

Quarterly Report – 21/Q2

August 23, 2021

0/Preface

Dear PANDAs,

This document provides a summary of the accomplishments and developments of the PANDA collaboration during the second quarter of 2021. We hope that the collaboration can meet in some form before the year is over. Until then, stay safe and healthy!

1/News from the Spokesperson

We appreciate the efforts the collaboration is putting into coping with the challenges that the Covid-19 pandemic has brought. During the past quarter, your work has been rewarded in the form of the three newly published PANDA physics articles, published. One of these is the *PANDA Phase One*, outlining our physics program for the first phase of operation.

However, we also acknowledge the fact that delivery problems of components could pose unexpected delays in some cases. Unfortunately, the FAIR facility itself is also delayed and the collaborations are doing their best to adapt to the situation. The technical management of PANDA is constantly adapting in collaboration with the responsible institutes to update plans accordingly.

Important news from the Collaboration Meeting in June, 2021 is that for the first time, a complete set of Governance Rules have been approved by the Collaboration Board and are now in force.

2/News from the Coordinators

//News from Technical Coordination

General News

The 14th ECE meeting took place together with ECSG between May 31 and June 4 with a dedicated PANDA breakout session on June 4th.

- The PANDA EMC TDR Update report was reviewed by ECE, recommendations were received, and the report was approved by ECE.
- The DAQT TDR review by ECE was completed, a report is in preparation.
- The Infrastructure and Installation Report is in review with ECSG, PANDA cost tables were provided to ECSG, comments and questions were received before the ECE/ECSG meeting. A final report is in preparation.

The latter two reports are input to the PANDA Construction MoU as they evaluate the cost of DAQT and infrastructure as items to be financed via the Construction Common Fund.

PANDA Coordination

PANDA Project Management

A further campaign of updates of milestones and project risk registers was started beginning of June as all results were due to be conveyed to the FAIR project management in the first half of July.

An ongoing activity is the safety risk assessment of all PANDA systems. The assessment is based on categories of hazards, a method for the evaluation of risks. Based on a previously completed example for the Cluster Jet Target, the basic tables of safety risk assessments of the Forward Endcap EMC and the Straw Tube Tracker were compiled and presented in May and June. These tables may now serve as starting points for the other parts of the EMC and of gaseous tracking detectors. Each safety risk assessment is required to be completed before installation can be started and a system's final design review can be accepted. It is a prerequisite for any operation permit and has to be performed for all systems.

The coordination currently also collects a compilation of the occupancy of all racks at PANDA with modules and crates to obtain a more precise specification of power and cooling requirements as well as input for the planning of cables and pipes. A detailed layout of the racks for the MVD system was received.

An online workshop for the detailed planning of the installation steps of the Forward Spectrometer was prepared for July 2021. In order to emulate a similar workflow as in the successful presence workshop for the Target Spectrometer installation, conducted in June 2019, the online tool "Concept Board" was adopted.

PANDA Hall and Infrastructure

The layout of the emergency stop buttons was finalized and a logical matrix of connections of devices to be switched simultaneously in case of an emergency was compiled in collaboration with the HESR team.

The design continued of the leakage-less, under-pressure cooling system for the electronics racks in the PANDA hall. For the safe operation, a reservoir to hold all cooling water in pipes and heat exchanges needs to be placed 2m below the lowest device.

The planning of the supply of the experiment with liquid N₂ for the cooling of the solenoid shield in the parking position and with gaseous N₂ for detector flushing was combined to reduce the overall consumption of liquid N₂. Evaporated LN₂ from the shield cooling can be used subsequently for detector flushing.

Further infrastructure work regards the optimization of the steel platforms for assembly and maintenance. For the overall construction, the number of weldings could be reduced by 70%. An extended layout was worked out for the mechanical rack placement at the Target Spectrometer and on the Forward Spectrometer platform.

Finally, a more robust, lighter design of the Central Space Frame supporting MVD, STT and beam-target pipe based on a hollow tube-like profile was achieved in collaboration with companies working in the field of CFC structures.

Magnets

Solenoid Magnet

The production of cryostat and cold mass is in progress at VZA, Votkinsk. Raw materials have been procured by BINP and were shipped to Votkinsk. The production of the SC strands has started and will be completed for the first coil in the fall. A 4th prototype coil is in preparation with another Epoxy resin to compare to the successful 3rd prototype with assembly planned in August. The FDR of the Control Dewar is now planned for the fourth quarter as the execution of production drawings needs to be outsourced to an external engineering firm.

All power supply units were purchased and await final tests as a complete power system at BINP. The energy dump resistor constructed from 750kg stainless steel plates was completed and will be implemented in a rack housing. Cable procurement has started.

HESR-PANDA Chicane Spectrometer Dipole

The Final Report on the magnet design in the framework of the design contract with BINP was submitted March 31 including all construction drawings, installation instructions and safety risk assessment. It was reviewed with experts from FAIR during the 6th BINP-FAIR Workshop online on April 27.

Furthermore, the scheme for the magnetic field mapping was presented. Preparations for the start of construction were started after the signing of the implementing addendum for the construction at the end of March.

Targets, Interaction Region, Luminosity Detector

Pellet Target

Various tests at low temperatures were conducted successfully in April and May 2021, with the already solved issues of nozzle blocking since last year, over many days of continuous operations. Continuous updates and improvements of adjustment systems of nozzles and sluice are ongoing to optimize transport of droplets to the 2nd vacuum chamber. Flow parameters are not yet fully satisfactory. The TDR writing continues.

Cluster Jet Target

At COSY a beamtime with the PANDA Cluster Jet Target was done in May 2021 with the setup shown in Fig. 1 (left). The aim were studies on beam-target interaction with a 3.0 GeV/c proton beam. At the COSY accelerator components of HESR for stochastic cooling and the barrier bucket cavity were employed to improve the beam quality. Target thicknesses between 1×10^{13} and 2.5×10^{15} atoms/cm² were reached with proton beam intensities between 2×10^9 and 5×10^9 .

Beam quality and energy loss were studied via Schottky measurements, beam size measurements were done using an ionization profile monitor (IPM). Beam size and momentum spread in the presence of a thick cluster jet are shown in to the right in Figure 1. The results were validated with MAD-X beam simulations. Data quality studies using $pp \rightarrow pp\pi^0$ in addition allowed to assess the recoil mass resolution.

Further work at U Münster regards tests with cold carbon sheets for a cryopump prototype and nozzle tests at the prototype target at Münster.

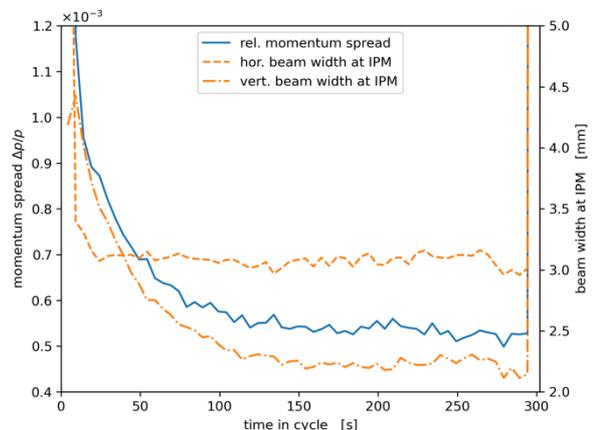


Figure 1: Left: Setup of PANDA Cluster Jet Target at COSY. Right: Effect of the stochastic cooling (part of HESR system) in presence of a thick target beam of 1×10^{15} atoms/cm². The beam size at the target location is $\sim 1/3$ of the one measured at the position of the IPM.

PANDA Interaction Region

The design work of the beam-target pipe at ZEA1 of FZ Jülich continues. In design review meetings further interfaces were discussed. A slight change of design of the beampipe is to make the crossing of the target pipe in a conical shape throughout the target pipe section.

Preparations to produce a prototype cross pipe to be done at FZJ continue. The aim is the assembly with the prototype Central Space Frame. With these prototypes, interfaces for mounting and supporting can be examined and the design can be verified.

Luminosity Detector

Surveys of the vacuum vessel were performed with a CMM, using SMR nests and balls on the vessel and capacitive sensors within, which have shown reproducible results between vacuum and non- vacuum in the vessel with deflections of less than 100 μm .

Currently a prototype DAQ with a Kintex7 board and MuPix8 sensor works, with State machine configurations, incl. injections, data receiver incl. data alignment and decoding. For the LMD prototype, two Kintex7 boards are needed and a Kintex Ultrascale+, as a concentrator with firmware to be tested.

The beam time at COSY with MuPix8 went well albeit with a smaller acceptance and efficiencies due to DAQ and operational settings, yet the data analysis is ongoing. Transition to MuPix10 with new flex-cable design is in progress. There, new settings are required as currently investigated at U Heidelberg.

Towards milestone M7, notes on mechanics, cooling and vacuum are in preparation.

Tracking Detectors

Micro Vertex Detector

The ToASt ASIC, submitted in April 2021, is expected by end of July 2021, ahead of schedule. The PCB design was done and a purchase order submitted at the beginning of June. Also, the first version of acquisition system for lab tests is ready. The remaining issue of the ASIC prototype is the somewhat higher power consumption due to triple redundancy. Remaining strip sensors for the MVD barrel part were ordered by Giessen (JLU) and acceptance tests at the factory are in progress. A system developed for LCR-measurements, commonly usable for all semiconductor devices is ready, will be used in the clean room.

Straw Tube Tracker

For the QA of PASTTREC FEBs (for STT & FT), charge injector boards were developed, which allow measurements for baseline determination, noise levels and S-curves on 8 boards simultaneously. First results show a noise level of approximately 1300 e⁻.

Based on the successful Phase 0 commissioning beamtime in Feb 2021 at HADES, the analysis continues with forward detector (STS1, STS2 and fRPC) including calibrations of STS1+STS2. In particular, the drift time measurements for all straw channels (STS1 + STS2) are found to be constant with about the same drift time –isochrone relation. This makes calibrations easier and verifies the good ASIC BL tuning. In Phase 0 simulations the use of pp elastic scattering events is investigated for experiment normalization and forward detector calibration. Preparations for the physics beamtime in 2022 start late summer 2021.

GEM Tracker

The internal review of the GEM Tracker TDR took place on 16.04.2021 and on 21.05.2021, with reviewers Peter Wintz (FZJ) and Bernhard Ketzner (University Bonn), both PANDA colleagues, as well as Leszek Ropelewski (CERN) and Gianluigi Cibinetto (INFN) as external experts. After the first meeting, a list of questions from the reviewers, regarding various aspects of the GEM Tracker, were addressed and answered at the second meeting.

The final report of this internal review has been received, which includes findings, issues, summaries, and recommendations. Once all considerations are implemented and addressed, the TDR will be prepared for release to the FAIR ECE review. Main issues are additional simulations to obtain stable rates for the layout of the GEM HV system, tests of the pad plane with r/o electronics and ExB effects to be addressed in the simulations. The most severe issue is the limited person power.

The RD51 collaboration extended an invitation to the GEM group to join a test beam time at CERN SPS in October 2021 including a loan of prototype readout electronics. Preparations to make this participation possible have started.

Forward Tracker

The In-Kind contract for FT1-2 was signed also at JU Krakow end of April. This marks the start of the FT production project. As soon as funds are available, procurement of parts will begin. The first step will be the purchase of straw material from Lamina. Further aging tests of straws with 4 different glues are prepared and measurements start in summer with results expected in fall. Two promising types of glue, recommended by CERN, will be tested in addition to the previously used ones. Purchase of a new clean gas system is in preparation.

The mechanical design of the FT1/2 planes has progressed and is almost ready.

Outer Tracker

The interface board PCBs are ready, yet procurement of some components is delayed. The mechanics for the modules support are being addressed, possibly with mock-ups this summer.

PID Detectors

Barrel DIRC

All radiator bars are available and undergo tests concentrating on internal reflection coefficient and checks of Nikon QA measurements. Photon sensory have been ordered, first samples are expected in the summer.

Reconstruction algorithms are in an advanced state and a detector demonstrator has been evaluated with a test beam at CERN. In addition, the GlueX DIRC has been successfully commissioned in cooperation with the GSI team cooperates within the FAIR Phase-0 programme. Furthermore, a part of the GlueX physics beam time in 2020 was conducted with it. Reconstruction algorithms for PID were developed at GSI and tested using the first GlueX data including the DIRC.

Further work on testing outgassing of materials used in the bar-box, on the mechanics and the readout electronics continues. A spherical lens prototype was received and will be tested at ODU in USA later this year.

Endcap Disc DIRC

Measurements with the prototype radiator were done in a light tight box within the Giessen Cosmic Station (GCS). The single photon resolution is estimated to be around 10 mrad. The trigger efficiency is about 2300 events in half an hour. There is a problem with condensation at the cooled parts of the detector not present in the later PANDA setup.

The latest version of the TOFPET ASIC to be employed in the EDD readout electronics in the meanwhile can measure positive and negative signals. Customized FPGA and ASIC boards were recently developed, and tests are in preparation.

The magnet box for testing magnetic fields effects on the FEE-PCBs serves also for liquid cooling studies. The requirement is a target temperature of 18-20 degree with and heat

generation of ~40 Watts. The measured temperatures are in good agreement with simulations.

Forward ToF

Work on the LED calibration system prototype has continued, using electronics systems developed at electronics department at PNPI. In addition, a few PMTs have been bought for tests at PNPI. Due to the pandemic, laboratory access restrictions and quarantines of personnel are in place.

Muon System

As a part of the preparations for the contract with FAIR, contacts are being reestablished with companies for the production of major components: The company doing extrusion of Al profiles is ready to work and have received drawings to provide an offer. Analog electronics will be again produced by Integral Semiconductors in Minsk with some minor improvements. The company producing plastic furnishings has undergone changes, but contacts were reestablished. Once all offers are there, the details of the collaboration contract with FAIR can be formulated.

The final version of the digital board for the FEE with Artix FPGA was tested at CERN with cosmics and will be tested at JINR with beam. Synergies with the NICA SPD experiment are optimally used and it was agreed in the Nuclear Physics Lab to start MDT production for both NICA SPD and PANDA.

A new setup with 1300 channels is available in autumn for tests at JINR with 1.5t including detectors and absorbers (compared to 10t of larger prototype at CERN). This allows to repeatedly perform test beams at Nuclotron from November with 1.5 GeV hadrons (later 7 GeV possible), allowing to reduce costly presence at CERN as the JINR facility is permanently accessible for tests.

Calorimeters

Target Spectrometer EMC

The EMC TDR Update Report was approved by FAIR ECE following the review in the spring.

Barrel EMC

The assembly of the 1st slice is nearing completion after the modifications of the pre-series support beam and progress in cooling & thermal insulation, backplanes and light pulser fiber coupling. To maintain cooling openings in the support beam it will use custom 2-piece profiles and O-rings and a silicone inlay.

In the latest APFEL flex-boards, ringing has been observed for large pulses. This has not been seen before, and reasons are under investigation.

In the HV backplane, a long-term drift of the internal measurement was seen. The reason is under investigation, yet the APD HV is stable, as determined with an external measurement. This will require calibration for future operations but is no further problem.

New simulation using $\bar{p}p \rightarrow \gamma\gamma$ instead of DPM propose APD gain optimizations grouped in three angular regions of the barrel with three different gains possibly.

Regarding Crystal production, more than 50% of the 3rd slice are available, with the Prague contract finished. Ovens need to keep running with PANDA raw material, otherwise these will be refurbished, and personnel may migrate to other projects.

Backward Endcap EMC

Component procurement and production continue. Alveoli are completed, FEE line-driver and HV distribution boards were tested, but there are delays with fibre bundles. The

mounting plate for the Phase 0 setup was delivered. Mounting tests of empty submodules show that it all fits on the plate (see Fig. 2).

APFEL flex boards show signal ringing after pulses, not observed in pre-series tests. Investigations on the cause not successful yet, are ongoing.

Routine lab operation of the DAQ based on the PANDA SADC v3.5 and Oliver Noll's firmware with feature extraction for APFEL pulses, UDP readout to a PC and new slow control functionalities (threshold and filter parameter setting, trace recording, spectrum measurements).

Tests of HV distribution boards with APFEL and APDs confirmed the main functionalities, while minor details still need to be fixed.

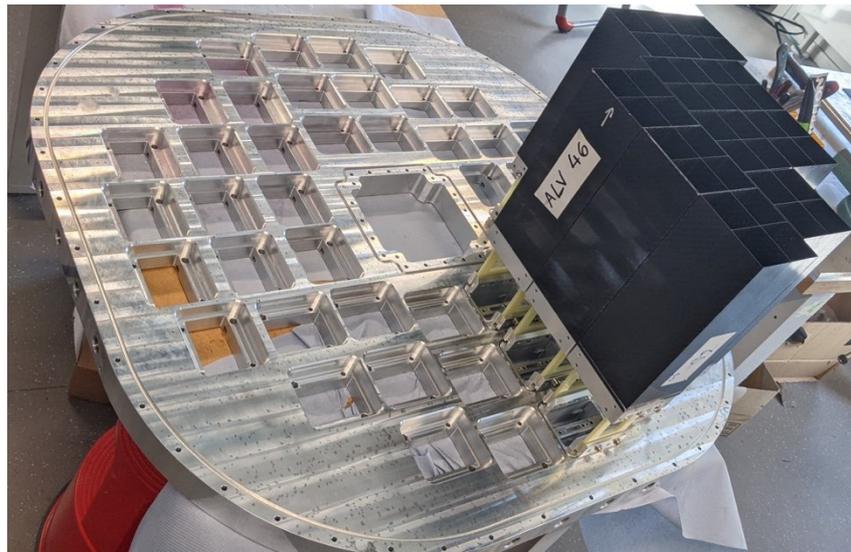


Figure 2: BWE EMC mounting tests of submodules on the support plate.

Forward Endcap EMC

By June, there were 103 (out of 193) APD submodules built and glued. Close to 100 submodules were shipped to Bonn for cosmics tests. APD screening is ongoing regularly again, back in (mostly) standard mode. New APDs from Hamamatsu (3000 pieces) arrived in March, 4500 ordered. So far, APDs screened - irradiated - screened: 19875 - 67% of whole target calorimeter and matched (on demand): 5000, enough for 100+ FEW EMC APD submodules plus complete BWE EMC.

Colleagues at the Bonn University observed problems 'mixups of readout', found in-time to be fixed. Appropriate mitigation measures are in place for further production.

Cooling tests are in preparation. The 1st half of cooling line is ready, the front lid w/ frame with build-up of permanent seals was glued to the stiffener ring, while a mockup of the seal is currently at *Strahlencentrum* Gießen for irradiation tests. Further parts are being ordered.

A complete set of the 15 parts for an SADC crate was delivered to Bochum (by an external company), with new thermal coupling pads, and the assembly is ongoing.

Online Systems

DCS

At RUB, a new CAN bus Hat (Adaptor PCB) for Raspberry Pi 2/3/4 was developed as earlier (classic CAN) components are discontinued and replaced with the newer released standard

CAN FD. While the design is ready, production is delayed by long delivery times of automotive electronics of about 30 weeks. Once assembled, tests will show if the new standard is backwards compatible to our CAN devices like THMP boards etc.

DAQT

The DAQT TDR has been reviewed by experts from ECE, a final revision of the TDR implementing all feedback was completed. A review report is in preparation by ECE. The next DAQT FEE workshop will be held online Oct 6-8, 2021. Greg Korcyl will head the DAQT system from January 2022, as endorsed by the PANDA CB.

//News from Computing Coordination

New Pandaroot version

In April 2021, the newest version of PandaRoot (v 12.0.0) was released to the PANDA collaboration. It contains many significant improvements, for example the updated EMC digitization and the change to a new tracking algorithm with higher track finding efficiency. In addition, several bugs have been fixed. For a detailed description of the changes, please have a look at the release note on the PandaRoot gitlab repository.

Recent developments

During the collaboration meeting in June, further progress in the development of PandaRoot was presented. A major improvement is the unification of the particle propagators which enables a straight-forward interchangeability between the more precise GEANE propagator and the faster helix propagator. In addition, many more activities have been presented:

- The speed-up of the Hough track finder
- Improvements in the language model-based tracking
- A study about the EMC photon position reconstruction
- A new algorithm to identify split-off events in the Forward Endcap EMC.

A detailed summary of the presentations can be found at the meeting minutes at the PANDA webpage.

//News from Physics Coordination

Publications

The PANDA Phase One paper, written in collaboration with the Theory Advisory Group (ThAG), has been accepted and published in [Eur. Phys. J A, 57, 184](#) (2021). It is important that all PANDA members are aware of this when giving talks or discuss PANDA with the outside world and give a message that is consistent with Phase One paper. The picture on the front page of the paper is shown in Figure 3.

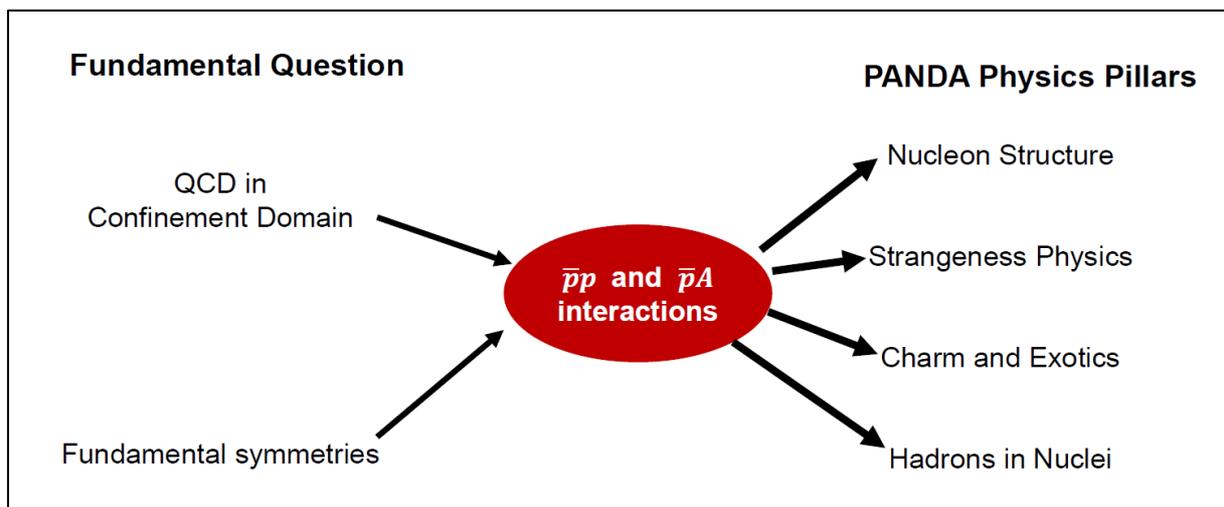


Figure 3: The conceptual map of the PANDA physics program as presented in the recently published Phase One paper.

The three additional papers that were accepted in the first quarter have now also been published. The full references are given in section 6.

Discussions are ongoing in order to define and evaluate highlights of our physics program for Phase Two, to be presented in a *Phase Two paper*.

Workshop

An online workshop on XYZ physics, sponsored by the ExtreMe Matter Institute (EMMI) has been organized by Christoph Hanhart and deputy physics coordinator Frank Nerling. Local organizers were Anja Meergans and Udo Kurilla. The workshop attracted in total 128 registered participants and comprised 42 talks. A summary of the workshop, including experimental as well as theory aspects, was given at the collaboration meeting in June 2021. The indico page of the events, including recordings of the talks, can be found here:

<https://indico.gsi.de/event/XYZ-states-2021>

ThAG

The present ThAG will be extended by two members: Feng-Kun Guo, CAS Beijing and Daniel Möhler, GSI Darmstadt, as suggested by the current ThAG and acknowledged by the collaboration board. The ThAG composition can be found here: <https://panda.gsi.de/content/theory-advisory-group>

New Working Group convener

Michael Papenbrock is the new convener of the group for “Non-perturbative QCD”, or more casually phrased “Hyperon physics”.

Publication Guidelines

The publication rules have been modified (see part about Governance Rules in the CB section). Some guidelines for writing PANDA papers and release notes are available here: <https://panda-wiki.gsi.de/foswiki/bin/view/PubCmt/PubComPracticalGuidelines>

//News from Resource Coordination

The in-kind contract for the forward tracker stations 1-4 has been finally signed by all parties involved, i.e. JU Krakow as both provider and shareholder, and FAIR.

Additional costs of up to 600 M€ [2021] for the FAIR project have been identified recently,

mostly due to the overall tight market for civil construction in Germany. All shareholders are supportive to cover these additional costs, in particular focusing on short-term needs to continue with the impressive civil construction progress.

The funding decisions for the 2021-24 period of collaborative funding for German universities (*Verbundforschung*) have been communicated by BMBF. With regard to personnel, the outcome for PANDA is seen as overall satisfactory. For investments however, there are as in the 2018-21 period, temporary restrictions imposed due to the pending financing of the buildings for HESR, CR and pLinac. A possible mitigation is discussed with FAIR management.

The date for the next Resource Review Board has been fixed to February 22 - 23, 2022.

The PANDA-CMoU was presented and discussed in more detail at the collaboration meeting in June. The goal is to have a draft ready during summer, to be agreed within the collaboration in fall 2021. Subject to the agreement from the funding agencies, this would allow to start the procurement processes of common infrastructure in 2022, which will be needed for installation in the middle of 2024, the date of 1st availability of the PANDA hall according to the recent re-baselining outcome.

//News from the Outreach Coordination

PANDA Outreach Concept: A new PANDA outreach concept paper (<https://www.overleaf.com/read/sjgfbpmszxs>) is publicly available for everyone who wants to have a look on the actual status of the different projects and to find out, how they can participate in PANDA outreach.

PANDA Lego Model: The design of the PANDA lego mode has been finalized in the beginning of 2021. It contains in total around 10,000 stones and is planned to be assembled during 2021 at GSI. However, due to problems with the tendering process and issues with the LEGO support, the purchase had to be delayed by a couple of months. Nevertheless, high-quality rendered images and videos of the full model are already available. The part list and model files are publicly available and can be enquired from Mustafa Schmidt at the University of Giessen.

Printed PANDA Model: The printed PANDA model is currently under construction at the University of Bochum. It will come in three parts, in order to guarantee a safe transportation. The wooden ground plates have already been manufactured. Also the transportation boxes will be tailor-made in Bochum with the required measurements, since no suitable option existed on the market. The material for these boxes already arrived. Furthermore, LED strips with microcontrollers were purchased. They will later be mounted on the model and used to display certain events. In addition, a dedicated computer with a bright screen will be used to show the same events within at the event display in combination with virtual PANDA model. Currently, the printing process has been stopped, in order to first define the best sectional planes with the help of PandaROOT simulations.

Hadron Physics Game: An improved layout of the already published hadron physics card game was developed by Miriam Kümmel in Bochum. In total, four game variations can be played after downloading the cards and printing them. The first one is inspired by the very popular game "Memory", using color symmetries. The second, recently added version is based on "Uno" and includes color and flavor symmetry. The other two versions, inspired by "Set" and "Rummy", make use of the baryon names, the particle spin, and charge. The latest design is available in our git repository (<https://panda-repo.gsi.de/outreach/cardgame>) and has been tested by a German Physics Teacher in Ecuador who successfully played the Set-like version in her class.

PANDA Masterclass: A large part of the introduction slides to the masterclass have been finalized by Miriam Kümmel. These are based on a very well-received public talk which Miriam gave at the star observatory in Recklinghausen in April 2021. In addition, Kümmel has received input from the theoretician Christoph Hanhart from FZ Jülich. However, many parts of the talk are yet to be completed, for which more human power is required.

The hands-on part of the master class will likely be based on an advanced lab course which has been designed at the University of Bochum, and benefitted from a local bachelor project. The lab exercises demonstrate to school students how to analyze the line-scan data of a $\psi(3823)$ using IPython notebooks. The latter can be used without a dedicated installation or environment. The goal of the exercises is to give students a flavour of how hadron physicists write analysis code. The first students have already completed the lab course. The feedback of the students provided input for improving the instruction manuals. This lab course is straight-forward to export to other universities. The related contact people are Matthias Steinke and Marc Pelizaeus from the University of Bochum.

Virtual Reality: Michael Papenbrock's (Uppsala University) implementation of a simplified CAD model of PANDA into the Unity graphics engine, has turned out to be useful for the PANDA constructors for checking the overall design, e.g. by using collision detection. The final goal is to transfer this model into VR glasses, in order to give outsiders and newcomers in PANDA the possibility to virtually walk through the PANDA hall and visualize certain events with the help of PandaRoot simulations. Currently, it is expected that a future project student can continue that work due to limitations in human resources.

Sticky Hadrons: A new Instagram channel has been created by Klaus Peters (GSI) at May 3rd (<https://www.instagram.com/stickyhadrons/>). It aims to present art, historical photos, and important people related to hadron physics to people in the outside world.

Organization & Meetings: Miriam Kümmel, who was a driving force regarding PANDA outreach, has unfortunately resigned from her previous position in Bochum and therefore left our small outreach task-force. However, a new member, Mark Lattery from the University of Wisconsin Oshkosh, has joined our outreach team. He and his team have a lot of experience in teaching particle and hadron physics to undergraduate students which can benefit our outreach activities significantly.

The Outreach group would like to take the opportunity to invite and encourage everyone to the monthly online meetings that take place the fourth Monday of each month at 3.30 pm CEST. The related details can be found here:

<https://panda.gsi.de/event/panda-outreach-meeting-0>

3/New from Boards and Committees

//News from the Collaboration Board

Membership news: The decision about the admission of the Tehran group needs to be postponed after intensive consultations with the GSI/FAIR legal department, whose imposts we need to follow.

Young scientist convent: A second "PANDA lecture week" similar to the one given in 2017 has been proposed. The suggestion has been supported by the CB and discussions about the organization, including possible financial support by the GSI, have been started. The lecture week should include PANDA physics talks, computing tutorials as well as presentations about PANDA hardware.

Governance rules: The main body of the GR as well as all Annexes A were already approved by the CB in collaboration meetings. However, Annex B1-B3 has awaited endorsement until now. While Annex B1 and B3 are "new" in the sense, that CB has never approved the contents,

the situation on B2 needed some more detailed explanation: Substantially B2 "*Policy for Presentations*" was approved in September 2018 and with some modifications in Sep 2019 as separate document already. In the GR Version 4.03, the "*Policy for Presentations*" was implemented as part B2 of the Annex. However, in the implementation process, different opinions were expressed within the commissioned GR writing board on some regulations. Therefore, CB had a secret ballot at the CB meeting in June where two versions were on the table. Governance Rules Version 4.04 (15/6/2021) were approved by a simple majority, which means that for the first time, the complete GR including all annexes is now in force. The GR will be available on our PANDA web-page.

Election of CB chairs: Frank Goldenbaum was elected for another two-year term as CB chair, whereas deputy chair Andrey Ryazantsev has served the maximum two terms and has to step down. Per-Erik Tegnér and Anna Shashkova were nominated as deputy chairs. A secret ballot, organized by the spokespersons, was carried out and it was decided that Anna Shashkova takes over as deputy CP chair. The CB and the PANDA management want to thank Andrey Ryazantsev for his valuable and appreciated work as deputy CB chair.

Other discussions: Regarding future video-conference software for PANDA, the management want to draw attention to the fact that GSI will discontinue the conference tool vibe/euze with effect 1.1.2022. We will therefore lose our uniform conference tool and do have only isolated applications. The need for an alternative solution was identified. GSI IT-department will be contacted for evaluating potential solutions similar to the ones applied e.g. at CERN.

//News from the Speaker's Committee (SpC)

During the second quarter of 2021, PANDA has been represented at the following international conferences and workshops:

- Workshop on Physics of Omega Baryons at the J-PARC-K10 beam line, 07-09/06/2021 *Status, perspectives, and opportunities of hadron physics with PANDA at FAIR* , by Michael Papenbrock
- NICA Spin Physics Detector collaboration workshop, 07-11/06/2021, *Status of the PANDA Experiment at FAIR* , by Frank Maas
- Mini Online-Workshop on Glueball Searches 01-02/06/2021, *Search for Glueballs at PANDA* , by Marc Pelizäus
- CHARM20, 31/05- 04/06/2021, *Charm physics with PANDA* , by Frank Nerling
- TIPP 2021, 24-29/05/2021
 - *The PANDA EDD prototype in Giessen Cosmic Station*, by Ilknur Koseoglu
 - *Latest Technological Advances with Microchannel-Plate PMTs*, by Albert Lehmann
 - *PANDA Barrel DIRC: From Design to Component Production*, by Georg Schepers
- ECT* Mass in the Standard Model and Consequences of its Emergence, 19-23/04/2021, *The PANDA experiment at FAIR* , by Alaa Dbeyssi
- EMMI Workshop: Experimental and theoretical status of and perspectives for XYZ states, 12-15/04/2021, *Can We Resolve the Nature of $\chi_{c1}(3872)$ with PANDA?* , by Klaus Götzen
- 13 Terascale Detector workshop, 06-08/04/2021 *Machine Learning for Particle Track Reconstruction* , by Waleed Esmail

4/Important Dates

//PANDA Meetings

- October 25-29: The plan is to have an IRL meeting at the GSI Darmstadt
- PANDA meetings during 2022:
 - CM 22/1 at GSI: March 7-11

- CM 22/2 in Prague: May 30-June 3
- CM 22/3 at GSI: October 10-14

//FAIR Committees

- October 20th: 30th FAIR AFC meeting
- November 2nd: 15th FAIR ECE & 6th FAIR ECSG Meeting
- December 14th: 33rd FAIR Council Meeting

//Conferences

- August 19th-25th: Lomonosov 20
- August 23rd – September 3rd: ICNFP
- August 30th – September 3rd: DPG – SmuK 2021
- September 5th – 10th: PANIC2020
- September 6th – 10th: IPA2020
- September 5th – 6th: AI STAR

6/Publications

1. *PANDA Phase One*, in [Eur. Phys. J A, 57, No. 184 \(2021\)](#).
2. *Feasibility studies for the measurement of time-like proton electromagnetic form factors from $\bar{p}p \rightarrow \mu^+\mu^-$ at PANDA at FAIR*, in [Eur. Phys. J A 57 No. 30 \(2021\)](#).
3. *The potential of Λ and Ξ^- studies with PANDA at FAIR*, in [Eur. Phys. J A 57 No. 154 \(2021\)](#).
4. *Study of excited Ξ baryons with the PANDA detector*, in [Eur. Phys. J A 57 No. 149 \(2021\)](#).

Karin Schönning and Ulrich Wiedner

on behalf of the PANDA Management

Uppsala, August 23, 2021