

B-Factory Programme Advisory Committee

Short Summary

9th meeting, 9 – 11 February 2015 at KEK

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Apologies received from H. Lacker (HU Berlin) and N. Neufeld (CERN)

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Short Summary of the Review Meeting

During the 9th review meeting, the committee heard the schedule of the SuperKEKB, the status of the Belle physics analysis, the physics programme of the Belle II experiment and the progress in the construction of the Belle II detector. This report is a short summary of the committee's findings and recommendations.

There have been uncertainties in the start of SuperKEKB commissioning work during the last one year due to budgetary problems. A revised plan was shown in this meeting, where the start of physics data taking would be delayed by one year, compared to the original plan, to October 2018. This would allow the Belle II experiment to start physics with the complete detector, rather than with a partially installed barrel particle identification system as considered during the last committee meeting in February 2014. However, a further delay should be avoided.

Strong analysis effort with the Belle data continues to be carried out, with 21 papers published in peer reviewed journals in 2014. The committee strongly endorses the effort to enable the Belle data analysis in the Belle II software framework, which ensures exploitation of Belle data till the Belle II will start taking physics data. The collaboration must keep providing adequate computing resources for the coming years. Preparation work for the analysis with Belle II data is advancing well. The current idea for the initial Belle II physics programme may require a revision in view of the new machine-detector installation schedule where the physics data taking will start only in October 2018: e.g. a physics programme during the Phase II machine commissioning period. Close collaboration with theorists is encouraged for developing the physics programme.

Good progress has been presented for the work at the intersection region between the machine and experiment. It is particularly important to develop commissioning and operation plans for the SuperKEKB and Belle II in close collaboration. The committee suggests forming a machine-experiment working group for this purpose.

The current idea for the BEAST II detector for the Phase II machine commissioning period was presented. During this period, the Belle II detector will be at the intersection

point and the BEAST II detector will be inserted instead of the Belle II vertex detector together with a temporary beam pipe in order to understand the machine related background. The committee urges the collaboration to develop a concrete project plan for the BEAST II detector with well justified goals and a priority list. It must take into account the required and available resources, and it should not affect the rest of the Belle II construction and commissioning effort.

The pixel detector project is on a good track. The team has successfully verified crucial steps in the production process, which gives strong confidence in the forthcoming detector production. However, the overall schedule is very tight. The committee thinks that the construction of a mockup for the cooling system must be completed according to plan so that crucial cooling tests of the components and the whole system can be started as soon as possible.

A recent change in the project structure, which established a project leader concentrating on the overall aspects of the silicon strip detector project, is highly appreciated. Good progress in the electronics development was reported. Production of pitch adapters remains on the critical path and its progress must be carefully monitored in a systematic manner along with other critical tasks. The committee appreciates the procedures put in place to qualify assembly sites and procedures to sign off components.

The first quartz bar box for the barrel particle identification system has been constructed and a production procedure established. However, various problems discovered during the construction demonstrate that the production process must be further improved and a very stringent quality control procedure must be in place. In parallel, an R&D study on the glueing procedure is encouraged to understand long term stability of the detector. The current plan is that the module acceptance test will be carried out at the Cosmic Ray Stand which is in operation now. A detailed programme must be urgently established for this test. An idea to perform a combined test with the central drift chamber with cosmic rays using a prototype of the Belle II data acquisition system has been presented. This idea must be developed as a proper project in order to judge the goal of the project and required time scale and resources. This effort should not affect the overall schedule of the experiment. Good progress has been reported for the electronics development, but completion of the firmware and production of the final electronics remain on the critical path.

Construction of the end-cap particle identification system is generally making good progress. The project team still needs to gather operational experience for the Hybrid Avalanche Photo Diode to ensure longterm stability of the detector.

There is no major concern for the central drift chamber, neither for the electromagnetic calorimeter nor K_{Long} -muon detector. While a cosmic ray test is being prepared for the central drift chamber, no clear commissioning plan has been presented for the two other detectors.

A coherent software development plan is now in place and performance optimisation work has started. Developments in data acquisition and detector monitoring and control system are advancing well. Recent evolution in the Belle II computing model shows the increased importance of the US and European computing centres and institutes. The committee thinks that it is important to adapt the model and infrastructure requirement to the real needs of the experiment, while avoiding unnecessary complexity. The committee also notes that human resources in the computing related issues are rather limited.