



# Plenary RRB

October 2020

Draft Minutes of the 51<sup>st</sup> Plenary Session of the  
LHC Resources Review Boards  
CERN, Geneva, 26<sup>th</sup> October 2020

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-2020-059 were approved.

CERN Status and News. E. Elsen, Director for Research and Computing

E. Elsen presented the new composition of the Scrutiny Group and the Computing Scrutiny Group for 2020 – 2021.

In the Council meeting in June the European Strategy for Particle Physics was updated and released, which recognises as highest priority the full exploitation of the LHC / HL-LHC and covers as well future Higgs factories, Accelerator R&D, future energy frontier, etc. In the September Council meeting the CERN MTP, which incorporates some near-term elements of the updated strategy, was approved.

There were no questions following this presentation.

Accelerator Status during LS2. E. Elsen, on behalf of F. Bordry, Director for Accelerators

Summary:

A steady ramp up of people working at CERN after the end of the lock-down has been registered. It was reminded that safety is first, second is quality and third is schedule. COVID-19 is treated as an additional hazard with all necessary adjustments.

- Linac 4: The goal of full intensity of 25mA has been reached at the end of the Linac
- Booster – PSB: All scheduled LS2 PSB installation work is finished as planned with now ongoing h/w commissioning for about 3.5 months.
- PS: Several internal devices for the beam dump have been installed and the following handover to the operation team is imminent.
- SPS: The Installation of the new beam dump system is ongoing. The RF cavities are being processed with a new power system, the full chain was tested successfully.
- LS2 HL-LHC civil engineering status: the excavation work at pt1 and pt5 is almost completed.
- 11T magnets: Two of the new dipole magnets should replace one of the long, conventional, currently used magnets. Many issues with those magnets have been solved over the last years, but it is still very challenging to absorb the mechanical stresses particularly when it goes through thermal cycles. The original design had to be adapted to pass at least partially the acceptance tests. However, there are still issues to be solved.

The baseline schedule of LS2 foresaw the installation of some 11T magnets, but the decision was taken not to install these magnets for time being. This does not compromise the Run-3 operation.

The machine requires a pilot beam with a few bunches at full energy in 2021 to verify after opening the entire vacuum that there are no aperture limitations, whereas the restart with beam delivering collisions and luminosity for the experiments is scheduled for February 2022.

There were no questions arising from this presentation.

Status of the Experiments, including Phase II Upgrades. E. Elsen, Director for Research and Computing

Summary:

The ICHEP 2020, which was meant to take place in Prague, was held completely virtually. Several new results were presented, such as the Spin alignment of vector mesons in rotating QGP by ALICE, the striking event by ATLAS showing a jet at  $\sim 2\text{TeV}$  on one side and missing energy on the other side, the decays of the Higgs to  $\mu\mu$  by CMS and the observation of time-dependent CP violation in  $B_s^0$  by LHCb.

Some shutdown work of the experiments was highlighted, like the TPC re-installation on the ALICE cavern in August after testing it at the surface, different work packages performed in the ATLAS cavern, The GE1/1 installation in the CMS cavern and the progress on all the sub-detector upgrades of LHCb.

As of the meeting of June 8, 2020, the baseline schedule for LHC and the experiments requires now that the experimental caverns have to be closed at the beginning of February 2022 in order to allow the start of luminosity production of the LHC. In this schedule, the installation of the NSW-A and the NSW-C of ATLAS and the CMS shielding on both sides can be performed beforehand. A pilot beam in the LHC at the end of September 2021 with the ATLAS detector still open, using a temporary beam pipe, is foreseen.

At that moment a fall-back option for closing the caverns at the end of November 2021 was considered, if in the review at the end of October 2020 the completion of the NSW-C deemed not to be achievable for its installation by the end of 2021, and considering a revised LHCb upgrade schedule. In this case the CMS shielding would have been installed in a YETS in 2021/2022 and the pilot beam run would have been skipped. The foreseen date for the installation of the NSW-C would then be during LS3. The LS3 schedule remained unchanged.

At the follow-up meeting held on October 23, 2020 huge progress and a resource loaded schedule for the NSW-A and NSW-C have been presented, indicating a very strong support by the ATLAS Technical Coordination for the project. It was noted that these commitments and the support by CERN, needs to be maintained during the whole 2021.

The latest possible schedule for the LHCb upgrade, which was strongly affected by the impact of COVID-19 at the collaborating institutes, is still compatible with a closure of the cavern in February 2022. The critical items in this schedule are the SciFi insertion and the VELO installation. The 11T magnets will not be installed during LS2. This baseline schedule would still allow LHC to deliver the planned integrated luminosity before LS3. There will likely be no ion beam for fixed target experiments in 2021. A short EYETS is required in 2023/2024 to install some CO2 cooling equipment for ATLAS and CMS.

It seems now, that due to COVID-19 impacts, the mentioned fall-back option with a closure of the caverns at the end of November 2021 looks unfeasible.

The next follow-up meeting is scheduled for March 15, 2021 using then more knowledge about COVID-19 impacts.

R. Tenchini asked, if the decision not to install the 11T magnets has an impact on other equipment, that has to be installed in the same area, like quadrupoles and if there is an impact on the possibility of running LHC at 14TeV. E. Elsen answered, that with this decision more time for systematic testing of all magnets is available and therefore the chances to run at higher fields and energies is likely increasing. Going in the same direction, the instabilities and ripples of the magnetic field of the new 11T magnets may as well limit the operation at full energy.

M&O Resources Scrutiny Group Report. B. Schmidt, on behalf of H. Sandaker, Chairperson SG

Two new Scrutiny Group members, James Yeck and Eduardo Mazzucato, from 2021 will replace William Christie and Georges Vasseur, who were warmly thanked.

Summary:

The general topics of the Scrutiny Group comprises the cash balance reconciliation between CERN Finance reports and the M&O A budgets of the experiments, where an excellent agreement was found; the long-term projections for the special online computing replacement accounts, where all experiments presented their projections; the M&O-B carry-over, where all experiments are below the agreed 30% of the yearly budget; and the tracking of entry fees, where no issues were found.

This year's specific topics were the impact of COVID-19, where delays in the schedule, expenditures and extensions of contracts had to be dealt with, the LS2 work and the inclusion of new detectors, where all experiments presented their plans and their collection of the Common Funds, which proceeded as planned.

Issues, which were raised during this cycle, were the Service Level Agreements, which resulted in significant changes to most experiments and the concerns of the experiments about the level of subsistence for users due to a different application of the existing French tax laws.

The approval of the M&O-A and M&O-B closing reports for 2019 and the budget requests for 2021 of all five LHC experiments were recommended.

There were no questions following this presentation.

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

Two new Computing Resources Scrutiny Group members (Nadine Neyroud and Jan van Eldik) needed to be approved by the RRB.

Summary:

The four LHC experiments have given updates on their computing and data processing activities and plans including the COVID-19 impacts on operation and material. Half, if not most of 2021, has to be considered as part of LS2. Overall, the total increase of the required CPU capacity is below the "flat budget model", which is ~15% increase per year. The changes of the computing models of LHCb and ALICE are considered in the request for 2021 and 2022. Overall, the usage and the requirements for 2020, 2021 and 2022 are in line with the plans and expectations, which were presented six months ago. The effect of COVID-19 on computing resources has been modest. The group encourages the WLCG and the experiments to continue their efforts to benchmark the use of GPUs for their use.

E. Elsen endorses the new two members of the group.

## Report from the Scientific Computing Forum. E. Elsen, Chairperson SCF

### Summary:

On October 23, 2020, the latest Scientific Computer Forum was held, where the progress in the use of GPUs in HEP Computing was presented by ALICE and LHCb, on which their front-ends are relying. ALICE heterogenous software architecture, using a Mikado approach, runs on AMD GPUs and on x86 CPUs. LHCb is using as well GPUs as part of a heterogenous computing architecture. Both experiments have seen large through-put improvements by employing GPUs with the adapted software architecture.

In addition, Machine Learning and AI were discussed in the meeting. In this respect, very interesting examples were shown, where the resolution and the selection profits from the deep learning.

H. Prosper asked how on this subject one can ensure that efforts are not duplicated across the collaborations. He recognised that there is this forum, but he asked if something more formal should be put in place to avoid duplications. E. Elsen mentioned that this issue is a continuous discussion in the forum, it is difficult to choose the right moment for going officially in only one direction. It is clear, that at some moment, one has to settle down on the best solution, but there is a risk to select too early one or the other platform, which may show up later as the wrong one. A year ago, it was quite questionable, if one could run general purpose code on this GPU environment and now it is almost common. There is a risk, if you prescribe too early how things should look like in the future. At the moment, common meetings, where people are informed about the developments are very important. E. Elsen concluded that yes, one would like to have guidance, but not too much at this stage. L. Malgeri mentioned, that CMS approved recently for the HLT an extended use of GPUs for Run-3. E. Elsen reminded that HEP is not driving this market, HEP should just be flexible enough to pick up the best solution from the market.

### Summary. E. Elsen

The Chairperson concluded the meeting by confirming the new members of both the Scrutiny Board and the C-RSG as previously introduced in the respective presentation and subsequently closed the meeting.

The proposed dates for the next RRB are 26-28 April 2021.

Reported by: W. Funk