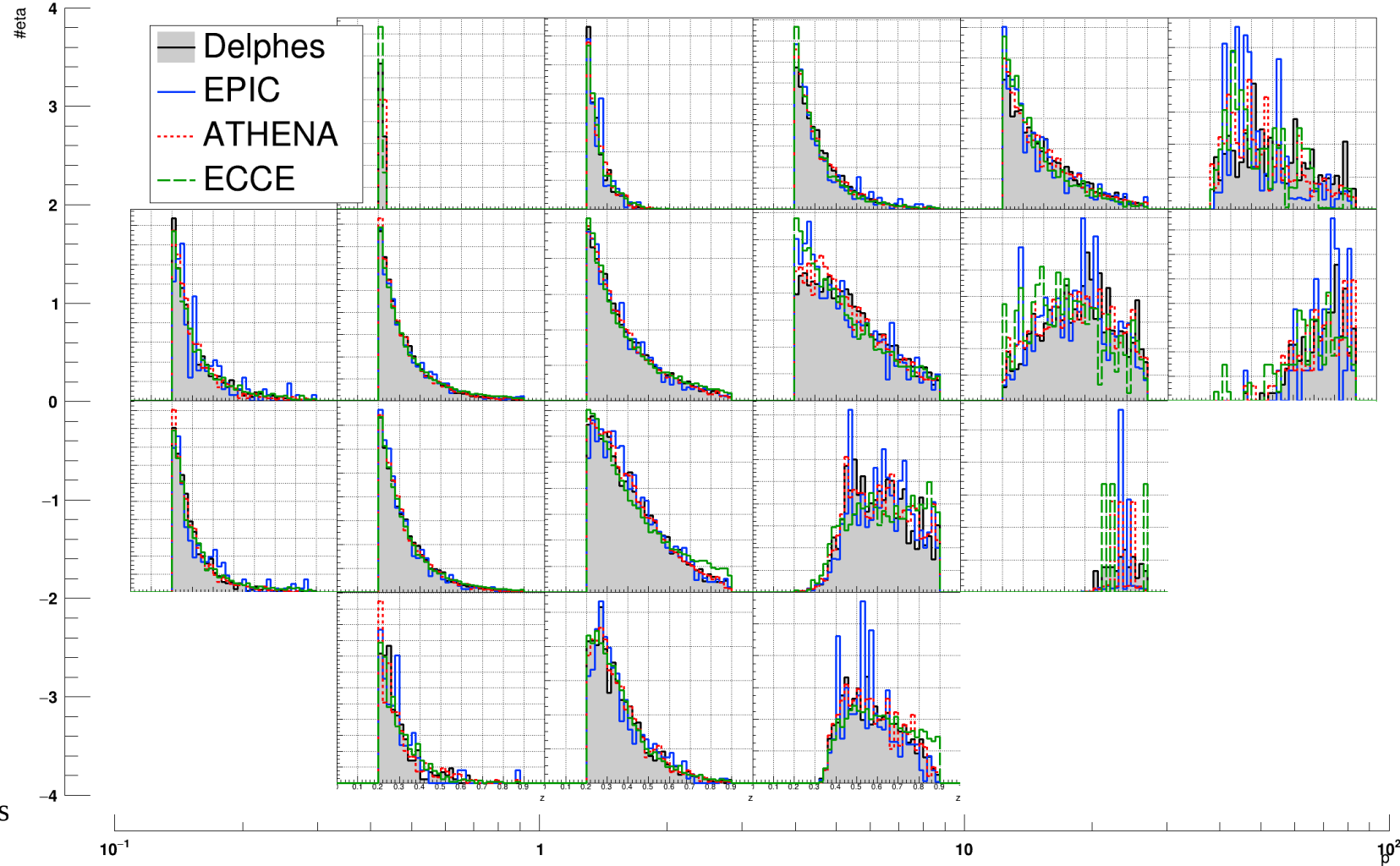




- ◆ Job matrices for:
  - Upstream [epic, ecce, athena, delphes]
  - Recon method [electron, DA, JB, ...]
- ◆ Typically takes ~40 min
  - Separate “no delphes” build to start full simulation jobs sooner
  - Alternatively, add Delphes to eic-shell
  - Slowest step: reading from S3

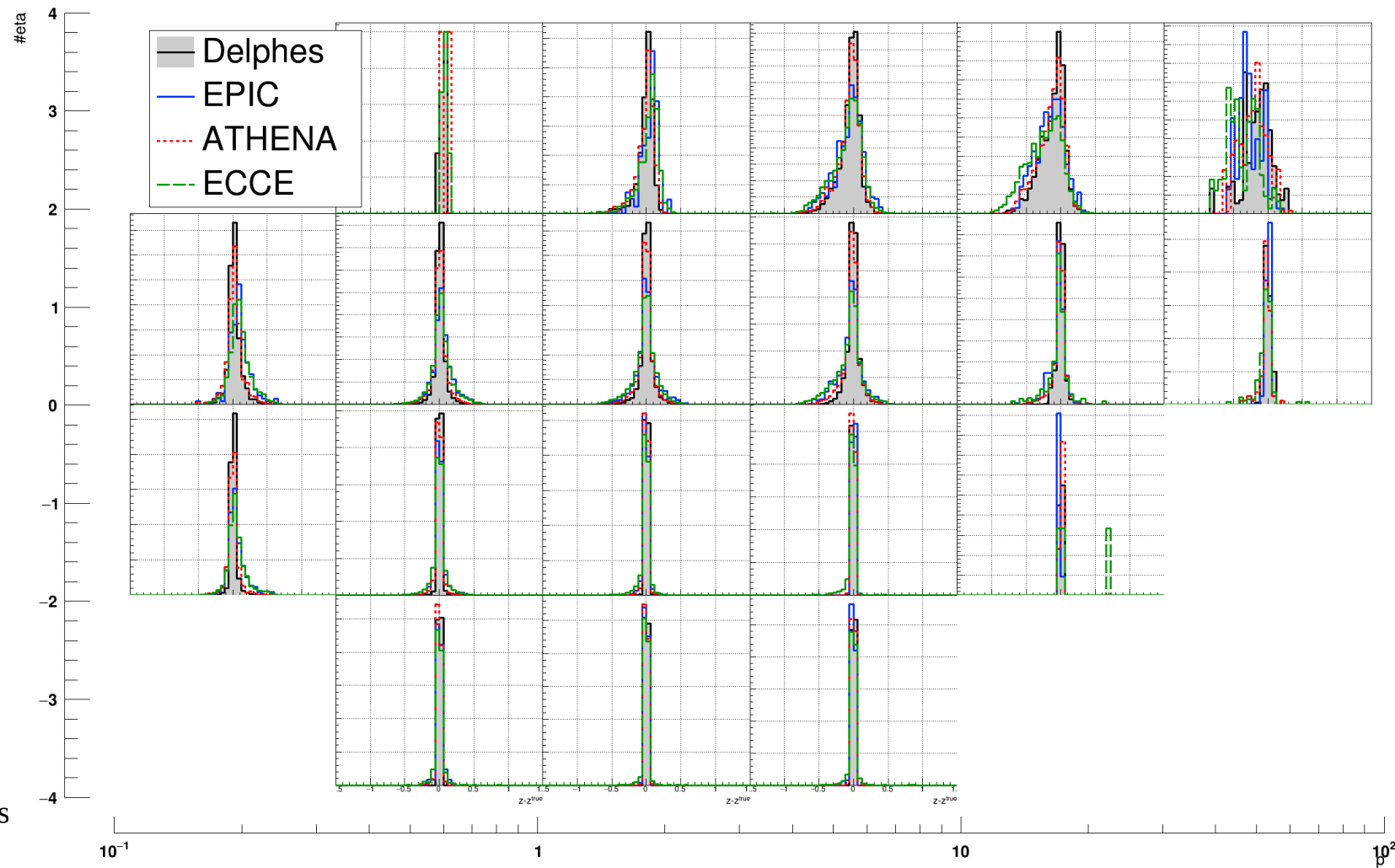
# Sample plots: $z$ in $(\eta, p)$

Electron method



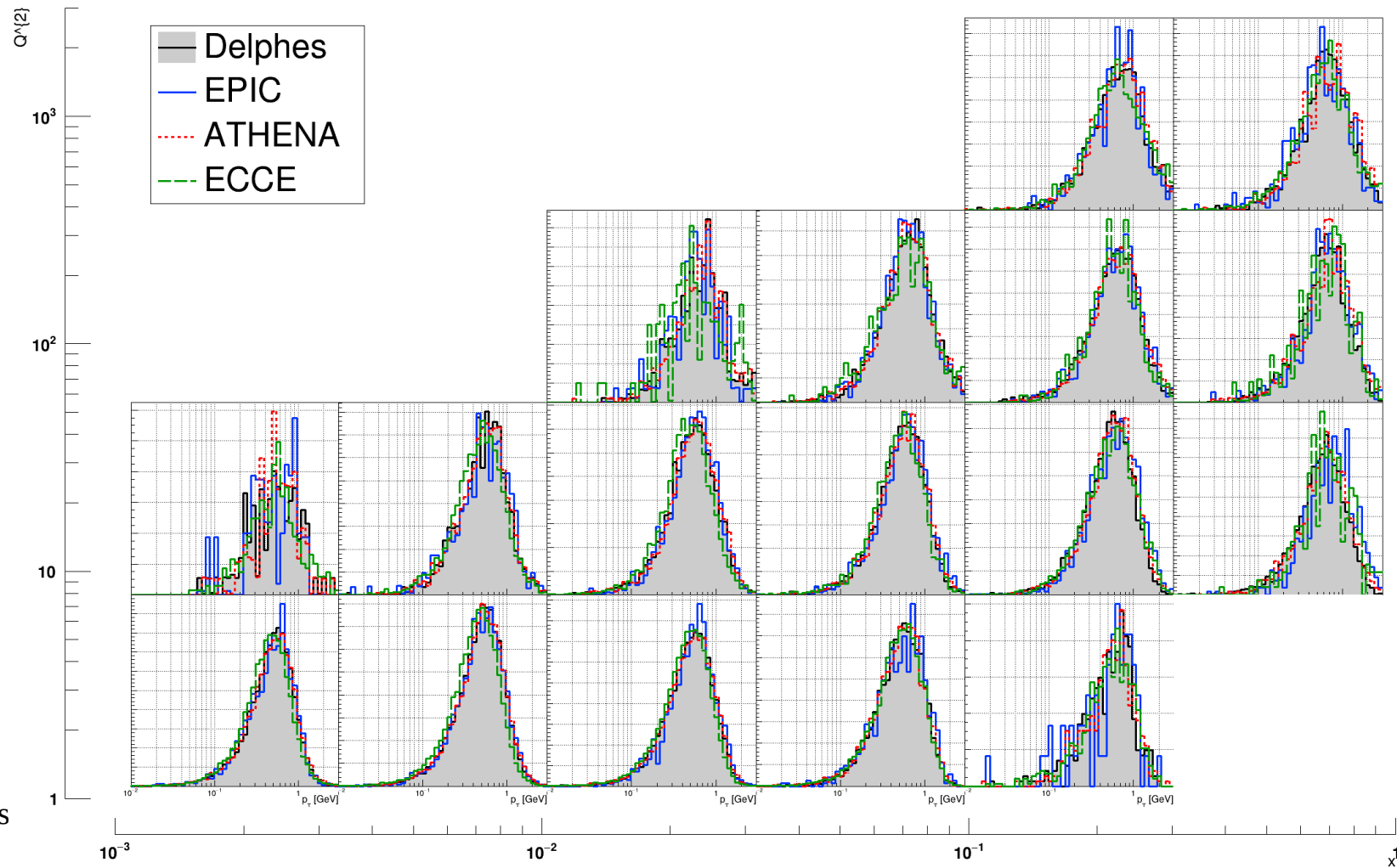
# Sample plots: z resolution in ( $\eta, p$ )

Electron method



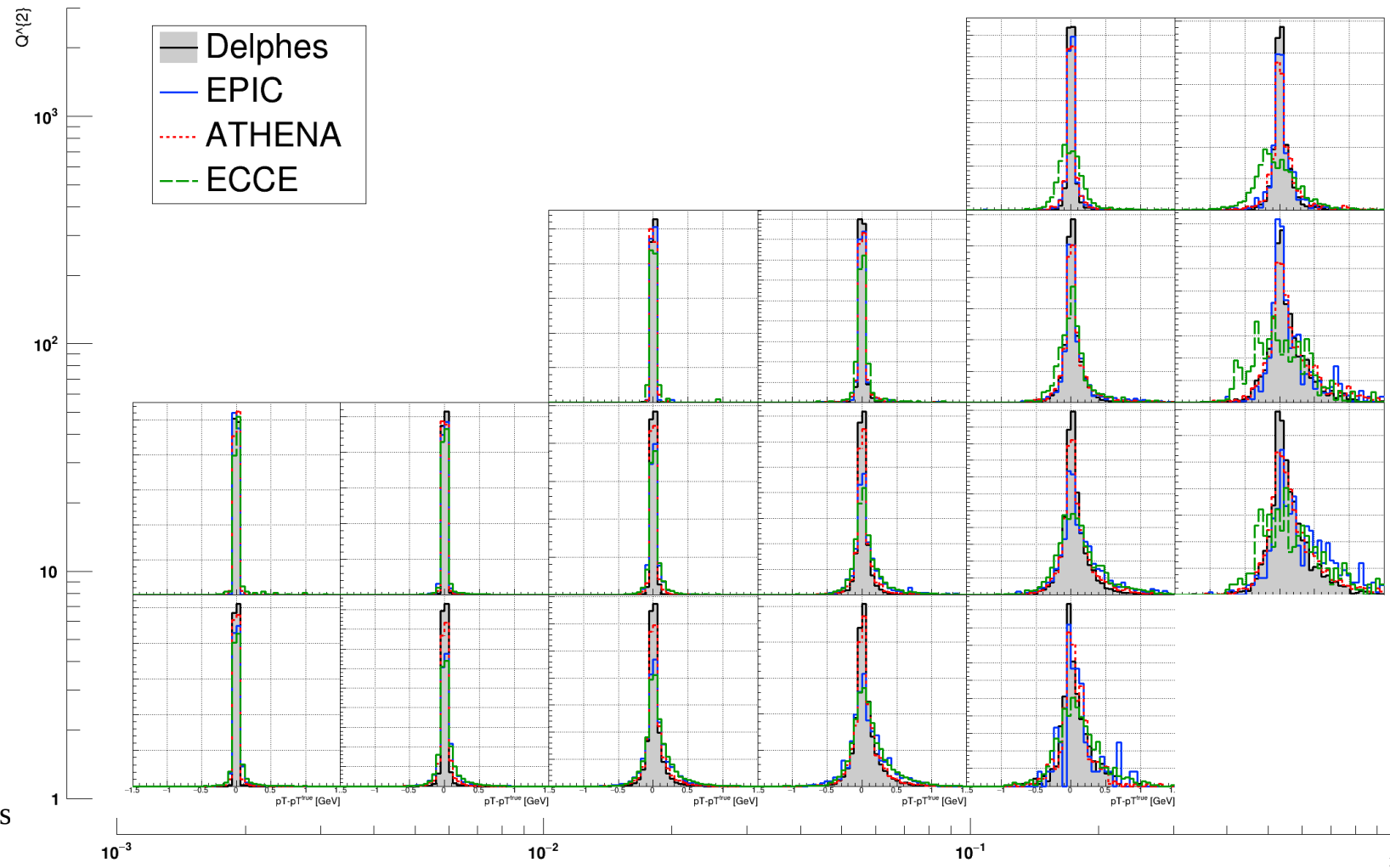
# Sample plots: $p_T$ in (x,Q2)

Electron method



# Sample plots: $p_T$ resolution in $(x, Q^2)$

Electron method



# Sample plots: $p_T$ resolution in $(x, Q^2)$

JB method

