

EMC related talks during the PANDA meeting

- FEE session
 - News from the transient recorder ASICs / Holger Flemming
- Computing session
 - The PandaRoot particle propagators / Sarah Gaiser
 - EMC photon position reconstruction / Naomi Davis
 - Split-Off Recognition for the Forward Endcap / Jonas Kohlen
- MEC session
 - Leakless cooling system – Update / Daniel Glaab
 - FWE EMC - Mechanics Updates / Thomas Held

News

- EMC flushing with dry air → use nitrogen (from liquid N₂ supply)
- Leakless cooling system for PANDA racks needs space in cooling pit → space requirement for EMC cooling?
- Safety assessment FWEC (Tom, example for Barrel & BWEC)
- Recommendations by the review committee of the Updated EMC TDR

PANDA EMCAL Updated TDR

Review Committee Report

Craig Woody (BNL)
Reporting for the Review Committee

FAIR ECE-ECSG Meeting
June 1, 2021

Review Process

Review Committee

- Craig Woody (BNL) – Chair
- Renyuan Zhu (Caltech)
- Tanja Horn (Catholic University/JLAB)
- Eric Mannel (BNL)
- Dan Cacace (BNL)

PANDA Correspondants

- Fritz-Herbert Heinsius (Ruhr-Bochum)
- Lars Schmidt (GSI)

ECE Correspondants

- Eugenio Nappi (INFN-Bari)
- Inti Lehmann (FAIR)

FAIR-ECE TDR 4_01 Update, received: 13 Oct 2020

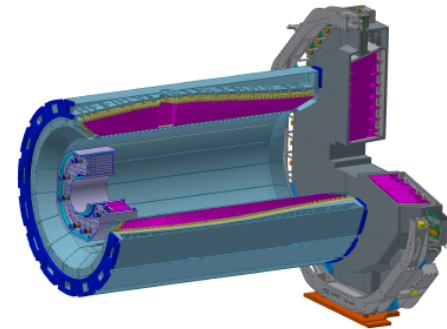
Update to the Technical Design Report
for the
PANDA Electromagnetic Calorimeter

(AntiProton Annihilations at Darmstadt)

Strong Interaction Studies with Antiprotons

PANDA Collaboration

October 8, 2020



153 pages

Time Scale

Oct 13, 2020 – Updated TDR Received by the ECE

Oct 23, 2020 – Review Committee formed and received a copy of the UTDR

Oct 27, 2020 – ECE/ECSG Meeting – PANDA Status Presented

Oct 28, 2020 – First meeting of the Review Committee

Discussions and other meetings took place over the next month

Nov 27, 2020 – List of questions sent to the PANDA EMCAL Collaboration

Collaboration requests to wait until March to respond

Mar 29, 2021 – Collaboration sends its answers to the Committee

Committee discusses responses and starts to prepare report

Apr 29, 2021 – Committee requests additional information from the Collaboration

May 10, 2021 – Additional information received

May 17, 2021 – Final Committee Report completed

Structure of the Review

- The Committee consisted of 5 people with different areas of expertise
- All committee members read the entire report but then focused on their area of specialty. These were broken down into 4 topics:
 1. Cost and Schedule – All
 2. Crystal Quality and Performance – Woody, Horn and Zhu
 3. Photosensors, Electronics and Readout – Mannel
 4. Mechanical Systems – Cacace
- The report was divided into 4 sections corresponding to each topic with separate Findings, Comments and Recommendations for each one.
- Additional documentation is included with the report
 - Questions posed to the Collaboration in November 2020 along with their responses in March 2021 (18 pages)
 - Follow up questions posed to the Collaboration in April 2021 along with their responses in May 2021

Executive Summary - 1

The Committee found the TDR Update very well written and contained a great deal of detailed information about the overall project as well as the detector and all of its various subsystems. We greatly appreciate the amount of effort by the collaboration that went into preparing this document. The overall feeling of the Committee was that the EMCAL project was in excellent shape from a technical point of view and that there were no serious issues or “show-stoppers” in any of the areas that were reviewed.

Executive Summary - 2

The main concern of the Committee was regarding the delivery schedule and potential funding issues for the crystals. With only one viable vendor (Crytur), there is no alternate plan for completing the detector if this vendor cannot deliver the crystals on time and within budget. The funding needed to purchase the remaining crystals relies on funds from Russia which have not yet been entirely secured and there is no guarantee that the necessary funds will become available in time to place the order for the remaining crystals. In addition, while Crytur has all the raw material it needs to produce the crystals, it will presumably need to increase its production capacity by building more furnaces in order to meet the delivery schedule. We feel that these factors represent a significant risk to completing the project on time and within budget and for carrying out the desired physics program on the proposed time scale.

Executive Summary

Recommendation:

We therefore recommend that the EMCAL Project Team continue to work with FAIR Management to secure the Russian funds as soon as possible and to continue to develop a plan for Day-1 operation that utilizes whatever fraction of the detector exists at that time.

Cost and Schedule

Recommendations:

1. The Collaboration should work with FAIR Management to secure the Russian funds as soon as possible and place the order to produce the remaining crystals.
2. The Collaboration should continue to develop a plan for Day-1 operation that will optimize the first physics output if there is only partial coverage of the detector and to fully instrument the detector at the earliest possible time.

Crystal Quality and Performance

Recommendations:

1. Develop a plan with Crytur to prepare for full scale production as soon as funding is available and determine the effect on the cost and delivery schedule if funds do not become available on the time scale expected.
2. Continue to explore other options for obtaining at least some fraction of the remaining crystals required from alternate sources.

Photosensors, Electronics and Readout

Recommendations:

1. The results of performance, stability and SEU radiation studies should be thoroughly documented in technical reports.
2. The components of the full electronics chain of the Barrel EMC and Forward and Backward End Cap electronics should be reviewed to determine if there might be other components (e.g., regulators, transistors, DACs) that might be susceptible to long term radiation effects. Conservative estimates of the radiation environment in which the different components reside should be used as part of the evaluation.
3. Testing of the HDA option for the Barrel EMC readout should be completed quickly and a final decision on the choice of readout electronics should be made to allow for the readout design to be finalized.

Mechanical Systems

Recommendations:

1. If not already analyzed, consider running FEA for all remaining loading scenarios.
2. The barrel slice gap thermal mitigation plan described is vague and should be fully analyzed by FEA accounting for potential gaps in insulation between slices, the slice with a hollow cylinder, etc.
3. Structural and thermal FEA analysis should be thoroughly documented in technical reports.
4. If not already implemented, consider adding fiducials marks at strategic locations on the various detector components for installation and survey.

Summary

- We conducted a rather thorough review of the PANDA EMCAL Updated TDR and found the project to be in very good technical shape. The documentation provided by the Collaboration was very detailed and clearly presented.
- Our main concern was in obtaining the remaining crystals on a time scale that would allow a sufficient fraction of the detector to be constructed and installed for Day-1 operation. We felt that there was considerable cost and schedule risk in doing this given the uncertainty in the Russian funding and the need for Crytur to ramp up their production capacity in order to meet the proposed schedule, and that the final cost may be higher than expected.
- We realize that this is part of a more general problem of keeping the entire PANDA project, as well as FAIR itself, on schedule and that both the PANDA Collaboration and FAIR Project Management are already making every effort to ensure that FAIR and all of its experiments are completed on time and within budget.