

PID Review Report

Benedikt Zihlmann

Electron-Ion Collider

BROOKHAVEN
NATIONAL LABORATORY

Jefferson Lab

U.S. DEPARTMENT OF
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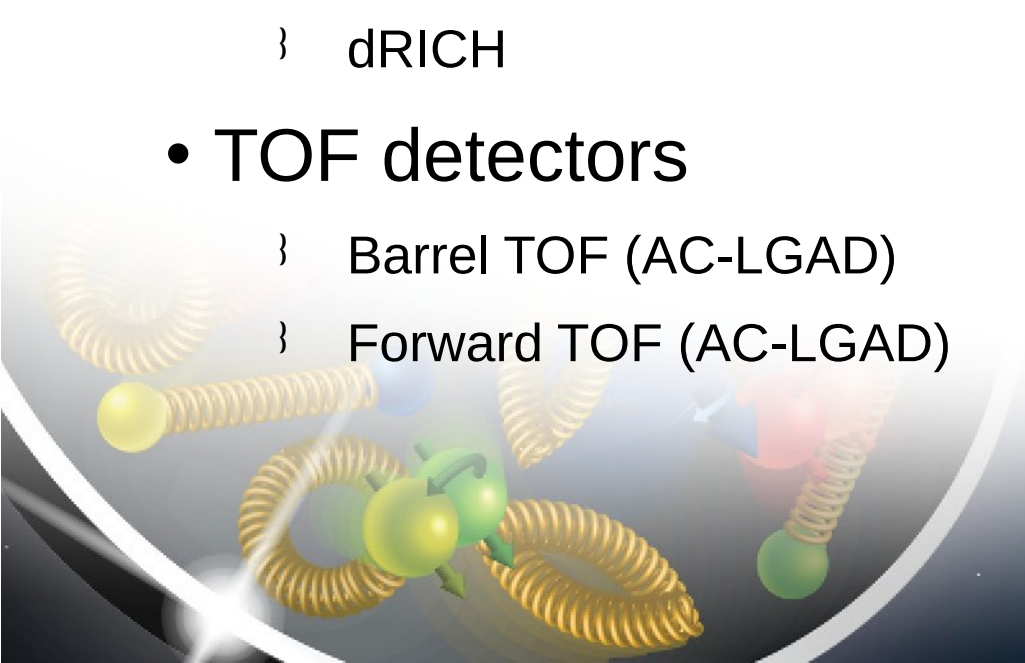
Incremental Design and Safety Review of the Electron-Ion Collider (EIC) Particle Identification Detectors

- Cherenkov detectors

- } pfRICH
- } hpDIRC
- } dRICH

- TOF detectors

- } Barrel TOF (AC-LGAD)
- } Forward TOF (AC-LGAD)

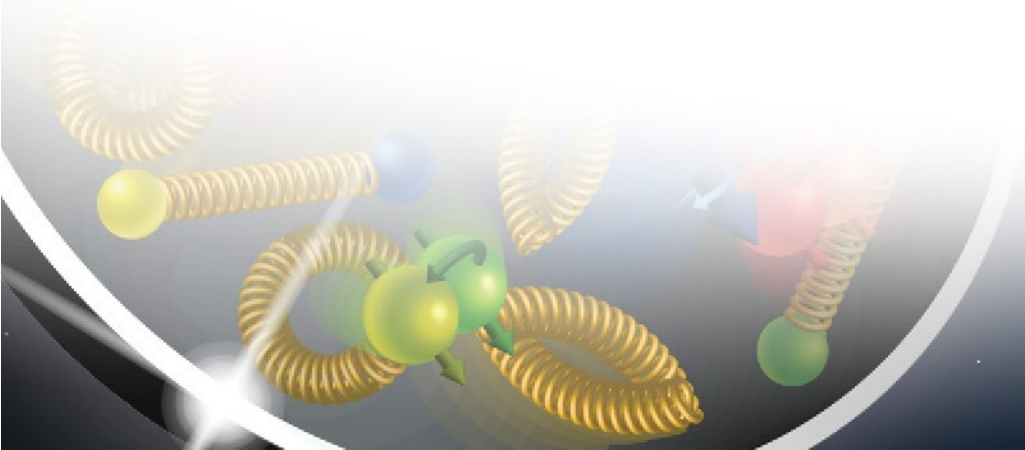


Review Charges

- **Are the technical performance requirements appropriately defined and complete for this stage of the project?**
- **Are the plans for achieving detector performance and construction sufficiently developed and documented for the present phase of the project?**
- **Are the current designs and plans for detector and electronics readout likely to achieve the performance requirements with a low risk of cost increases, schedule delays, and technical problems?**
- **Are the fabrication and assembly plans for the various particle identification detector systems consistent with the overall project and detector schedule?**
- **Are the plans for detector integration in the EIC detector appropriately developed for the present phase of the project?**
- **Have ES&H and QA considerations been adequately incorporated into the designs at their present stage?**

Review outcome

- For all charges: general yes, with 24 comments in total
- Two Recommendations (both on charge 1):
 - } **We recommend to capture the bi-directional interface between tracking and PID detectors: e.g. translation between position and angular resolution requirements for PID detectors.**
 - } **We recommend to perform a thermal simulation of the dRICH SiPM array considering different operating temperatures and impact on the quartz window and gas radiator.**



Example Comments

- Initial **detector performance requirements** were provided by the EIC Yellow Report which were translated to the JLab Requirements webpage. However, the JLab requirements page does not include all the performance requirements (or at least with the same terminology as PID detectors, e.g. tracking position and angular resolution at radiator). The Yellow Report requirements may also need to be tailored to the ePIC detector and defined for the project.
- Many studies have been done with **standalone simulation** and reconstruction, however additional support should be provided for integrating the latest designs and realistic PID performance into the full ePIC simulation.
- Recent progress has been made in ePIC's cross-cutting PID WG to understand tracking requirements for PID detectors. **Requirements documents should capture the bi-directional interface** between tracking and PID detectors: e.g. translation between extrapolated track impact point and angle resolution requirements for PID detectors. It could be evaluated where the PID subdetectors can contribute to improve the tracking performance and how in the reconstruction algorithms this could be integrated.

Comments

- Very positive review
- Good presentations
- Informative and fruitful discussions
- Many thanks to all the reviewers and the speakers.

