Workfest report: Jets and HF WG

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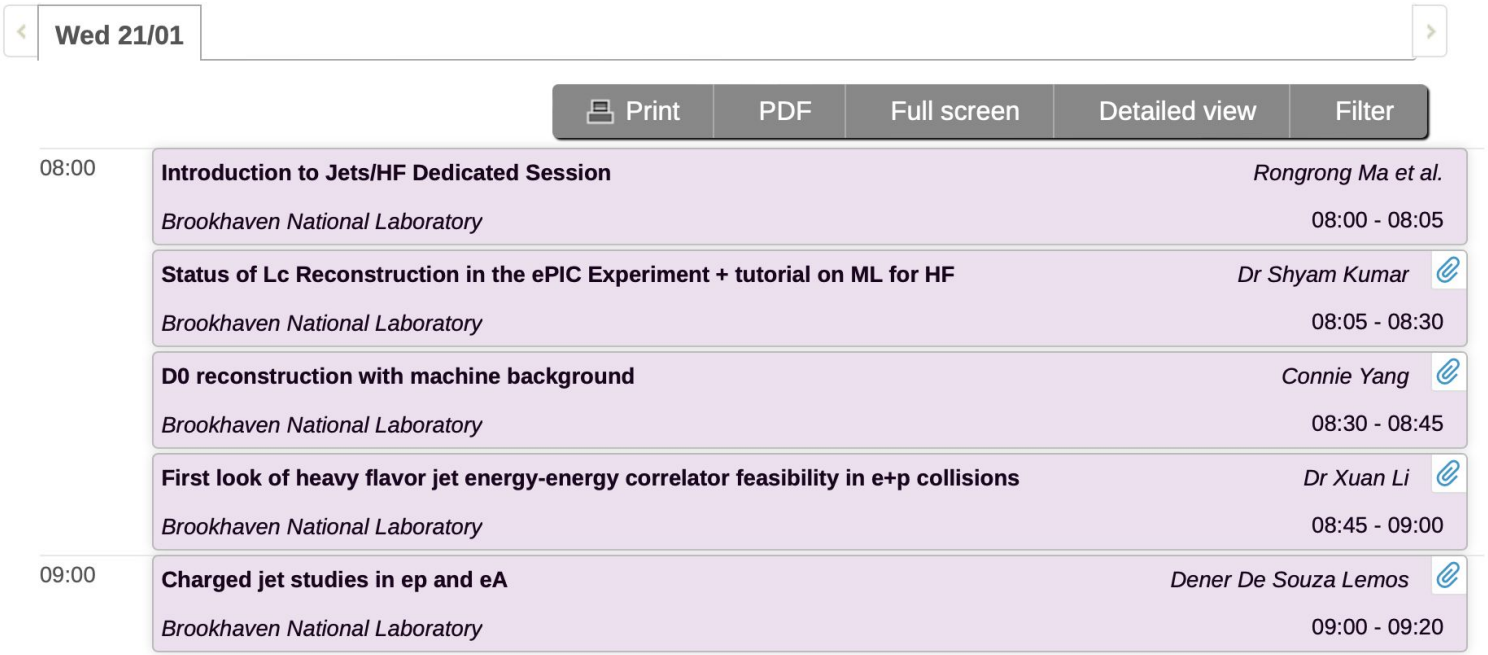
Feb. 13, 2026

One session on Wed. morning



Participants ~ 15 online ~ 10 offline

Λ_c reconstruction

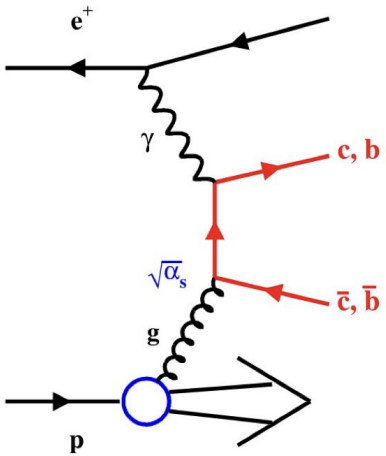
S. Kumar (INFN)

SLIDES

- Charm baryon-to-meson ratio (Λ_c/D^0): explore hadronization
  - Reconstruction of Λ_c baryon: truth vs. real PID; straight cuts vs. ML
  - Branching ratio in PYTHIA8 simulation for Λ_c->$pk^-\pi^+$ is too low (factor ~9)

Photon-Gluon Fusion (PGF) is leading order [LO] mechanism

https://doi.org/10.1016/j.ppnp.2015.06.002



$\gamma^* g \rightarrow c\bar{c}$ or $b\bar{b}$

$c \rightarrow D^0(c\bar{u}) \rightarrow K^-\pi^+$

$c \rightarrow \Lambda_c^+(udc) \rightarrow pK^-\pi^+$

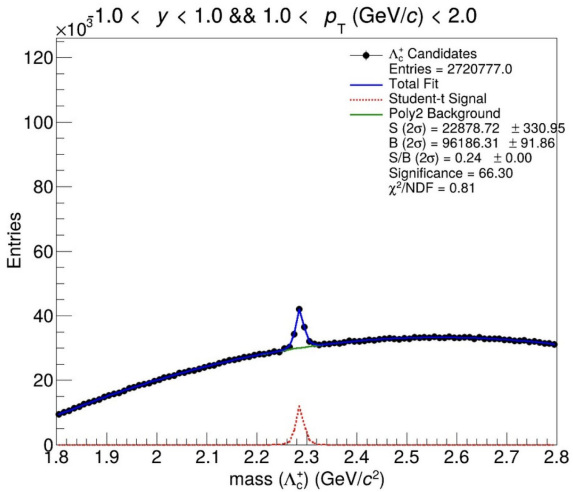
Particle	Mass (GeV/c²)	cτ (μm)
$D^\pm$	1.869	312
D^0	1.864	123
$B^\pm$	5.279	491
B^0	5.280	456
Λ_c^+	2.286	60

Study includes Λ_c^+ and Λ_c^- both

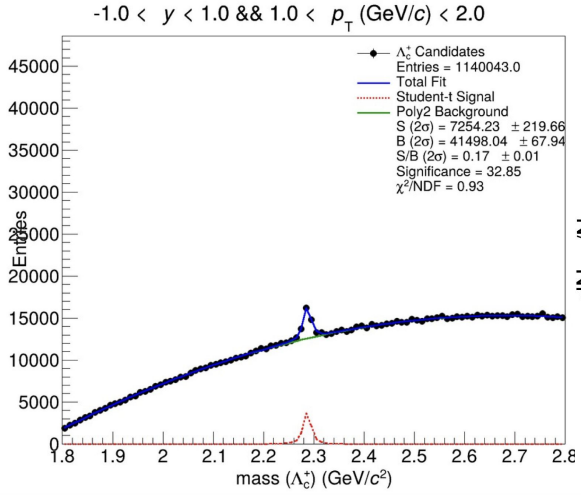
Λ_c reconstruction

S. Kumar (INFN)

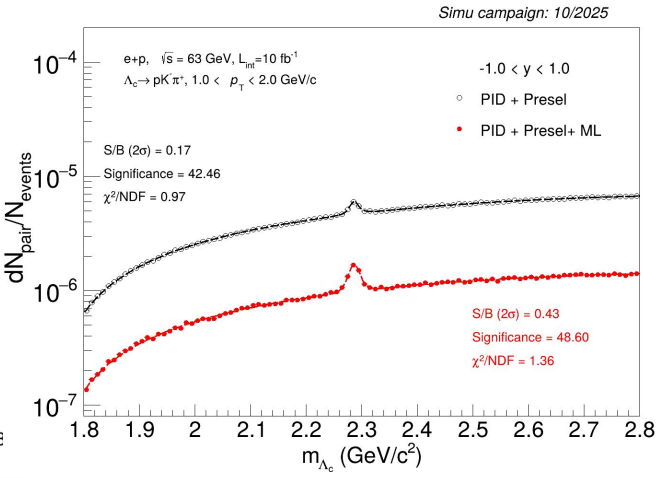
SLIDES



Straight cuts, Truth PID
Sig = 66



Straight cuts, Real PID
Sig = 33



Real PID + ML
Sig = 49

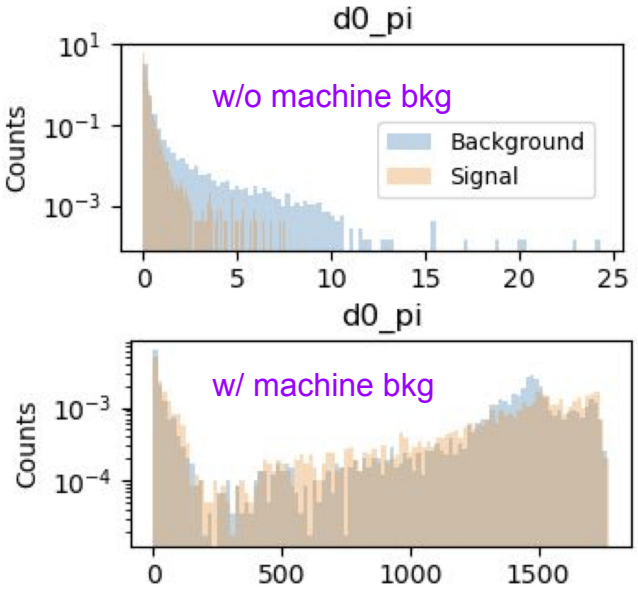
- An online ready-to-use ML framework

Machine background: D^0 reconstruction

C. Yang (UT, Austin)

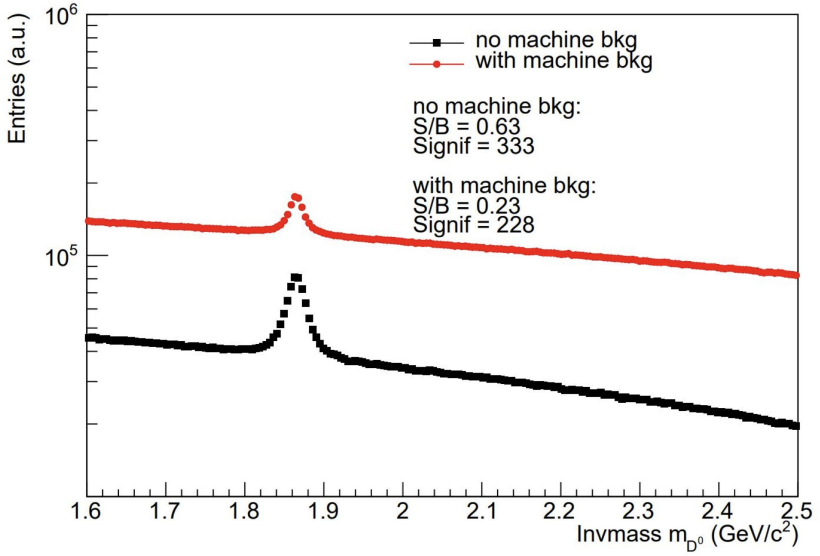
SLIDES

10x100, $Q^2 > 1$ GeV^2 (Oct Campaign)



Analysis with nhits > 3 cut (w/ machine bkg)

After top. cuts (BDT score > 0.6, -2 < y < 3, pt > 1)

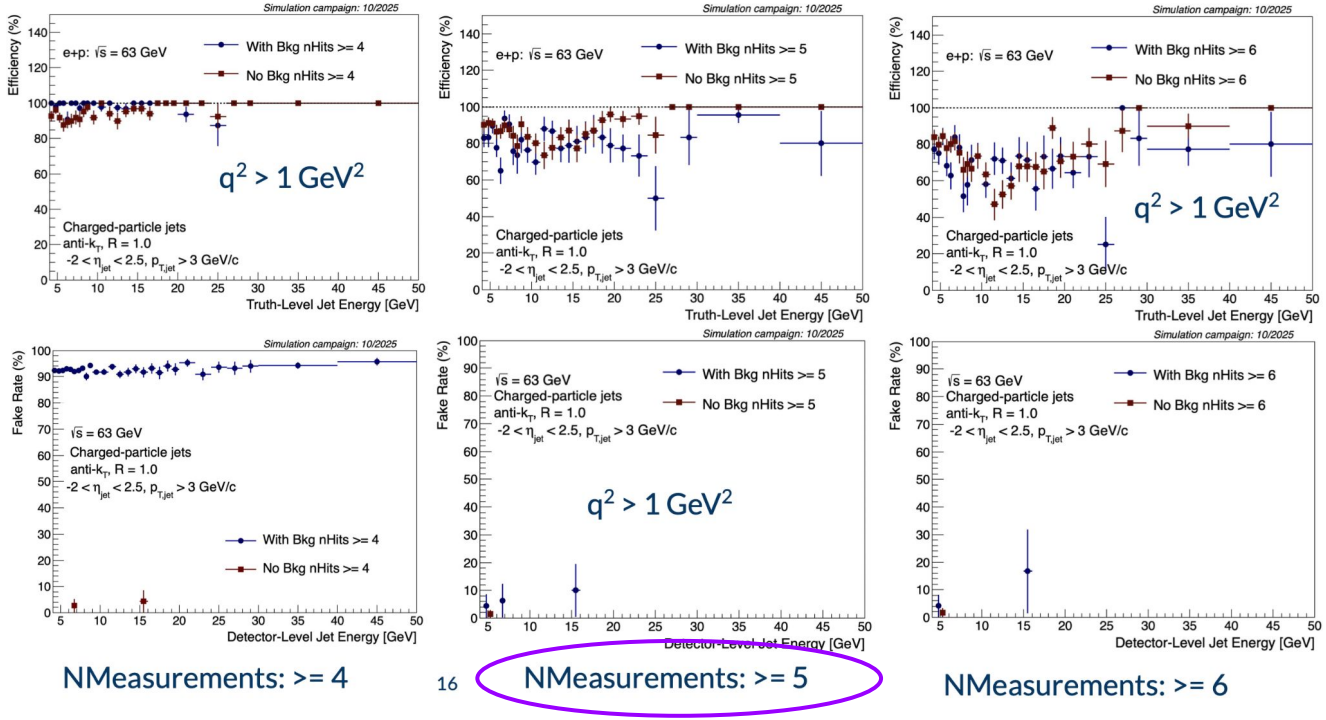


- Need to select good tracks for primary vertex finding #2405

Machine background: jets reconstruction

Dener (BNL)

SLIDES



NMeasurements: >= 4

16

NMeasurements: >= 5

NMeasurements: >= 6

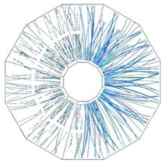
- First look: need nhits >=5 to remove background tracks in 10x100 ep collisions
- Other approaches?

Jet R_{eAu} with different radii

Dener (BNL)

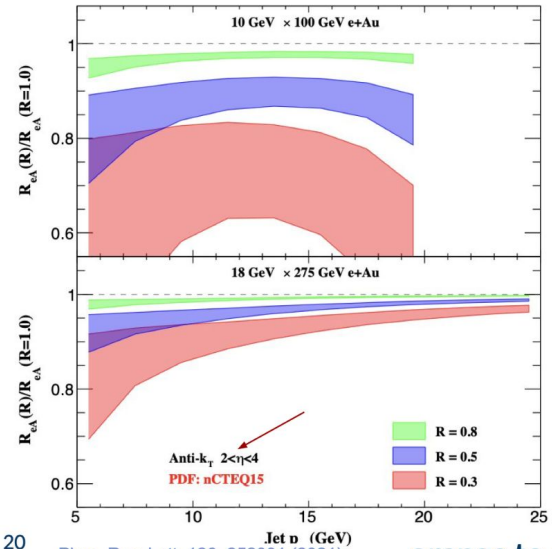
SLIDES

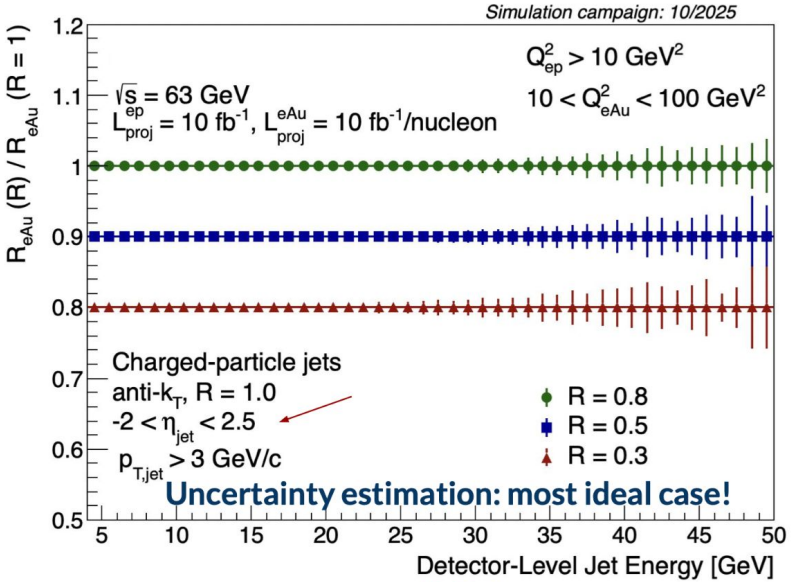
To address medium induced effect



Different radii R_{eAu}

~120k events





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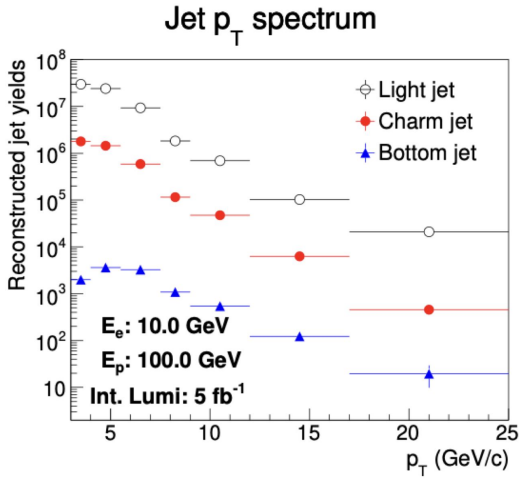
orange to apples comparison

Brookhaven National Laboratory

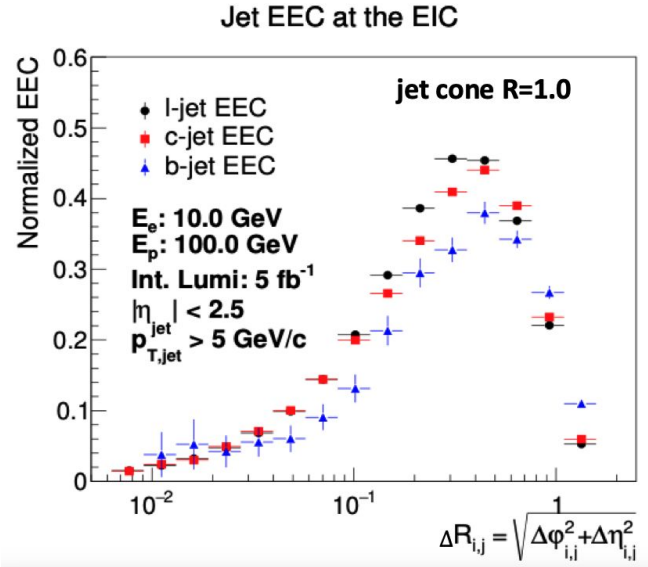
HF jet energy-energy correlator

X. Li (LANL)
SLIDES

- Study dead-cone and flavor-dependent energy loss



- Track $p_T > 0.2$ GeV/c, Track $|\eta| < 3.5$
- No. of constituents inside jet > 3
- Jet $p_T > 3$ GeV/c



Smearing based on performance parameterization

- Next: use official ep and eA simulations

Other topics that could use more help

- Machine background studies
- Charm structure function; D^+, D_s, and B meson performance
- Particle Flow benchmarking
- More jet performance and physics studies
- *Anything you are interested in :)*

Jets and HF working group

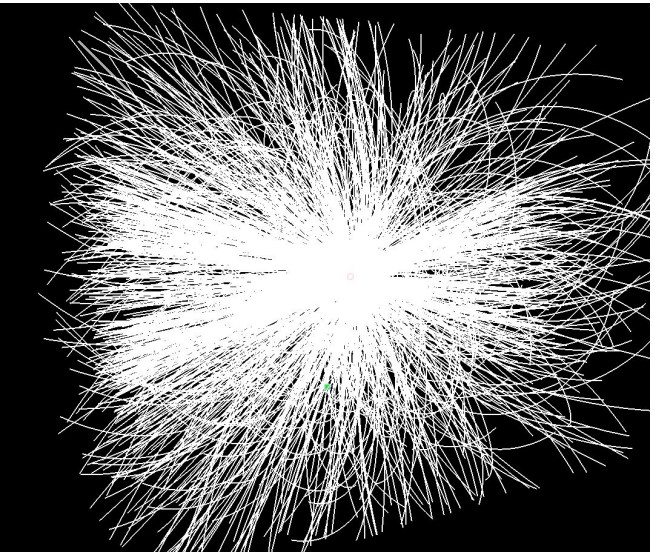
- Contact and administrative info
  - Mailing list: eic-projdet-jethf-l@lists.bnl.gov
  - To subscribe, visit: https://lists.bnl.gov/sympa/info/eic-projdet-jethf-l
  - Indico: https://indico.bnl.gov/category/420/
  - Mattermost: https://chat.epic-eic.org/landing#/main/channels/phys-jets-hf
  - Webpage: https://www.epic-eic.org/physics/jets_hf.html
- Conveners
  - Rongrong Ma (marr@bnl.gov)
  - Shyam Kumar (shyam.kumar@ba.infn.it)
- Working group meetings
  - Tuesdays at 11:30 am ET (bi-weekly)
  - Zoom link: see Indico
- **Analysis codes**: https://github.com/eic/snippets/tree/main/JetsAndHF/

Backup

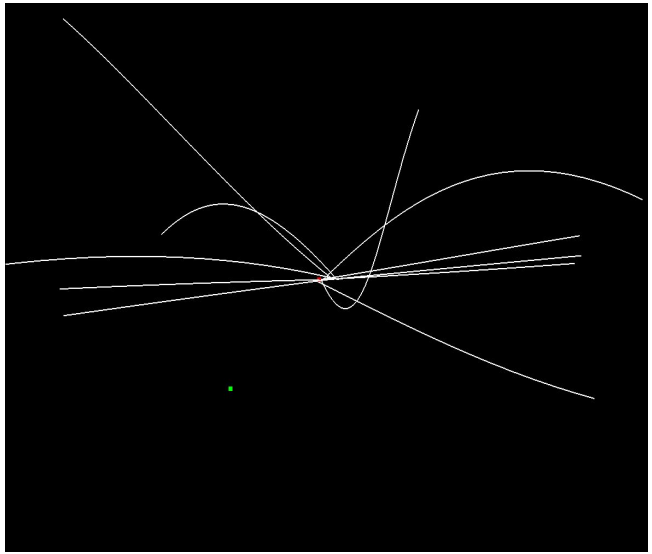
Event visualization

ep (10x100, Q^2> 1 GeV^2) (Oct Campaign with machine background)

No nhits cut

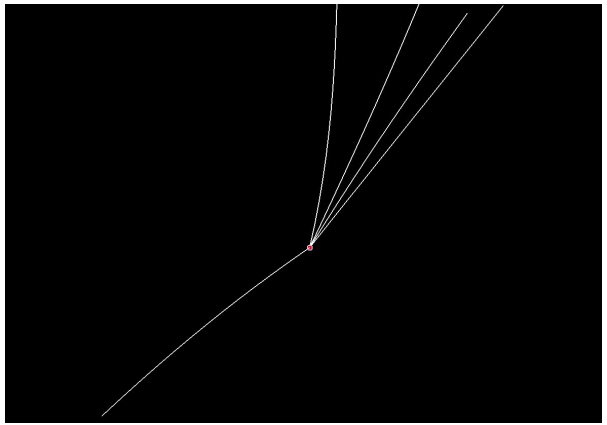


nhits>3



MC Vertex, Reco vertex failed

ep (10x100, Q^2> 1 GeV^2) DIS event w/o bkg



Average multiplicity ~4

Systematic uncertainties

- Heavy flavor
  - Uncertainty on tracking efficiency
  - Particle identification efficiency uncertainty
  - Luminosity uncertainty (1.5%)

- Jets
  - Uncertainty on tracking efficiency
  - Luminosity uncertainty (1.5%)