

# Minutes of the Joint COMPASS and AMBER TB meeting of 19<sup>th</sup> January 2021

S. Levorato

March 10, 2021

## Attendace via Vidyo only

Jens Barth, Norihiro Doshita, Jan Michel Friedrich, Bernhard Ketzer, Igor Konorov, Daniele Panzieri, Stephane Plachkov, Marcin Ziembicki.  
Oleg Denisov, Stefano Levorato, Fulvio Tessarotto.

Maxim Alekseev, Oleg Kiselev, Martin Losekamm, Christophe Menezes Pires, Paul Raimer, Paolo Zucccon. Vincent Andrieux, Vladimir Anosov, Franco Bradamante, Alain Magnon, Gerhard Mallot.  
Chandradoy Chatterjee, Silvia Dalla Torre, Christian Dreisbach, Shuddha Dasgupta, Nicole D'Hose, Eva Maria Kabuss, Evgeny Maev, Jan Matoushek, Michael Pesek, Vladimir Poliakov, Triloki, Benjamin Moritz Veit.

The material presented during the meeting is available at <https://indico.cern.ch/event/863787/>  
**The meeting starts at 9:00 am**

## Agenda

- 1 Approval of the minutes of the Technical Board hold on 3 November 2020
- 2 News and communications
- 3 Detector Survey
- 4 RICH-1 update status
- 5 RICH-1 activity planning
- 6 H1 planning
- 7 PT status and planning
- 8 RICH-WALL and MWPC planning
- 9 DC4 planning
- 10 Cold Silicon status
- 11 COMPASS GEM update

- 12 DAQ Status and planning
- 13 IKAR TPC positioning
- 14 IKAR TPC status and planning
- 15 PRM scintillating fibers
- 16 AoB

## 1 Approval of the minutes the TB of 3 November 2020 *S. Levorato*

The minutes of the Technical Board hold on 3 November 2020 are approved.

## 2 News and Communications *S. Levorato*

- a Stefano Levorato illustrates the new structure of the joint AMBER and COMPASS technical board meetings. They implement the presence of experts/responsible persons of (sub)-detectors for the C++/AMBER phase-I that are not already present in the COMPASS spectrometer setup. It is extended also to physics coordinators of the PRM, antiproton production cross section measurement and DY physics program. The COMPASS TB members will be asked for explicit acceptance via mail, to be temporary AMBER TB members.
- b Cyril Cot, the COMPASS technician has left: he is replaced by Eric Thabuis.
- c The archive in the underground of 892 will be reduced. Part of the cupboards will be dismantled to allow for the installation of the AMS clean room air ventilation system. The COMPASS material has to be moved away or disposed. No deadline has been given yet. Franco Bradamante objects to do this operation now and asks to have it postponed. Stefano Levorato underlines this urgency is related to the contract with the company who will perform the intervention, and states it is possible that no action from our side will result in the disposal of the whole material. Christian Dreisbach remarks all material belonging to TUM has to be moved to a safe place, possibly near 888.
- d The new TSO of 892 is Roberto Peruzza who replaces Niels Dupont
- e From March 1<sup>th</sup> the proximeter contact tracing device is mandatory at CERN, its booking can be performed at <https://proximeter-dist.web.cern.ch/>
- f The Technical board meetings will be organized in alternating mornings and afternoons to allow an easier participation of US colleagues. 3 TB dates has been moved to avoid the overlap with the AM and to be enough in advance w.r.t. the CB meeting. The new dates are 19 Jan Morning, 23 Mar Afternoon, 04 May Morning, 06 July Afternoon, 28 Sep Morning, 16 Nov Afternoon.

- g The flammable gas system renovation is now ongoing also in 888 hall, the first flammable system test is foreseen at the end of February and the flammable gases should be available by end April. For the installation of the retention container below MW2 we have been asked for the removal of the F1 cards connected below the MW2 detector.
- h The replacement of the STRAW 3 ISEG HV power supply system by CAEN A7030DP is ongoing, the interface box between the Radial and Redel connectors is expected to be delivered at the beginning of March.
- i The Traka BOX in COMPASS has been installed, it will operational in the next weeks.
- l Delays in the delivery of chilled and raw water to COMPASS, originally planned for the mid of January, have been accumulated by CV for a total amount of 3 weeks. This delay does not compromise, at the moment, the COMPASS restart planning. The earliest use of raw/chilled water is foreseen at the beginning of March.
- m The first trunk of fibers towards SM2 has been installed and successfully tested .
- n Due to the need of space for the future tests in the M2 beam-line the area occupied by ECAL0 and the LH target has to be emptied.
- o The COMPASS Gunn diode tube has been sent back to ELVA for its upgrade, two, non working COMPASS EIO tubes have been delivered to CPI for inspection.
- p Support systems for remote operations have been tested in the 888 during and after the dry run. The EPSON Moverio BT-2200 and the Realware HMT-1. Both have proved to be a useful tool to provide remote help. Better coverage of the HN2 hall is needed to exploit their performance. Investigation in collaboration with IT is ongoing to check the possibility to install new access points that can be turned off and on in case the 2.4 and 5 GHz WI-FI frequencies will result in an increase of noise detected at the level of detector FEE cards.

### **3 Detector Survey *S. Levorato***

Stefano Levorato reports about contacts with Pascal Sanvitu to start the planning of detector surveying for 2021. After nearly 2 years of stop an extended campaign of surveying has to be planned. Vladimir Anosov has evaluated the required time for the measurements to be performed in 3 man/months. Part of the surveying campaign can start now, while detectors that are not yet in the hall, or still need intervention can be surveyed later (+ last minute detector installed after target loading). Vladimir Anosov underlines that the SM2

movement date depends on the RICH-WALL installation, since the detector rotation can not be performed when SM2 is in muon configuration. All detectors attached to SM2 have to be surveyed after SM2 displacement. An email will be sent to detector experts requiring to provide the detector readiness status and plans, the need of experts for the survey as well as the foreseen time schedule for the operation.

## 4 RICH-1 update status *S. Dasgupta*

Shuddha Dasgupta reports about the RICH-1 preparation for the 2021 runs at the end of the 2020 dry run.

- The Cooling system has been fully refurbished and restarted on 15 October.
- The new pressure and temperature sensors for the RICH-1 MWPC PDs have been successfully installed.
- The HV system for both top and bottom rich MAPMT PD has been verified: 6 faulty channels have been found. Access to MAPMTs is needed to identify the origin of the problems: cable or resistive divider.
- The new HV modules for MWPCs PD and the CAEN mainframe have been successfully tested.
- The new HVCS program has been tested by Gergö Hamar from remote.
- The new fibers patch cords for F1 cards have been fully installed
- The full FEE system has been turned on for all PDs. Pedestals and thresholds scans to verify its functionality have been performed.
- The LED pulser driver for the RICH-1 visible PD is now operational again. The LEDs inside the RICH have however been found not to be operational.

## 5 RICH-1 activity planning *S. D. Torre*

Silvia Dalla Torre summarizes the status of the activity performed so far for the RICH-1 detector. Due to the pandemic instead of 20 man-weeks of technical personnel 8 man-weeks could be provided, instead of 11 man-week of PhDs post-docs 8 man-weeks and finally instead of 18 man-weeks of physicists for Dry Run 4 only man-weeks.

The 630 Kg of  $C_4F_{10}$  radiator gas, ordered to F2, have been received and preliminary tested with promising results. Other 500 Kg of radiator gas, hard to be made transparent in the VUV domain without very large gas losses have been exchanged with an equivalent amount with LHCb. Silvia Dalla Torre remarks that the main difficulty for the 2021 run is the restart of the cleaning process due to the impossibility of having a dedicated person on site. A preliminary

evaluation of the time to process the required gas for 2021 run is 3 man-months. The Trieste contribution to the H1 mechanical refurbishing is also delayed due to the pandemic situation.

## 6 H1 planning *M. Veit*

M. Veit reports about the activity performed in view of the H1 preparation for 2021 after the movement of the detector in 891:

- labeling of all component and visual inspection
- light leak search and check of PMT currents
- dark rate and signal study with measurements with source
- removing of the photo-multipliers and preparations for disassembly

Studies are ongoing to identify the failures of the H1 PMT+base photo-detection system and to verify if the PMTs ET Enterprise 9128B can be used as replacement of the XP2980 ones. Moritz Veit reports that the H1 refurbishing is progressing slower than foreseen because of lack of man power due to Covid travel restrictions, but it is still on track for 2021 run.

## 7 PT status and planning *M. Pesek*

Michael Pesek reports about the PT magnet commissioning during the dry-run and about the Gunn diode system status. PT planning for 2021 is illustrated too. The commissioning operation of the PT magnet system started on 29/10 when the 4K temperature was reached. The whole system has been successfully tested and its operation stopped on 24/11. Few interventions are needed before next cool-down: the exchange of the LN2 turret o-ring and the check of the LHe level gauges.

The Gunn Diode system, after being tested in laboratory conditions has been installed in its nominal position next to the PT magnet. Microwave generation has been successfully tested up to 3W. The full system has then sent back to the manufacturer for the modifications aimed to improve the cooling system, implement the digital frequency modulation and increase the operational frequency range (currently 69.8-70.2 GHz).

The request of manpower for 2021 run are illustrated. Nori Doshita asks for Jakko Koivuniemi presence to be officially requested to Illinois group for his presence on site after Easter for at least 3 months: May-July.

## 8 RICH-WALL and MWPC planning *M. Alekseev*

Maxim Alekseev reports that due to the impossibility to plan any travels due to the Covid restrictions the group decided to move some of the short MDTs in Torino with the wire tension measurement equipment to verify its functionality.

For the long tubes there is a request of clarifying the space availability at the end of the hall for the remounting of the MDT support structure. Stefano Levorato answers that the space requested will be available.

Maxim reports that the foreseen amount of work time, originally planned in 10 months, has to be compressed. Alexander Samartzev should arrive at CERN at the end of February to start the work on the long MDTs. Vladimir Anosov asks when a final decision will be taken by Torino for the repair of the RW, since the detector installation can not be performed with SM2 in muon configuration due to the needed space for the RW rotation. The installation of the RW results constraining the movement of the SM2 and the detectors attached to its platform as well as the survey planning. This last operation requires at minimum one week. Two weeks services installation are requested by detector experts for RW before being operational. The RW group will shortly elaborate and communicate a detailed planning for the RW activity.

All the components are ready and available for the MWPC detector foreseen to be upgraded with the new FEE. The preparation of the detector will start in February 2021: the installation of the new FEE should take 10-15 days including cabling and initial checks.

## 9 DC4 planning *S. Platchkov*

Stephane Platchkov illustrated the operation needed for the DC4 repair finalization.

- Perform the Detector HV tests.
- DAQ tests with local DAQ to check the connections and the noise figure.
- Mount the air cooling tubes and the temperature probes
- Prepare the DC4 to be moved in the hall

The intervention is foreseen during the first week of February by S. Platchkov, D. Neyret and two Saclay technicians. Local DAQ will be needed to perform the tests, Martin Zemko will provide support in case it is needed. The re-installation of the DC4 in the COMPASS spectrometer is foreseen during the first half of March and will require two days. Anosov stress that the communication of the dates of the intervention has to be done well in advance to book the transport service. Bernhard Ketzer remarks the importance to foresee the installation of the GEM station support and cable chain structures.

## 10 Cold Silicon Status *C. Dreisbach, S. Levorato*

Christian Dreisbach reports about the status of the silicon preparation for the 2021 run. Due to the Covid pandemic no support on CERN site could be provided. The goal to test the cryo system during the 2020 dry run could not be achieved. No test of the stations could be performed. The time scale to

restart the system in 2021 is evaluated in approximately 1.5 months. Stefano Levorato presents the WP provided by EP-DT for the maintenance and restarting of the cooling system of the silicon tracker. The cost is evaluated in 17 kCHF. Jan Friedrich reports TUM will investigate the possibility of supporting the operation, part of the cost of the WP can be covered by CERN.

## 11 COMPASS GEM update *B. Ketzer, J. Floethner, S. Levorato*

Stefano Levorato reports about the LV installation performed during the last two days of the dry run for the GEM-4 station. The detector has been equipped with two R&S NGP8XX family power supply. The units have been integrated in the DCS system with a readout rate of 10 to 15 Hz. The devices have been extensively tested in terms of communication stability by Christophe with positive results.

Bernhard Ketzer shows the preliminary results on the noise figure of GEM-4 FEE with the new LV power supply system. No major differences are visible w.r.t. to those when CAEN LV power supply are used.

Stefano Levorato recalls the cost of the PS by R&S: the cost of 13 HMP4030 3ch 0-32V max 10A is 30524CHF, the cost of 10 HMP4040 4ch 0-32V max 10A is 23126CHF, the cost of 10 NGP804 4ch 0-32V max 20A is 39350.30CHF.

## 12 DAQ status and planning *I. Konorov*

Igor Konorov reports about the test performed for the DAQ and the results obtained during the dry run.

- The remote access for shifts via X2GO was successfully tested and operated
- The new Start of Run script, the new DAQ GUI and the new DAQ libraries were successfully integrated.
- MurphyTV, COOOL, and User programs were recompiled with UDP monitoring *ctalibrary*
- The new Juniper Ethernet network switch was integrated, all sub-networks have been interconnected via the switch.
- The test of CTA (CERN Tape Archive) new storage facility was performed during Dry run.

The execution of GUI on pccoczm may result in an unresponsive operation of the PC. To avoid this problem a well defined usage of the PC for DAQ GUI, MurphyTV, COOOL will be implemented. The UDP protocol packet size had to be decreased from 8 to 1.5k to avoid MTV and COOOL freezing.

Igor Konorov reports that the long DAQ term tests (over night) ended with DAQ

crash after few completed 200 spill runs. The problem is being investigated: the most probable reason is the unbalanced data flow of MUX11 and MUX12. Igor Konorov then illustrates the urgent items to be ordered for the DAQ system during the month of January 2021. The total cost of the hardware needs sums up to 20 kCHF.

### 13 IKAR-TPC positioning *S. Levorato*

Stefano Levorato illustrates the two garage positions considered for the TPC: inside the M2 beam-line and outside it. In both positions the TPC can not be filled with hydrogen. The pros and cons ( access, services needed ) of the two solutions are discussed. The TPC garage position will be defined according to the muon halo beam rate at the two places. Stefano Levorato will ask BE to provide the values.

### 14 IKAR TPC status and planning *O. Kiselev*

Oleg Kiselev presents an overview of the IKAR TPC operating principle and of the main working parameters. He also recalls the tests performed in 2018 with the ACTAF2 40 liter prototype at COMPASS. Thresholds values of 200 keV could be achieved with 40 keV energy resolution at 300kHz beam rate. The transport to CERN of the IKAR TPC and its related equipments is described. IKAR TPC reached CERN on 19 November and was installed in the 891 building. The TPC inner structure has been dismantled and safely stored in view of the new 2 drift 400 mm cell configuration for the PRM test.

Oleg Kiselev then summarizes the preparation status:

- The new HV stainless steel flanges have been produced at GSI, the feed-through is made in Kovar and the He-tightness has been tested: they are ready for mounting
- A new, non standard, high pressure valve operational to 30 bar (usable for main TPC too), capable of vacuum levels down to  $10^{-6}$  mbar, is ordered. The interface flanges to the TPC still need to be produced.
- 16-ch boards housing the AD891 OPA are available.
- The Struck SIS3316 VME FADC 14 bit @250 MHz 16 channels FADC will be employed. A modified firmware version to guarantee the compatibility with a trigger-less DAQ readout is planned.
- The field shaping rings optimization via ANSYS FEM calculations is ongoing at GSI

Oleg Kiselev presents the project timeline:

- Production of the electrodes is foreseen for mid February at PNPI



- The flanges leak checks are planned for the end of February
- Reassembling of the TPC will start in mid March
- The High-pressure valve will be ready for mounting the end of March
- The pressure test of the assembled TPC are foreseen for mid April
- The baking and pumping of the TPC will start in May
- The testing of the TPC setup: chamber, HV system, vacuum system, slow control, electronics and DAQ is foreseen during the month of August
- The full TPC setup will be ready for the period between the end of August and the beginning of September

## 15 PRM scintillating fibers *M.J. Losekamm*

Martin Losekamm reports about the results of the simple MC to evaluate the effect of the increase of fiber thickness from the initially foreseen  $200\mu\text{m}$  to the  $500\mu\text{m}$ . With the thicker fibers an efficiency of 100% at 2 MHz beam rate and 99% at 10 MHz beam rate can be achieved.  $Q^2$  resolution is decreased of about 1% at  $10^{-4} (\text{GeV}/c)^2$  and no effect is detectable above  $5 \times 10^{-3} (\text{GeV}/c)^2$ . For these reason the 4 stations for the PRM measurement will employ  $500\mu\text{m}$  fibers. The simpler detector design will allow to have a prototype with  $40\text{mm} \times 40\text{mm}$  active area ready for the Pilot Run in September.

## 16 AoB

- No other arguments are proposed.

The meeting ends at 3:20 pm.