

B-factory Programme Advisory Committee

Short Summary of Autumn Review Meeting

19–20 November 2020 Remote Meeting

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Apology received from R. Forty (CERN), * Expert members

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Short summary

The autumn review meeting of the Belle Programme Advisory Committee (BPAC) was held remotely on 19th and 20th of November 2020 focusing on the progress of the SuperKEKB and Belle II operation since the last BPAC review meeting in June 2020. This document summarises the most important findings and recommendations of the committee.

After the summer break, the Belle II experiment has been taking physics data since the end of October 2020 (Run 2020c). Compared to the June BPAC meeting report, overall data taking efficiency has improved from 84.2 % to 88.3 % and the committee congratulates the collaboration for this achievement.

Hardware status of the detector is very good. Although the Belle II collaboration has been coping extremely well with COVID restrictions, continuous attention must be paid to ensure the stable and sustainable operation of the detector for the rest of 2020 and 2021 data taking, where the number of detector specialists onsite will likely be still limited. The committee encourages the collaboration to sustain its efforts to further automate the detector operation, in order to reduce the workload of the shift crews and on-call detector specialists.

Successful completion of the computing hardware replacement at the KEK Computing Research Centre was reported. This work took place during the intensive data processing period. Although most of the core computing activities were migrated to the

new system as planned, some disturbance in the Belle II distributed computing activities was unavoidable. The committee understands that the timing and process for replacing the computing hardware are constrained externally and cannot be controlled by the experiment. However, the collaboration could plan and prepare for the transition to minimise the interruption due to the shutdown and startup procedure. The experience gained from this operation should be used to prepare for the future.

Although there are still features in the data that cannot be fully reproduced by the detector simulation, the understanding of the Belle II detector performance has reached a level sufficient for complex physics analyses, which has been demonstrated by several published results. The collaboration should, however, continue its effort to improve their understanding of the detector performance.

The committee commends the ongoing data analysis work for the coming winter conferences. In parallel with the effort striving toward collecting 1 ab^{-1} of data, the collaboration is encouraged to develop a strategy that exploits the advantages of the Belle II experiment over others. For this purpose, the committee recommends to continue and enhance the existing framework for the communication and collaboration with theoreticians, as well as experimentalists from other experiments, to explore a wider scope of physics programme.

The committee is pleased to hear that the construction of the pixel vertex detector (PXD) with the full two layers and associated beam pipe is proceeding well to be ready for the installation in summer 2022. It is recommended, however, to build up contingency whenever possible since the installation of the PXD will be a delicate operation with a significantly increased number of cables to be accommodated in very limited space. The installation procedure has to be carefully studied.

The accelerator group has been coping very well with COVID situations. While the committee noted that starting up of the accelerator complex has not been so smooth for Run 2020c affecting the commissioning and operation of the SuperKEKB, the group has been addressing the problem efficiently. Stable operation of the linac injector is crucial for the success of the Belle II experiment and sufficient care must be taken. Whereas the understanding of the machine induced background for the experiment is making steady progress, the committee was alerted by the damage in the collimator jaws and a quench of one of the superconducting final focusing magnets. For the experiment running at high luminosities with a small diameter beam pipe at the interaction point, this type of accident is an intrinsic risk. The Belle II collaboration and machine group are strongly encouraged to investigate how to further improve the protection system for the machine and experiment.

Lastly, the committee is pleased to learn that the KEK management was able to allocate resources for an additional month of data taking during the 2020 Japanese Fiscal Year and looking forward to hearing more details of the long term plan with necessary upgrade to achieve 50 ab^{-1} in 10 years during the coming BPAC meetings.