

Short Summary on CERN Scientific Policy Committee Meeting 14-15 December 2015

by T. Nakada on behalf of the members

Geneva, 17 December 2015

Agenda items discussed during the normal session include the following topics:

1. Status of the LHC Machine (F. Bordry), Experiments (S. Bertolucci), and Computing (I. Bird)
2. Status of the ISOLDE and n-Tof activities (K. Blaum)
3. Particle Physics Programme at KEK (M. Yamauchi)
4. Preview for the Medium-Term Plan 2017-2021 (F. Gianotti)
5. Five-Yearly Review Report on the Fellows, Associates and Students Programmes (S. Hegarty)
6. Discussion on the European neutrino activities: DUNE (A. Rubbia), Hyper-K (F. Di Lodovico), CERN neutrino platform (M. Nessi), and Other activities (K. Long)

Reply to the Council question concerning the CERN activities for the future energy frontier machines was also discussed.

The committee congratulates the machine group for successful commissioning work for the LHC startup at $\sqrt{s} = 13$ TeV, which led to stable physics data taking, with a peak luminosity of $\sim 5 \times 10^{33} \text{ cm}^{-2}\text{s}^{-1}$ by the end of 2015 proton run. A total of $\sim 4 \text{ fb}^{-1}$ pp collision data was collected by the ATLAS and CMS each, and wealth of their physics results have been presented during the LHC Seminar in the afternoon of 15 December. Those results extend the validity of the Standard Model to a higher energy scale than what was obtained by the Run 1 data with much higher statistics. This is a good demonstration of advantage for operating at higher energies. ALICE and LHCb are also publishing their results from the $\sqrt{s} = 13$ TeV data and all four experiments took data with Pb-Pb collisions at $\sqrt{s} = 5$ TeV per nucleon. The SPC applauds everyone who contributed to this great achievement and is looking forward to the data taking in 2016, in which the β^* should be reduced to 40 cm in order to achieve the nominal luminosity, $10^{34} \text{ cm}^{-2}\text{s}^{-1}$, after the technical stop. The committee supports the decision by the machine group not to remove the “Unidentified Lying Object” during the technical stop, since removing the object requires opening of the magnet, which comes with associated risk, and the object does not seem to limit the aperture of the machine. Cleanup of the contamination in the cryogenic circuit of the CMS magnet

during the technical stop is crucial and must be completed with utmost care and without being compromised by the schedule of the technical stop. The committee pleasantly notes that large effort on the software development was made in order to optimise algorithms and to exploit the new CPU architectures. Also the computing models are evolving to access various computing resources. As a result, computing resource requirement for data processing and analysis before the High Lumi Upgrade is no longer a serious concern. However, computing resources for the High Lumi LHC remains an issue.

The committee is impressed by the large variety of interesting science being pursued at the ISOLDE and n-Tof facilities. Experiments are addressing not only nuclear physics, which is the core programme, but also astrophysics, material science, biology and life science. The facilities are attracting many users and young physicists are developing their unique research programme, which can be seen by the several ERC grants awarded to them. The SPC congratulates the machine group for successful completion of the HIE-ISOLDE commissioning and start of its physics exploitation. This will further boost diversity of the CERN scientific programme. Recent positive development for reinstalling the TSR project into the scientific programme as a result of continuous efforts by the CERN management is highly appreciated by the committee.

Flavour physics is a focal point of the KEK physics programme with Super KEK-B in Tsukuba campus and muon and kaon beams at JPARC, by performing precision tests of the Standard Model and beyond. In addition, neutrinos are sent from JPARC to the Super-KAMIOKANDE for neutrino mixing parameter measurements. They also provide photons, positrons, muons and neutrons for material and life science. Hyper-KAMIOKANDE and ILC are the two future large scale programme being considered now. For the Hyper-KAMIOKANDE, substantial reduction of the cost is being implemented in order to fit to a level which could be considered by the existing Japanese funding framework, while efforts to attract international funding have started for the ILC that requires resources beyond what a single country can provide. The committee notes the importance of Japanese role in the worldwide particle physics activities.

The committee takes note of the preview of the 2017-2021 Medium-Term Plan given by the Director General designate and is looking forward to hear some details during the March meeting, followed by a White Paper for the May meeting.

Presentation of the Five-Yearly Review Report on the Fellows, Associates and Students Programmes for 2010 to 2014 was very useful and much appreciated. The committee particularly applauds the success of attracting young students and scientists to CERN through this programme to disseminate CERN's scientific and engineering wealth. Ongoing efforts to improve the gender balance is well recognised and should be strengthened with further proactive actions to the target group in the complete career path. While the total number of fellows over the five years increased significantly, little change is observed for the number of fellows in theory and experimental physics. These fellows work on the core activities of CERN and are vital for the future of the field and the committee stresses that the current level should be maintained and not be affected by any possible cuts in the future.

The European Strategy for Particle Physics stresses the importance of CERN to "pave the way for a substantial European role in future long-baseline experiments". The CERN Neutrino Platform is a reply and implemented in the Medium Term Plan. In this meeting, four speakers provided to the committee valuable information on the European neutrino activities. DUNE and Hyper-KAMIOKANDE are two large long baseline neutrino projects deploying different types of beam and detector technology providing complementary nature.

For the DUNE experiment, the US has made a strong commitment to provide infrastructure, with strong European participation in the experiment, and FNAL plays a role of host laboratory. For the Hyper-KAMIOKANDE experiment, KEK and the University of Tokyo are forming a team to realise such a facility and many European groups in the T2K experiment are interested in the participation. The CERN Neutrino Platform, now under construction, provides infrastructure where future neutrino experiments can test large scale prototype and final detectors and several proposals have already been approved and work started. Other ideas presented were to produce a long baseline neutrino beam by extending the European Spallation Source (ESS) facility and to use high intensity muons as a source of neutrinos. The SPC appreciates those presentations for the future discussions. The committee also notes the remark by the Director General designate that CERN intends to form a neutrino physics group for contributing to physics studies and to fully capitalise the Neutrino Platform.

Discussion on the Council questions concerning the CERN involvement in the future energy frontier machines reached a general consensus and this is given in the slides used for the presentation to the Council and will be elaborated in the coming months.

The meeting was closed after expressing the committee's sincere acknowledgement to the outgoing members of the management and the President of the Council who was attending the meeting for the last time in her capacity.