



Plenary RRB

November 2023

Draft Minutes of the 57th Plenary Session of the LHC Resources Review Boards CERN, Geneva, 23rd October 2023

Documents and slides of all presentations can be found on the RRB Indico pages, accessible via the LHC-RRB home page <http://cern.ch/committees/LHCRRB>

The minutes of the last Plenary Session, CERN-RRB-2023-053, were approved.

CERN Status and News. J. Mnich, Director for Research and Computing

It was reminded that the Council will have to decide and to announce its decision on the termination or continuation of the International Cooperation Agreements (ICAs) with the Russian Federation (expiration date December 2024), the Republic of Belarus (expiration date June 2024) and the Joint Institute for Nuclear Research (JINR) (expiration date January 2025) at least 6 months before the expiration dates. Therefore, the Council will have to decide on Belarus and probably on Russia in December 2023 and on JINR in 2024. The experiments will present the 2024 M&O A/B requests including the expected contributions from Russia/Belarus and JINR and alternative tables without 2024 contributions from Russian and Belarus institutes.

The Open Quantum Institute (OQI) has been approved by the Council and will be integrated as societal arm in the CERN Quantum Technology Initiative.

The CERN library renovation has been completed.

The CERN and NASA Open Science Summit 2023 has been held in July.

The Science Gateway opening happened on October 7th, 2023 and as the first scientific event in the Science Gateway, 50 years of neutral current and 40 years of W/Z discoveries will be celebrated.

The date for CERN's 70th anniversary celebration is fixed to the October 1st, 2024.

On behalf of the Russian community A. Gordienko expressed congratulation to Director-General F. Gianotti on the occasion of successful completion of the Science Gateway. During his address, A. Gordienko made a general comment that this year Russia has fully paid all obligations for the 2022 M&O budget of the LHC collaborations and has secured the M&O contributions to the current 2023 budget and the planned 2024 budget. The Ministry of Science and Higher Education is ready to continue the relationship and work on those subsystems, where its scientific community has their relevant obligations. He expressed appreciation to the CERN management and its financial services for their support.

Status of the Accelerator Complex post LS2. R. Steerenberg, on behalf of the Director for Accelerators

The 2023 LHC machine main events timeline was presented, where on March 20th the mechanics of one of the Crystal-collimator broke during testing, on April 2nd a power cut on the 80KV lines happened, leading to the rupture of RF safety discs, which were this year fast replaced, on April 21st the first stable beam of 2023 was achieved. On May 12th the 1st collisions with 2374 bunches

have been achieved, and on May 25th the RF finger module issue has shown up, then repaired and afterwards the running was successfully resumed. On July 17th, a fallen tree in VD caused a power glitch and then lead to magnet quenches and a small leak has been showing up on a bellow between the cold mass and the insulation vacuum. A special intervention on the cryogenics system opened up a repair window of about 10 days to replace the bellow. In August and September two vacuum leaks on Target Dump Injection Segments appeared, which have to be replaced during the YETS 23-24. These leaks were preventing pp operation, but Pb ion was still possible. On September 26th the first stable beam with ions with more than 1200 bunches has been achieved. Due to the aperture reduction of the upgraded ALICE inner detector, hot spots on the two sides of the detector have been encountered, causing a huge background. Solutions to this problem have been afterwards applied and now the background has been sufficiently decreased. In October, several beam dumps due to SEUs have been detected. With luminosity levelling the rate has been halved.

In conclusion, the proton run was cut short, the high β and the VdM run have been performed, the p-p reference run was very limited and has to be re-scheduled in 2024 and the Pb ion run period has been extended, but with a challenging start. The 2023 physics run ends in the morning of October 30th.

Overall, about a half of the initially scheduled 25ns pp physics time was achieved, leading to 32 fb⁻¹ instead of 75 fb⁻¹. Before the incident, the proton performance was excellent. For the Pb ion run after the initial hick-ups, a ~83% machine availability was achieved over the last weekend. If LHC would continue with this performance in the next years, then the estimated goals in luminosity should be achievable. The LHC injectors have already the potential to deliver the performance foreseen for the HL-LHC and CERN is squeezing out this potential until the end of Run 3 to be ready for Run 4. The first 2024 beam is expected in the LHC on March 11th.

There were no questions following this presentation.

Status of the Experiments, including Phase II Upgrades. J. Mnich, Director for Research and Computing

In 2023, ~32 fb⁻¹ pp luminosity has been delivered to ATLAS and CMS, with the best performance ever up to moment where the incident happened.

Some new physics results have been presented: Search for magnetic monopoles by ATLAS, first observation of the decay $\eta \rightarrow 4\mu$ by CMS, the most precise measurement of $\sin(2\beta)$ by LHCb and the measurement of the lifetime of strange baryons and nuclei by ALICE.

For the Phase II upgrades of ATLAS and CMS, the projects are making very good progress, reaching now the (pre-)production phase. However, the schedule for both experiments remains extremely tight with no significant contingency. For ATLAS, the ITk Pixel and Strips define the critical path of the schedule. For CMS, the global float is now ~3-4 months and the focus was set in understanding the resources needed to complete the upgrades. This was supported as well with the help of workshops with the Fraunhofer IPA, which has happened for CMS and will happen for ATLAS.

The conception of a "Next Generation Triggers" proposal has been launched, which is supported by a private group of donors, and a task force between the proponents has been set up. The proposal with a value of 48M USD over five years was positively evaluated by the foundation and by CERN, leading to the recent approval of the NextGen by the CERN Council.

Concerning the computing for the 2023 LHC data taking, the data traffic to T0s is closely related to the delivered luminosity of LHC. For the computing resources, the experiments can globally leverage ~40% beyond the pledge capacity at the WLCG sites. The Prévessin Data Centre is now in the commissioning phase of the building and the services such as electrical, cooling and ventilation with the first computing infrastructure installation at the end of this year.

There were no questions following this presentation.

M&O Resources Scrutiny Group Report. H. Sandaker, Chairperson SG

Several members of the Scrutiny Group will be stepping down, many thanks for all their contributions. A call for new members is being placed. The Scrutiny Group has elected Ariane Frey as the new leader for 2024-2025.

Summary:

Overall, very good agreement between the reports from the collaborations and the CERN financial reports has been achieved. The M&O-B carry-over for all experiments is below the agreed 30% of the yearly budget or the experiments will execute a down spending according to the plans. The improved long-term projections for the special online computing replacement accounts of all experiments were presented. A down-spending to zero before and including 2028 is planned. The trend with delayed contributions has been improved. All new sub-detectors in LS2 are now integrated, but the increase in expenses is not yet quite stabilised. The expenses for the detectors to be installed in LS3 have started and are increasing. For the tracking of the entry fees, no issues were found. The war in Ukraine affects all experiments, mitigations are ongoing and not trivial. There are concerns about the rise of the cost of power, inflation, exchange rates and shortages of raw materials etc.

The approval of the M&O-A and M&O-B closing reports for 2022 and the budget requests for 2024 of all four LHC experiments were recommended.

J. Mnich thanked very much H. Sandaker for her many years of service for the Scrutiny Group and for being chair of the Scrutiny Group.

Computing Resources Scrutiny Group Report. P. Sinervo, Chairperson, CRSG

Summary:

For the four LHC experiments, the available computing resources for 2023 meet the needs, especially given the change in the running schedule. The approved resources for 2024 are sufficient to support the approved physics program. There is continued availability of opportunistic CPU utilization by all experiments. The use of the HPC resources continue to rise.

For ALICE, 2025 reflects an expected growth of ~15% driven by pp and PbPb running. The estimation for ATLAS reflects the full year of running, but the increase is smaller than in previous years due to the use of fast simulation. Some increase of CPU, Disk and Tape for CMS in 2025 is expected. For LHCb, the request for 2025 reflects the new computing model with an expected increase of ~60%.

S. Crépé-Renaudin asked what the reason for the increase of raw data size of ATLAS is. P. Sinervo answered that the L1 calorimetry trigger system and read-out was not yet fully commissioned, which lead to a larger data format size than anticipated. Secondly the first (before 2023 data taking) estimation of the pile-up effects was somehow

too optimistic, which lead to an increase of the raw event size. A. Hoecker added that this is related to the LAr super-cell information, which is still read-out for the commissioning.

Summary. J. Mnich

The dates for the next RRB are 22-24 April and 28-30 October 2024.

There being no further questions, the Chairperson closed the meeting.

Reported by: W. Funk