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Response from the German Committee for Particle Physics (KET) to the ESG request for further input on collider scenarios

Submitted by the German Committee for Particle Physics, KET¹

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Abstract

Based on the German input to the European Strategy Process “Statement by the German Particle Physics Community as Input to the Update of the European Strategy for Particle Physics” submitted in December 2018 the German Committee for Particle Physics (KET) has formulated the following answer to the ESG request for further input on different collider scenarios. The answer has been discussed during the annual meeting of the German particle physicists in November 2019.

¹ KET (Komitee für Teilchenphysik) is an elected body of the German particle physics community which represents the community inside and outside of Germany.

The German particle physics community has provided input to the ESPPU process in its document “Statement by the German Particle Physics Community as Input to the Update of the European Strategy for Particle Physics” submitted in December 2018. This statement is the consensus result of a two-year long series of community workshops.

The key statements² addressing present and future large colliders and to CERN formulated in the German input document are:

The physics potential of the experiments at the LHC and its upgrade, the HL-LHC, as well as at SuperKEKB must be fully exploited.

An electron-positron collider, upgradeable to a centre-of-mass energy of at least 500 GeV, should be realised, with the highest priority, as the next international high-energy project.

We strongly support the Japanese initiative to realise, as an international project in Japan, the ILC as a "Higgs-Factory" with an initial centre-of-mass energy of about 250 GeV.

Continuation of the development of accelerator and detector technologies and studies for a next-generation hadron collider, at the highest possible centre-of-mass energies beyond the LHC, should be pursued with high priority.

CERN must maintain its leading role in particle physics, and further develop its potential. This requires the continued close collaboration with national laboratories, institutions and universities.

In response to the ESG request to provide additional input on the scenarios for CERN-based large colliders we further expand on these consensus statements:

We reaffirm CERNs leading role in particle physics. A long-term perspective for the laboratory is vital for the development of our field.

The successful realization of the HL-LHC and the full exploitation of its physics potential should be the highest priority for the mid-term future.

As next international high-energy project, we consider an electron-positron collider as highest priority of our field. Maximum complementarity with measurements at hadron colliders would require the collider to be upgradable to centre-of-mass energies of at least 500 GeV to allow direct measurements of the Higgs self-couplings and to provide a high sensitivity to BSM physics.

Currently, different design options for the next electron-positron collider are being discussed; one of these machines should be built. The decision for one of these projects and its realisation should happen in a globally coordinated context and as an international effort. Europe, with CERN as the European laboratory for particle physics, should play a leading role in both the decision making process and the realisation of the next electron-positron collider project.

We emphasise the vital role of CERN for Particle Physics in Europe and world-wide and believe that CERN should prepare to host the next hadron collider at the high-energy frontier.

Europe through CERN and the national laboratories and institutes should pursue the development of advanced accelerator and detector technologies with high priority.

² For brevity, we do not repeat the entire list of statements given in the December 2018 document.