Validation status and plans

5/17/2023

Validation Charge & Priorities

- **Validation (**Torri Jeske, Dmitry Kalinkin**)**:
  - **Charge**: Responsible for the validation of the simulations via a suite of detector and physics performance plots. Develop autonomous checks and verification of the validation plots.
  - **Priorities for 2023**:
    - Implement and document our Simulation Production Strategy, together with Production WG.
    - Develop and maintain a collection of plots that showcase the performance of the ePIC detector, its physics reach, and enable comparison to a baseline or previous simulation campaigns.
    - Drive the development of unit tests for the ePIC software, together with the Development WGs.

Where we are now, TL;DR

- Initial meetings started this week
- We would really like to have:
  - A liaison from each PWG to work with us on development of benchmarks
  - An initial set of data in some form (text file, histogram, etc) with a brief description of the data
  - Develop ‘checks’ on which to evaluate the data

Benchmarks

1. **Detector benchmarks:** based on output of detector simulation (single configuration), e.g. used to check basic detector quantities and calculate sampling fractions, material budget plots, etc
2. **Reconstruction benchmarks:** based on output of detector simulation or digitization, intended to test reconstruction algorithms, e.g. determine tracking resolution and efficiency, etc
3. **Physics benchmarks:** based on output of reconstruction, intended to mimic reference physics analyses, e.g. DIS x and Q^2 resolutions, DVMP, etc

Focus for Today

Slide by W. Deconinck from https://indico.bnl.gov/event/18341/contributions/72973/attachments/45990/77741/2023.02.08%20Benchmarking%20%26%20Validation.pdf

Prior physics benchmarks implementation: https://eicweb.phy.anl.gov/EIC/benchmarks/physics_benchmarks
(may not be accessible outside national labs without an account)

Requirements

- Input: .edm4eic.root files of the full event simulation (e.g. use the previous simulation campaign)
- Output: values/histograms in a text/ROOT file (the final format TBD)
- Analysis software, ideally:
  - Uses modern tools (RDataFrame or Uproot recommended)
  - Is ready to be run unattended
  - Self-contained (codebase can be re-shaped as the benchmark collection collectively evolves)
- Plotted observables should quantify the overall performance of the ePIC detector towards the physics goals of the EIC
- A textual description for the observables need to be provided

Action Items

- Liaison from each PWG to participate in development of the benchmarks together with the Validation WG
- Start with data/histograms (in some form)
  - Eventually, pass/fail condition(s)