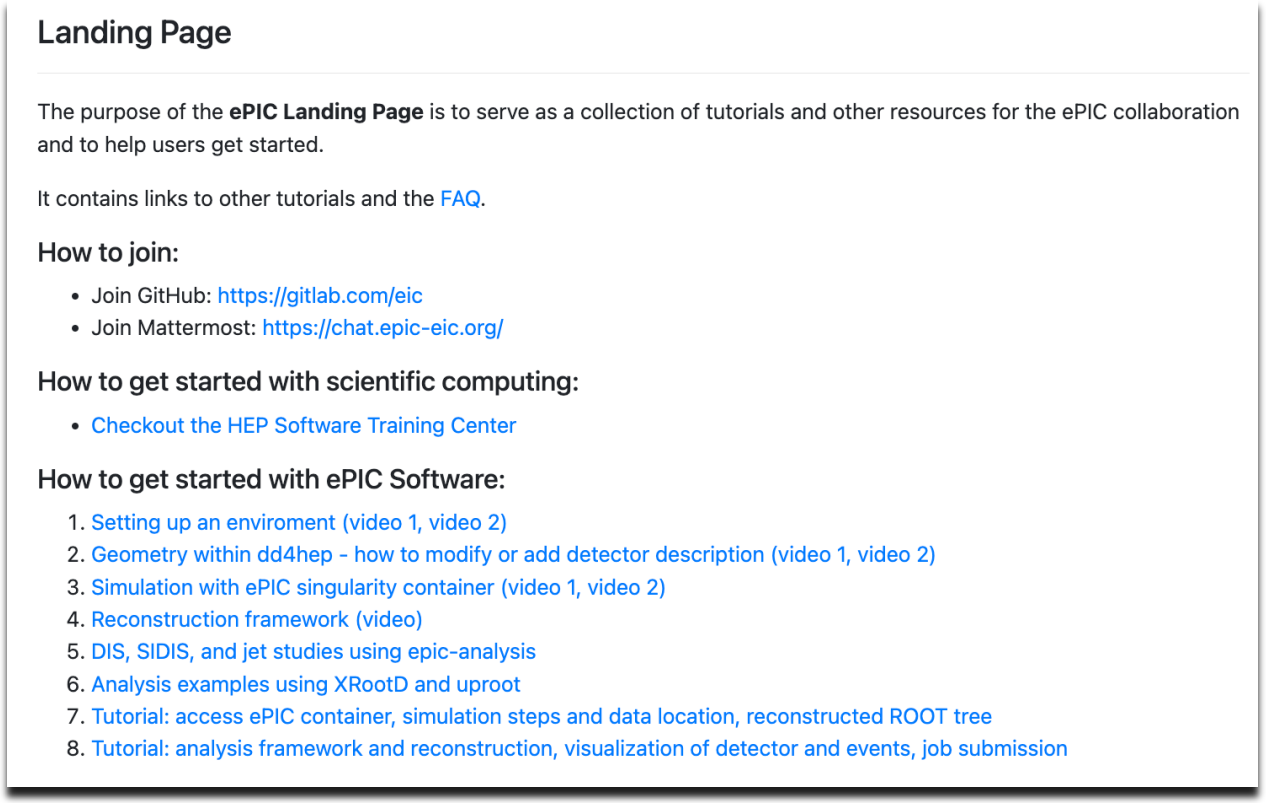
October simulation campaign – diffractive phi in eAu

Kong Tu, BNL

Oct 23, 2023

Landing page and status from simulation campaigns



Landing Page

The purpose of the **ePIC Landing Page** is to serve as a collection of tutorials and other resources for the ePIC collaboration and to help users get started.

It contains links to other tutorials and the FAQ.

How to join:

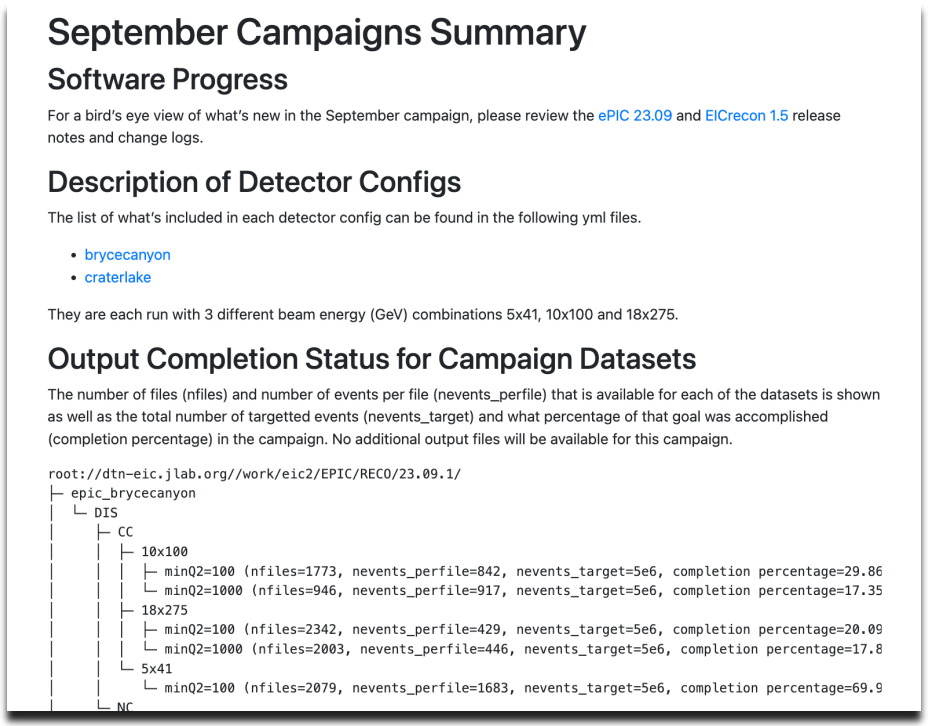
- Join GitHub: https://gitlab.com/eic
- Join Mattermost: https://chat.epic-eic.org/

How to get started with scientific computing:

- Checkout the HEP Software Training Center

How to get started with ePIC Software:

1. Setting up an enviroment (video 1, video 2)
2. Geometry within dd4hep - how to modify or add detector description (video 1, video 2)
3. Simulation with ePIC singularity container (video 1, video 2)
4. Reconstruction framework (video)
5. DIS, SIDIS, and jet studies using epic-analysis
6. Analysis examples using XRootD and uproot
7. Tutorial: access ePIC container, simulation steps and data location, reconstructed ROOT tree
8. Tutorial: analysis framework and reconstruction, visualization of detector and events, job submission



September Campaigns Summary

Software Progress

For a bird's eye view of what's new in the September campaign, please review the ePIC 23.09 and EICrecon 1.5 release notes and change logs.

Description of Detector Configs

The list of what's included in each detector config can be found in the following yml files.

- brycecanyon
- craterlake

They are each run with 3 different beam energy (GeV) combinations 5x41, 10x100 and 18x275.

Output Completion Status for Campaign Datasets

The number of files (nfiles) and number of events per file (nevents_perfile) that is available for each of the datasets is shown as well as the total number of targetted events (nevents_target) and what percentage of that goal was accomplished (completion percentage) in the campaign. No additional output files will be available for this campaign.

```
root://dtn-eic.jlab.org//work/eic2/EPIC/RECO/23.09.1/
├─ epic_brycecanyon
│  └─ DIS
│     ├─ CC
│     │  ├─ 10x100
│     │  │  ├─ minQ2=100 (nfiles=1773, nevents_perfile=842, nevents_target=5e6, completion percentage=29.86
│     │  │  └─ minQ2=1000 (nfiles=946, nevents_perfile=917, nevents_target=5e6, completion percentage=17.35
│     │  ├─ 18x275
│     │  │  ├─ minQ2=100 (nfiles=2342, nevents_perfile=429, nevents_target=5e6, completion percentage=20.09
│     │  │  └─ minQ2=1000 (nfiles=2003, nevents_perfile=446, nevents_target=5e6, completion percentage=17.8
│     │  └─ 5x41
│     │     └─ minQ2=100 (nfiles=2079, nevents_perfile=1683, nevents_target=5e6, completion percentage=69.9
│     └─ NC
```

https://eic.github.io/documentation/landingpage.html

End of month status.

Comparison between [Nov] 2022 and [Oct] 2023

- Diffractive Phi sample was not produced between these campaigns. (*August 2023 Campaign had a bug in calorimeter energy threshold.*)

- https://eic.github.io/epic-prod/RECO/22.11.3/ **(Nov 2022)**
- https://eic.github.io/epic-prod/RECO/23.10.0/ **(Oct 2023)**

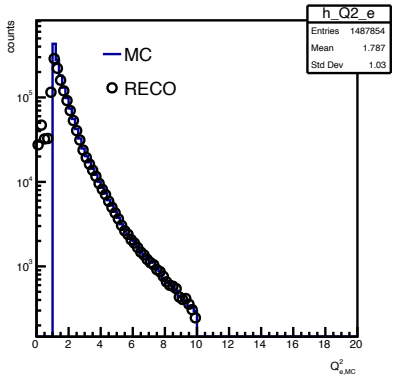
Coherent eA diffractive phi – selections.

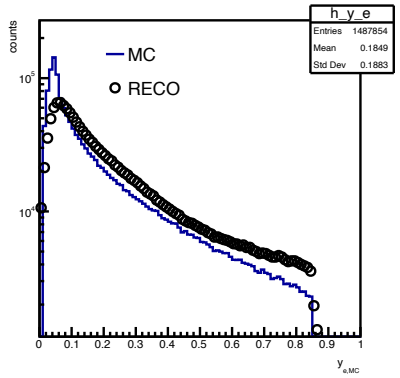
- $1 < Q^2 < 10\ GeV^2$, $0.01 < y < 0.85$
- Good electron selections:
  - Leading cluster.
  - Energy calibration is ~ 4.5%
  - Select clusterRadius < 550 mm
  - Electron track (leading p_T, charge < 0, !association to K^-)
  - **0.8 < E/p < 1.18**

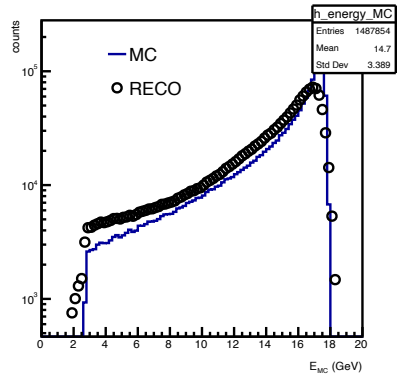
- DIS event selection:
  - **27 < E – Pz < 40 GeV**

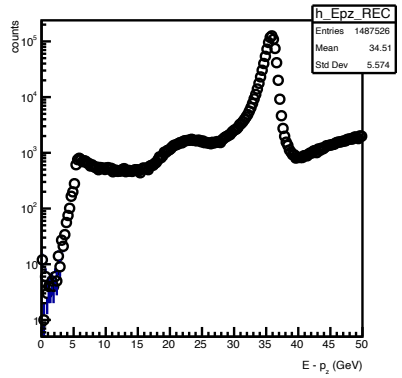
- φ phase space:
  - daughter K |pseudorapidity| < 3.0;
  - Within 0.02 GeV of φ mass.
- Method L on t reco.

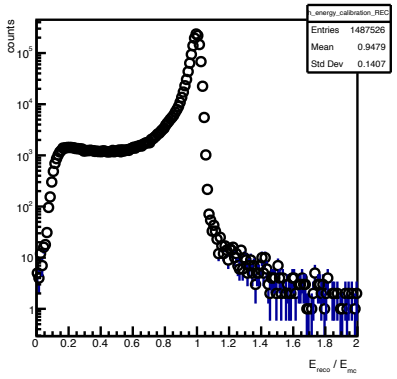
[Nov] Diffractive phi in eAu – DIS control plot

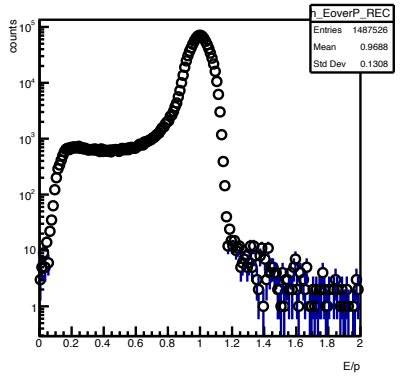


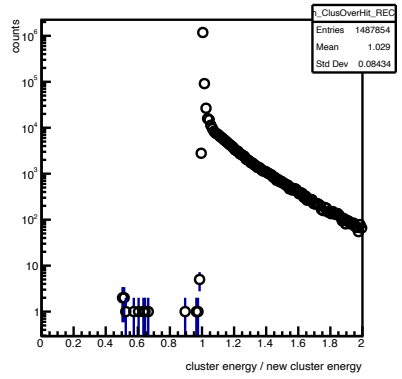


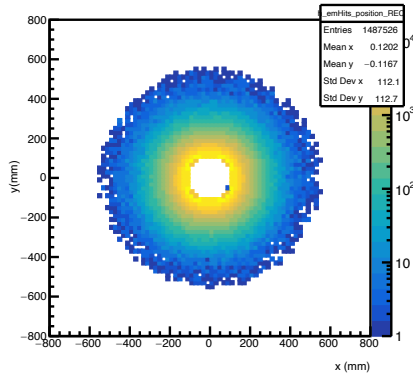




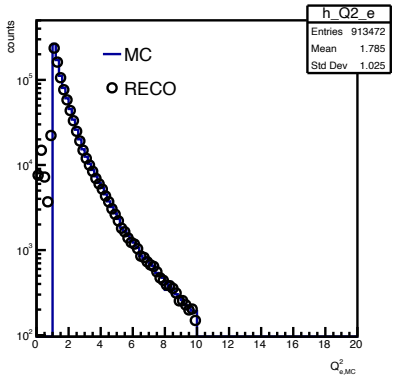


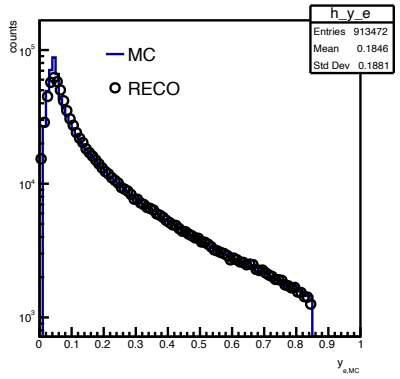


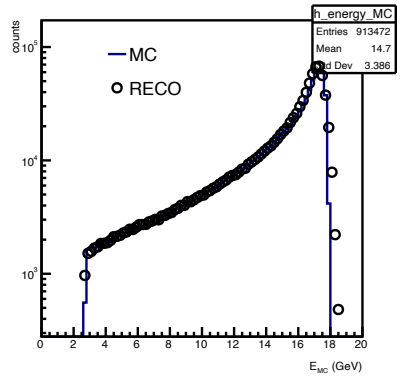


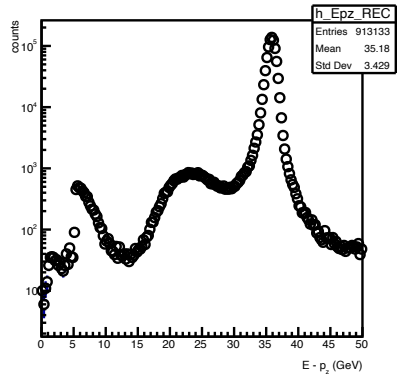


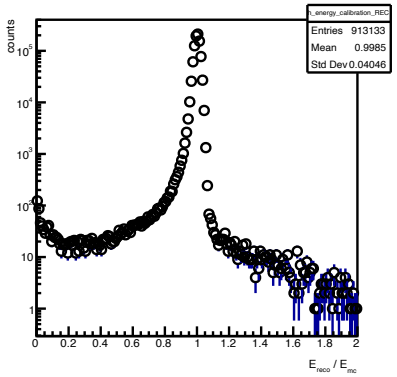
[Oct] Diffractive phi in eAu – DIS control plot

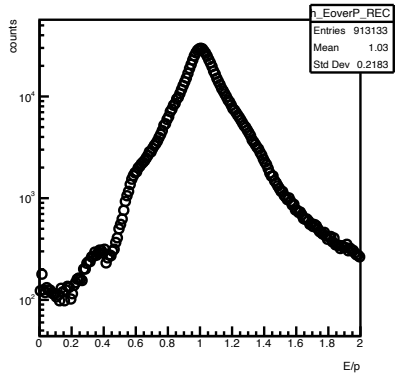


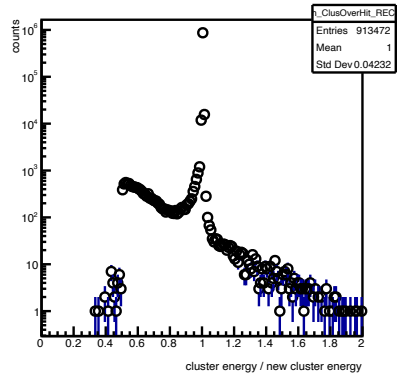


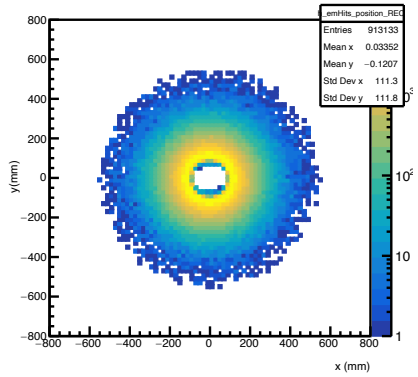




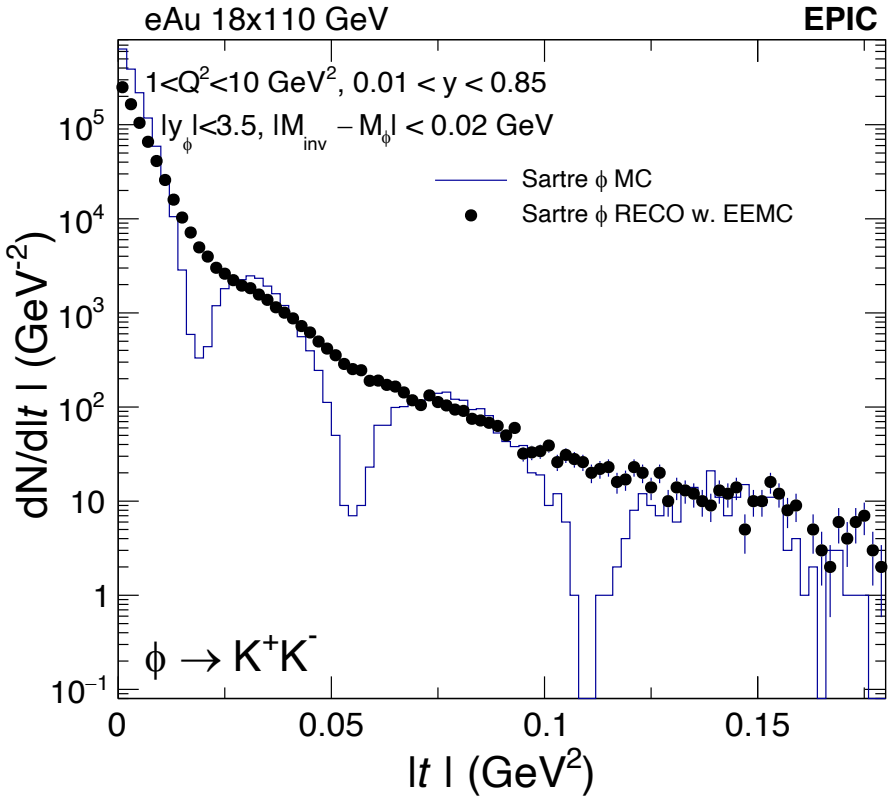








[Nov] Diffractive phi in eAu – t distribution



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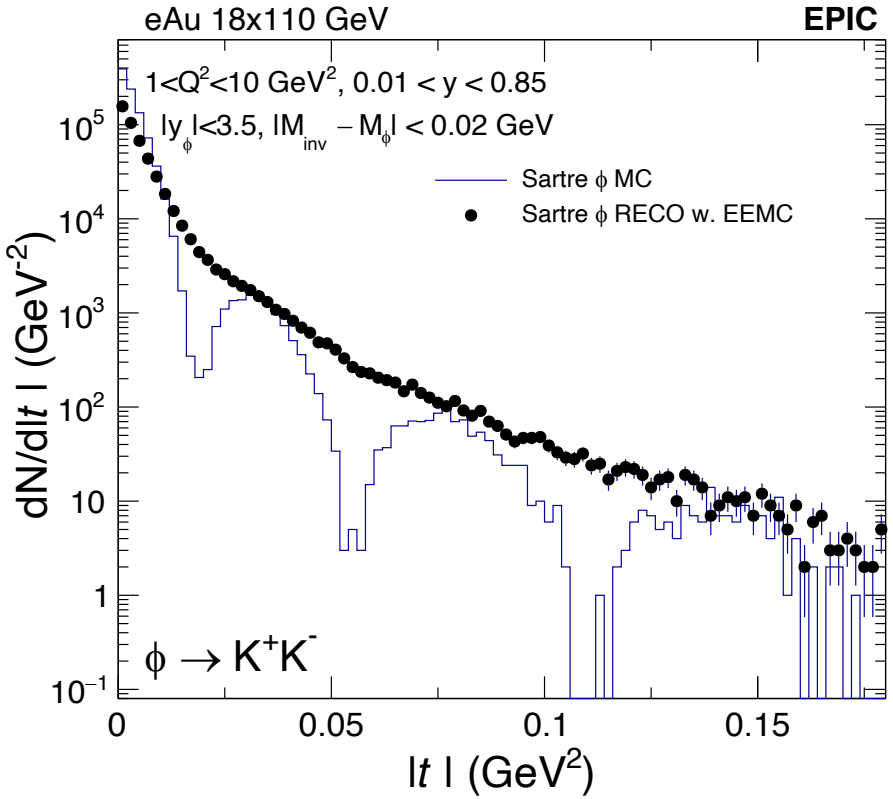
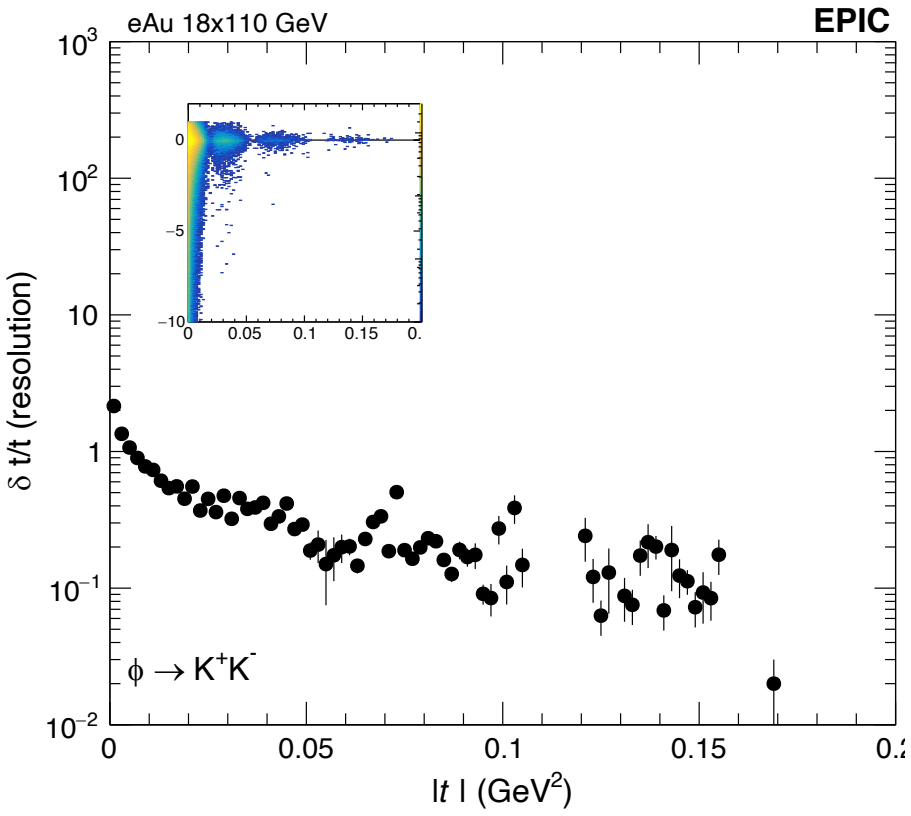


[Nov] Diffractive phi in eAu – t resolution



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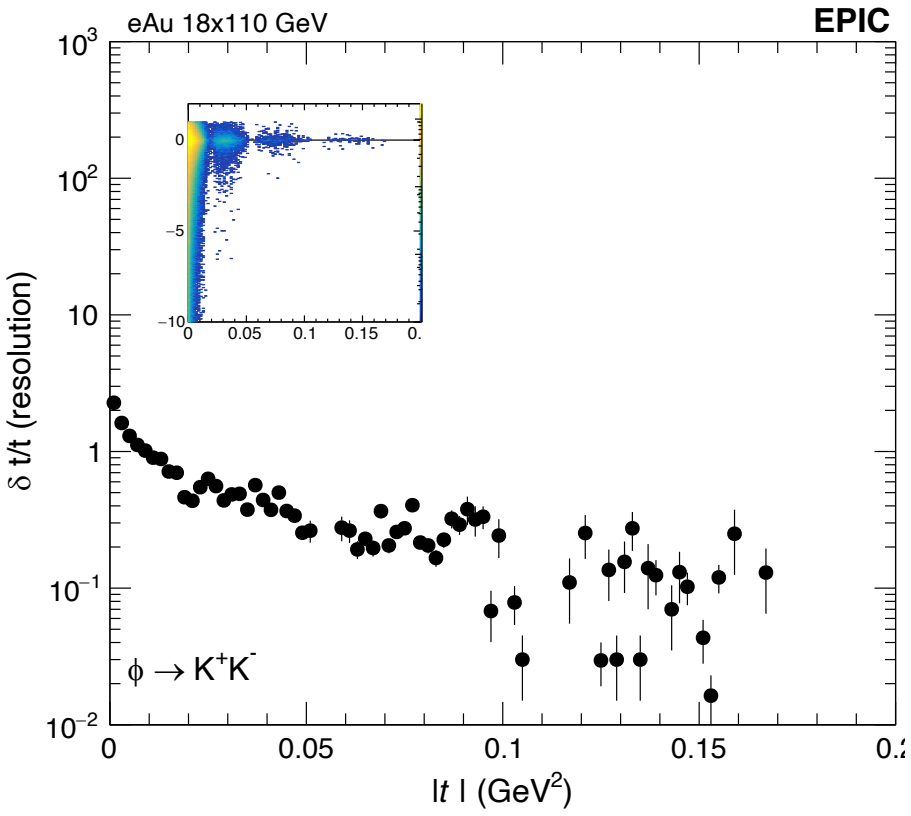
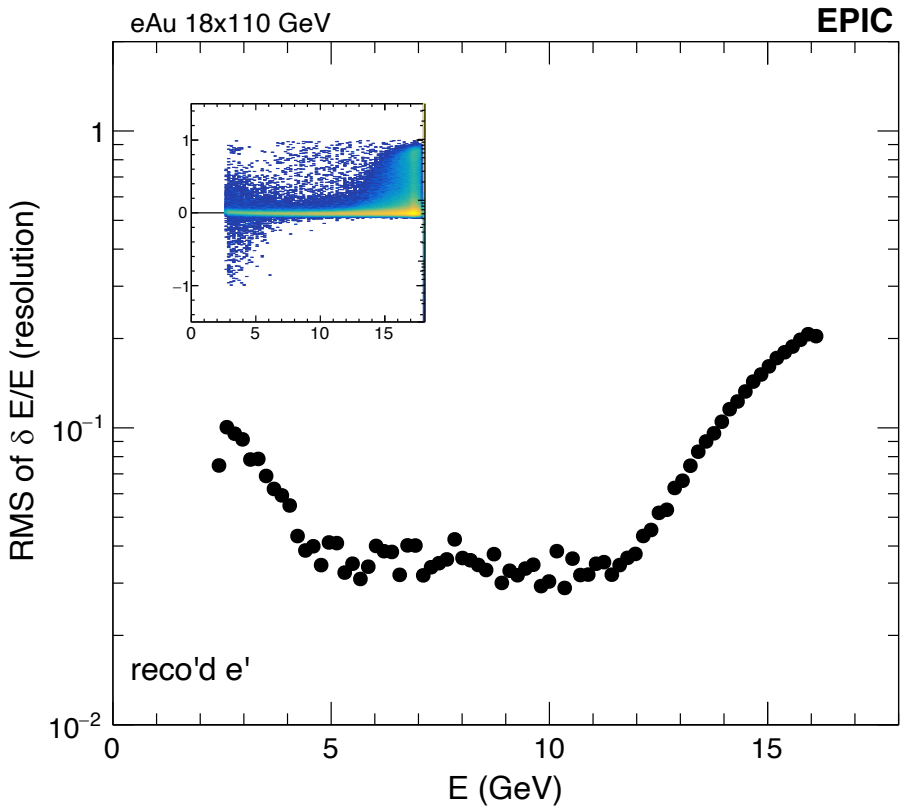


[Nov] Diffractive phi in eAu – e’ E resolution



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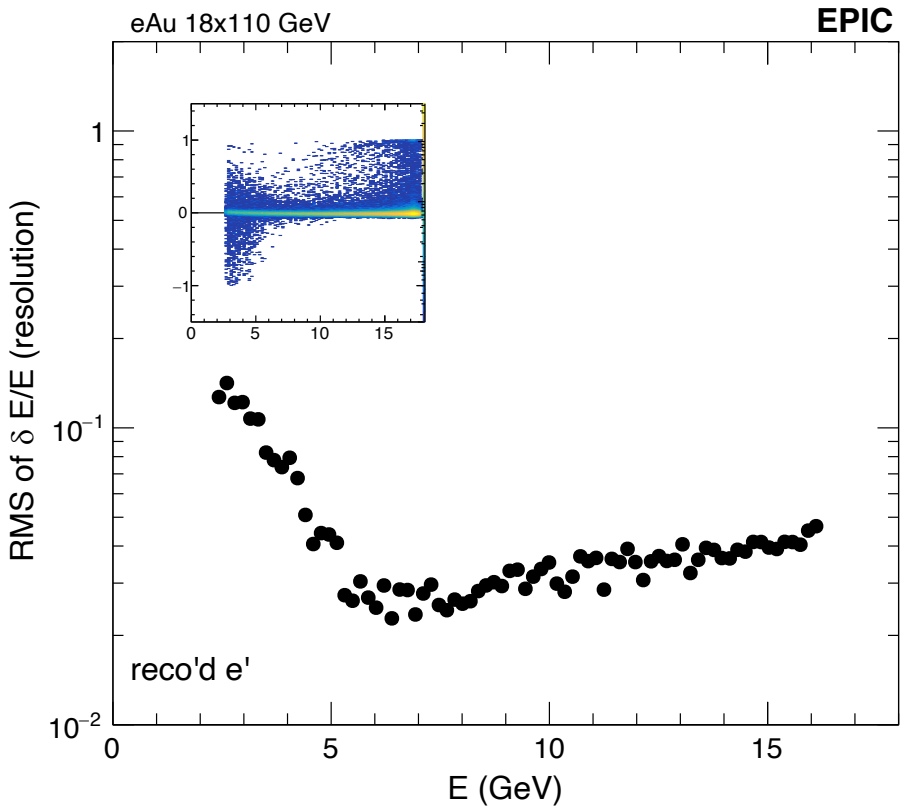
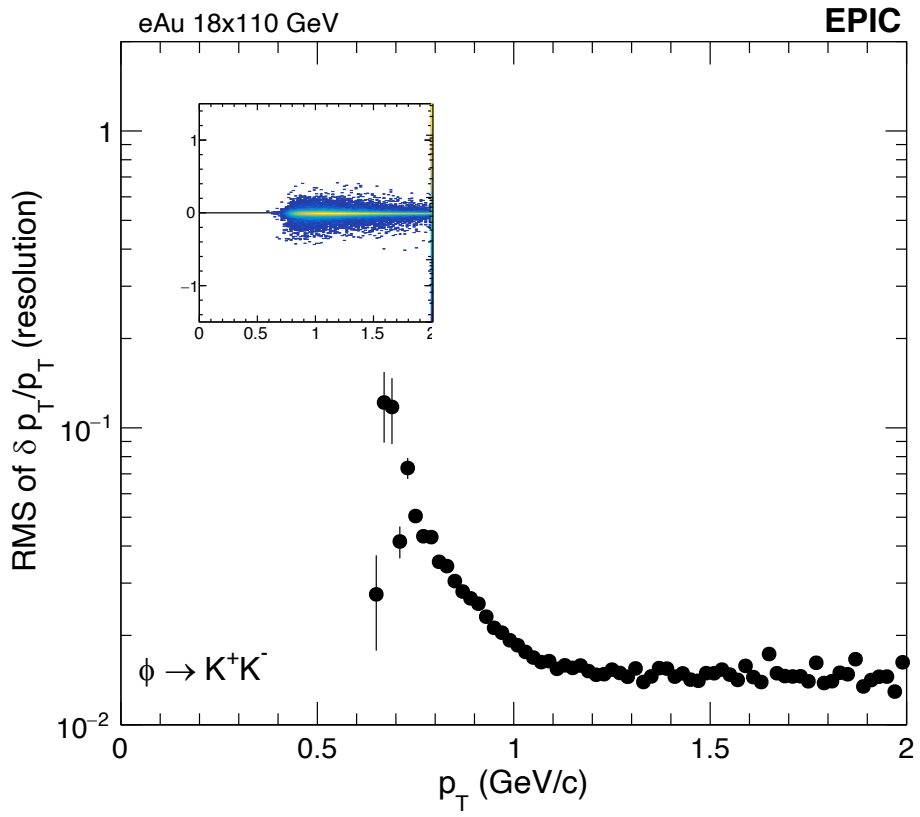


[Nov] Diffractive phi in eAu – VM p resolution



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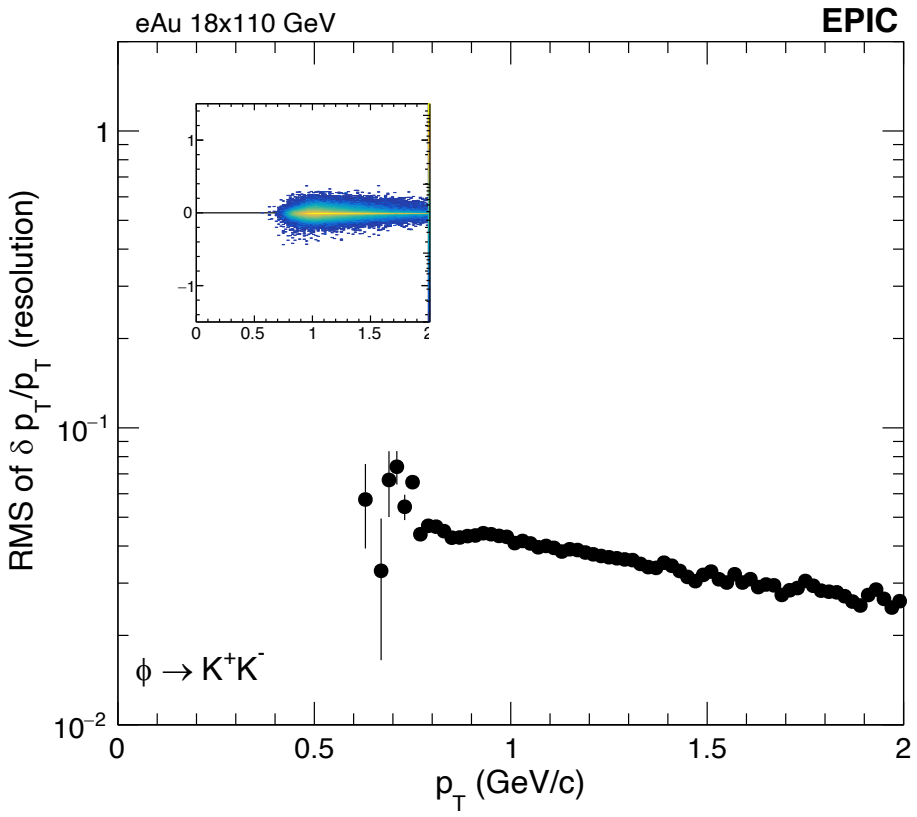

Summary

- October 2023 campaign seems to have better DIS control plots, e.g., e’ energy reconstruction, cluster energy, etc. while the Nov 2022 campaign has better t-resolution and better tracking on VM reco’d.
- This will be run monthly and see how it changes over time.