Report from the EIC Project detector technical review of the e/m and hadronic calorimetry

Alexander Kiselev & Alexander Bazilevsky (BNL) ePIC General Meeting, December 8, 2022

The review panel



Lars Schmitt (GSI)



Rainer Novotny (Giessen)

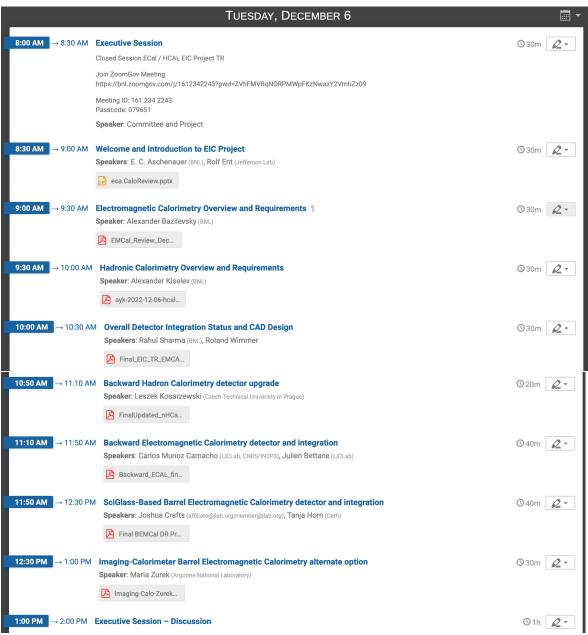


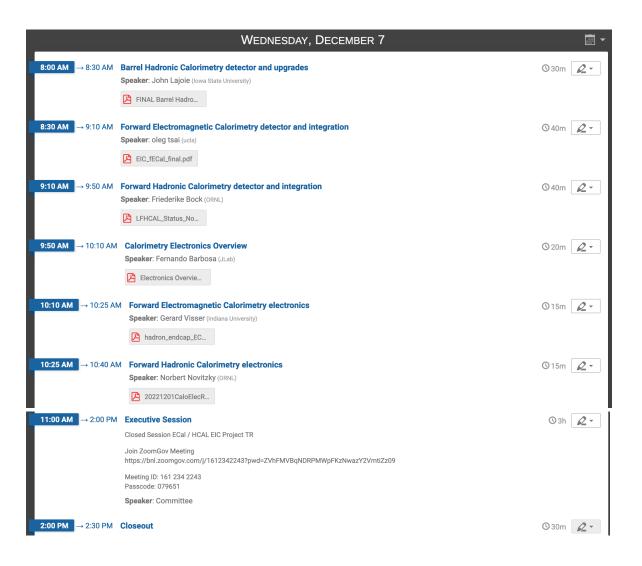
Felix Sefkow (DESY)



Roman Pöschl (Orsay)

The agenda





Several questions & answers -> ran over time badly on both days -> Closeout moved to Thursday

The topics

- Introduction
 - Elke
- Overview talks
 - AK, Sasha
- Integration
 - Roland
- Electromagnetic Calorimetry subsystems
 - Carlos & Julien, Joshua / Maria, Oleg
- Hadronic Calorimetry subsystems
 - Leszek, John, Friederike
- Electronics
 - Fernando, Gerard, Norbert

The charge and the digest of the closeout

Review Charge Questions (1)

- 1. Are the technical performance requirements appropriately defined and complete for this stage of the project?
 - Requirements are not fully clear for all systems
- 2. Are the plans for achieving detector performance and construction sufficiently developed and documented for the present phase of the project?
 - Some steps are missing in plans of new systems to ensure performance see recommendations
- 3. 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?
 - At the current phase the risks are not yet fully assessed, in particular for new systems - see recommendations

The charge and the digest of the closeout

Review Charge Questions (2)

- 4. Are the calorimeter fabrication and assembly plans consistent with the overall project and detector schedule?
 - Time schedules contain float and match the overall project, but risks of manufacturing for new systems are not yet assessed, and QC plans are at an early stage.
- 5. Are the plans for detector integration in the EIC detector appropriately developed for the present phase of the project?
 - Detector integration is mostly based on placeholders, as designs are not yet fixed.
- 6. Have ES&H and QA considerations been adequately incorporated into the designs at their present stage?
 - Some systems consider ES&H and QA appropriately and should serve as examples to other systems.

General Conclusions

Findings

- Optimisation for particle flow still missing
- Not all requirements for detector performance are clear

Comments/Concerns

- A unified readout scheme is helpful
- Careful choice of SiPM: rad. hard (insensitive against neutrons!), correct pixel size for dyn. range. Characterise before final procurement, sample control (also rad hardness) as part of QA
- Size of SiPMs to be optimised in view of dynamic range in front-end ASICs

Recommendations

- Carry out more simulation and reconstruction studies (particle flow)
- Construct comprehensive engineering test articles for the detectors where possible, and validate simulations with beam tests
- Perform risk assessment for new designs
- Hold next review in person and schedule it sufficiently in advance

Final report expected before Christmas