Jet and Heavy Flavor WG Summary

Olga & Brian

09/29/2023

Group Information and Contacts

- Mailing List: eic-projdet-jethf-l@lists.bnl.gov
  - https://lists.bnl.gov/mailman/listinfo/eic-projdet-jethf-l

- Meeting Indico Pages: https://indico.bnl.gov/category/420/

- Wiki Page: https://wiki.bnl.gov/eic-project-detector/index.php/JetsHF

- Mattermost Chat: (sign-up link)
  https://eic.cloud.mattermost.com/signup_user_complete/?id=i8gnmob4stdrpjfrezhegxs3ew

- Conveners
  - Olga Evdokimov – evdolga@uic.edu
  - Brian Page – bpage@bnl.gov

- Meetings
  - Wednesdays 12 pm time slot - Biweekly

Workfest Proposals

Vertex Reconstruction Workfest

Organizers:

Jets and HF Group and Track Reconstruction Group (Olga, Brian, Shujie, Barak)

Description and Goals:

We propose a joint workfest session between the Jets and Heavy Flavor group and the Track Reconstruction group to address primary and secondary vertex reconstruction, which will be vital to the heavy flavor program at ePIC. This session will provide an opportunity for experts in the development of tracking and vertexing to exchange information with analyzers interested in heavy flavor reconstruction to ensure that our vertexing capability meets the needs of the heavy flavor program. As track finding / vertexing is an area of active development and the Collaboration Meeting is over three months away, it is difficult to say what specific tasks will need to be addressed, but as the meeting draws nearer, the organizers will identify open issues and define a detailed program. We are requesting a full day session, but if accommodating all parallel sessions becomes challenging, we would be willing to reduce it to a half day session. We may also be interested in splitting a full day session into two half day sessions on different days

Workfest Proposals

Particle Flow Workfest

Description and Goals:

The development of a particle flow algorithm (along with electron finding, vertexing, and low Q2 tagging) was identified by the physics working groups and Analysis Coordinators as a key reconstruction goal. Particle flow will have broad applicability across various analyses, but is particularly germane to the Jets and HF group as it will form the input to jet finding algorithms. Current estimates are that a preliminary “baseline” algorithm can be in place by the December simulation campaign, which makes a January workfest an ideal forum for the evaluation of such an algorithm. The primary goal of this workfest would be the identification and development of algorithm specific benchmarks which would allow for performance evaluations. If this session extends to a full day, additional goals could include further jet-specific benchmarks and evaluations of the particle flow algorithm via comparisons of jet characteristics such as resolution and energy scale between track-only and particle flow inputs.

Jet Data Structure

- Currently, jets in EICrecon are stored as a ReconstructedParticle type – but this structure does not allow for the storage of much useful information (area, background, etc)

- One idea is to create a dedicated jet type which can store this ‘non-kinematic’ information

- So… what do we need? (Began discussion at Wednesday’s meeting)
  - Basic jet info (Radius, algorithm, frame, …) Should be stored as metadata once for each branch
  - Area
  - Background Should be on a jet-by-jet basis. Differentiate between different sources. Store as a separate structure?
  - Calibrations
  - … Structure should be general enough to handle foreseeable use cases. Tools to generate background and calibrations should be available to the end-user for custom applications

Physics Benchmarks

- Had a good discussion at Wednesday's meeting about potential physics benchmarks and corresponding workforce
- Xuan expressed interest in a number of HF related benchmarks and reconstruction more generally – needs further follow-up
  - R_eA measurements for example were included in YR
  - Stresses vertexing and PID
- Kevin and Renee have expressed interest in hadron-in-jet benchmarks
  - Collin's asymmetries included in YR
  - Stresses PID
- Renee also expressed interest in energy-energy correlator measurements (new measurement)
- Brian expressed interest in various substructure benchmarks

Open Tasks

- Implementing reconstruction and physics benchmarks
  - Track QA
  - Vertex reconstruction benchmarks
  - Various physics benchmarks (see previous slide)
- Jet factory maintenance
  - Jet -> particle PODIO associations
- Jet Container Development (see slide 5)
- Particle Flow Development
  - Numerous tasks: https://github.com/orgs/eic/projects/10/views/1?filterQuery=particle