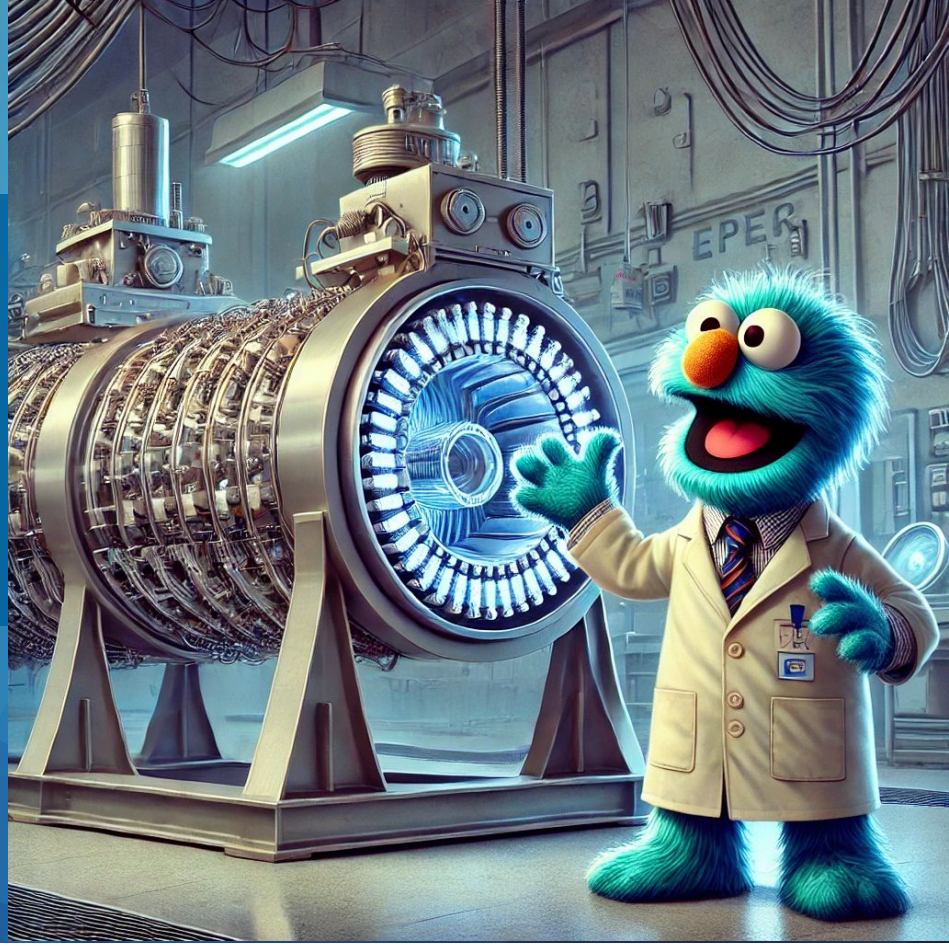
ePIC TIC Meeting, November 18, 2024

The ePIC Barrel Imaging Calorimeter

BIC preTDR Review Status

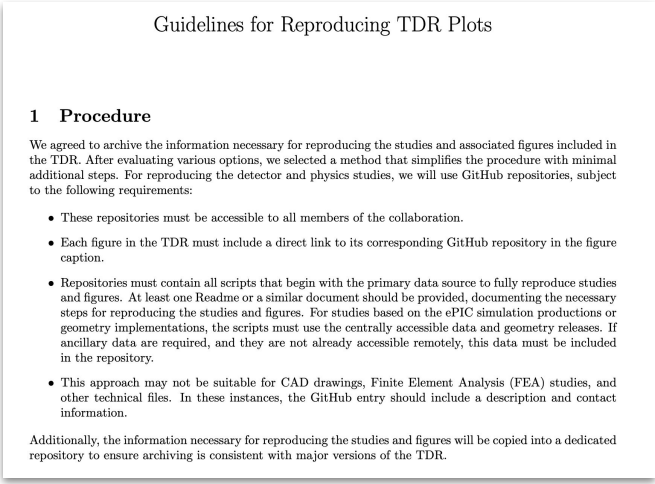


Sylvester Joosten
Argonne National Laboratory
on behalf of the BIC DSC

Toward pre-TDR v1.0

On track for v1.0 on December 1st

- On track to address most reviewer comments by December 1st
  - Some reviewer comments warrant discussion (see next slides)
- Created GitHub repository for analysis code of BIC TDR figures:
  - https://github.com/eic/epic-tdr-bic
  - This addresses the Guidelines for Reproducing TDR Plots (https://zenodo.org/records/14170704)
  - Will provide codes for most figures by December 1st
- Will reproduce most figures from the latest official campaign
  - Caveat: single particle samples for some studies not part of campaign, will address with production WG
- Have partial rough draft of supplemental material ready, will need iteration and expanding in the future



Guidelines for Reproducing TDR Plots

1 Procedure

We agreed to archive the information necessary for reproducing the studies and associated figures included in the TDR. After evaluating various options, we selected a method that simplifies the procedure with minimal additional steps. For reproducing the detector and physics studies, we will use GitHub repositories, subject to the following requirements:

- These repositories must be accessible to all members of the collaboration.
- Each figure in the TDR must include a direct link to its corresponding GitHub repository in the figure caption.
- Repositories must contain all scripts that begin with the primary data source to fully reproduce studies and figures. At least one Readme or a similar document should be provided, documenting the necessary steps for reproducing the studies and figures. For studies based on the ePIC simulation productions or geometry implementations, the scripts must use the centrally accessible data and geometry releases. If ancillary data are required, and they are not already accessible remotely, this data must be included in the repository.
- This approach may not be suitable for CAD drawings, Finite Element Analysis (FEA) studies, and other technical files. In these instances, the GitHub entry should include a description and contact information.

Additionally, the information necessary for reproducing the studies and figures will be copied into a dedicated repository to ensure archiving is consistent with major versions of the TDR.

Discussion: Reviewer Comments

Requirements from Physics and Requirements from Radiation Hardness

- ***Reviewer:*** *Several symbols of requirements like (G-DET-ECAL-BAR.1), which is not referred to again before or after. I suggest removing them or referencing these symbols in the performance section.*
  Question 1 for TIC: What to do with formal Project detector requirement labels? Do we refer to them in the TDR or should we remove them as suggested?

- ***Reviewer:*** *“electron-pion separation is required up to 50 GeV and down to 1 GeV": this is not a performance requirement that is usually given at pion rejection at particular electron efficiency.*
  Question 2 for TIC: This is a formal requirement from the Project table. What is the policy in the TDR regarding these requirements? We prefer to follow the official requirements table.

- ***Reviewer:*** *Included the expected rad dose*
  Question 3 for TIC: We are already listing the 1-MeV neutron equivalent. Is this what we want to do globally? Do we also want to add doses in rad?

Discussion: Reviewer Comments

Requirements from Data Rates

- ***Reviewer:*** *"handle the high event rates expected at full luminosity,": please specify the rate requirement in Gbps or GBps.*
- **Question 4 for TIC:** We wrote the requirements section separate from the detector technology choice, which is how we address the requirements. That means we cannot at this stage talk about data rates as they are a consequence of the technology choice. We believe this warrants discussion. We are adding a paragraph in the Performance section to include the data rates. Is there a plan to include one common chapter about detector rates also in the DAQ section?

- ***Reviewer:*** *"Given ePIC deploys a full streaming DAQ, two more requirements are needed: (1) support streaming operation, i.e. electronics do not require level-1 triggering, and (2) low noise."*
- **Question 5 for TIC:** Do we really need to repeat for (almost) every single detector that we need to support streaming operation, seeing as this is a global requirement for ePIC?
- **Question 6 for TIC:** Not clear what "low" means, or if this is really a requirement versus a preference. We implicitly mention this as we need to be able to detect MIPs, which is precluded in a "high"-noise scenario. However, there are also readout solutions (e.g. coincidence requirements in an FPGA for zero-suppression) that could help mitigate "high" noise. **We believe we don't have all the external requirements from the DAQ-side in order to write a specific requirement at this point.** What is the opinion of the TIC on dealing with low-noise "requirements"?