### Action to be taken

| For information | SCIENTIFIC POLICY COMMITTEE  
|                 | 315th Meeting 
|                 | 23-24 September 2019 | - |

| For information | RESTRICTED COUNCIL EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE  
|                 | EUROPEAN STRATEGY MATTERS  
|                 | 194th Session 
|                 | 27 September 2019 | - |

### REPORT ON ECFA ACTIVITIES
Report on ECFA Activities

1. Dates of Plenary and Restricted ECFA meetings, and ECFA Newsletters

Since the Council meetings in September 2018, two Plenary ECFA (PECFA) meetings have taken place, as listed below. The agendas and presentations can be accessed via the links provided.

103rd Plenary ECFA meeting at CERN, 15-16 November 2018: https://indico.cern.ch/event/759130/

104th Plenary and Joint ECFA-EPS session in Ghent (Belgium) on the occasion of the EPS-HEP conference, 13 July 2019: https://indico.cern.ch/event/577856/sessions/291392/#20190713

The presentations were webcast and the recordings shared with the community. A novelty is the publication of ECFA Newsletters following each Plenary ECFA meeting. The biannual newsletters are shared with the community via a mailing list and are also available on the ECFA website: https://ecfa.web.cern.ch/content/ecfa-newsletters. Anybody with a CERN account (including a lightweight account) who wishes to receive them can join the e-group by clicking on “Members” under the following link: https://e-groups.cern.ch/e-groups/Egroup.do?egroupId=10319139&AI. For information to the CERN Council delegates, the first three issues are attached to the printed version of this report.

During the same period, Restricted ECFA (RECFA) visited the following countries:

The Netherlands, 19 October 2018: https://indico.cern.ch/event/753418/
Spain, 1 March 2019: https://indico.cern.ch/event/790274/
Slovenia, 5 April 2019: https://indico.cern.ch/event/800978/
Poland, 24 May 2019: https://indico.cern.ch/event/813051/

The agenda and content of the open sessions can be accessed via the links provided.

Additional RECFA meetings took place prior to the PECFA meetings, on 14 November 2018 and 13 July 2019, as well as a special RECFA meeting on 14 December 2018, dedicated to the topic of the ECFA-initiated working group revolving around the comparison of the expected performance of future colliders in the field of Higgs physics.
2. Plenary ECFA meetings

a. The 103rd PECFA meeting at CERN (November 2018)

The meeting was open to the community at large, with seats reserved for registered ECFA members. We heard reports on activities at CERN, DESY and the National Laboratory of Frascati. Mid-term reports were scheduled from Denmark and Israel, as well as a report from the ECFA Detector R&D Panel on the survey it had conducted within the European community during summer 2018. In the light of an ECFA-initiated survey on the recognition of individual achievements in large scientific collaborations, a dedicated open session on that topic took place, including presentations and a debate. The open session that followed covered technologies relevant for future colliders and included overview presentations of each proposed future collider worldwide.

The content of the presentations and discussions during the meeting were reported in ECFA Newsletter #2 (24 pages). All presentations were webcast and the recordings are available on the Indico page of the meeting: https://indico.cern.ch/event/759130/.

b. The 104th PECFA meeting in Ghent (July 2019): joint ECFA-EPS session

The topic of the joint ECFA-EPS session was “Toward the Update of the European Particle Physics Strategy”. Reports were presented on the Open Symposium for the update of the European Strategy for Particle Physics, which had been held in Granada (Spain), with a particular focus on a number of topics that merit further attention. These included technologies for future colliders, detector R&D, what future colliders can reveal about the Higgs boson, physics beyond colliders, synergies between particle physics, astrophysics and nuclear physics and, last but not least, challenges in software and computing.

The content of the presentations and discussions during the joint ECFA-EPS session were reported in ECFA Newsletter #3 (16 pages). All presentations were webcast.

3. RECFA country visits

Since 2018, the reports on RECFA’s country visits have contained both an executive report and an extensive report in which RECFA elaborates on its recommendations. Both the executive summaries and the extensive reports are available on the ECFA website (http://ecfa.web.cern.ch/content/executive-summaries-and-letters-member-states#overlay-context=content/archives). The executive summary of each visit is reproduced below.
a. The Netherlands, October 2018

It was a great pleasure for the European Committee for Future Accelerators (ECFA) to visit the Netherlands on 19 and 20 October 2018. Please find enclosed a brief summary of our recommendations, followed by a more extensive letter in which we elaborate on these themes.

- Dutch involvement in high-energy physics via Nikhef, which is one of the strongest particle and astroparticle physics institutes in Europe, is an exemplary model that combines a national laboratory with universities.
- The education system is very impressive and is clearly a source of great motivation for PhD students.
- To remain at the forefront in Europe, we encourage Nikhef to sustain its mission for a strong R&D component in instrumentation, to foster a sense of innovation and to prepare, in a timely fashion, its workshops for the future beyond the already planned projects.
- At the same time, we look forward to a strong signal being sent by the funding authorities of their willingness to embrace the upgrade vision for the data centre supporting particle physics and other research fields.
- The committee appreciated the creation of an internal advisory board linking particle physics, astroparticle physics and astronomy in the Netherlands.

In closing, on behalf of ECFA, I would like to thank the Dutch particle physics community and the Dutch government for their hospitality.

b. Spain, March 2019

It was a great pleasure for the European Committee for Future Accelerators (ECFA) to visit Spain on 1 and 2 March 2019. Please find enclosed a brief summary of our recommendations, together with a more extensive letter in which we elaborate on these themes.

- With about 1000 researchers, Spain is a stronghold of high-energy physics in Europe, and it gave the Committee great pleasure to note the community's strong scientific ambition.
- On the international level, the Committee underlines its appreciation of the researchers from Spanish institutions who are involved in the LHC experiments, namely ATLAS, CMS and LHCb.
- We appreciate the recent efforts by the Spanish government to establish a budget line for the annual construction and operation costs of the LHC experiments mentioned in the MoUs, allowing long-term planning for Spain’s participation in large research infrastructures.
- National networks enhance Spain’s research, but the funding for these networks has reached a critical level and the budget should at least be maintained.
Several excellent accelerator facilities serving applications in academia and industry are in operation in Spain, and the related accelerator R&D projects have a major impact in the field as a whole.

The majority of engineers and researchers in detector R&D and construction are hired on project-based budgets, which the Committee perceives as a weakness in the system that needs to be corrected in order to sustain the leading position of Spanish groups in this technology-oriented field.

We applaud Spain’s efforts to make CERN attractive for industry, as well as its plans to further strengthen the industry liaison system.

In closing, on behalf of ECFA, I would like to thank the Spanish particle physics community and the Spanish government for their hospitality.

c. Slovenia, April 2019

It was a great pleasure for the European Committee for Future Accelerators (ECFA) to visit Slovenia for the first time on 4 and 5 April 2019. Please find enclosed a brief summary of our recommendations, followed by a more extensive letter in which we elaborate on these themes.

• The strategic focus on the ATLAS and Belle2 experiments has resulted in a high level of visibility for the Slovenian particle physics research groups.
• The Committee strongly appreciates the efforts by the funding bodies to maintain an adequate budget supporting long-term engagement in high-energy physics experiments, and especially to secure the necessary funding for the upcoming upgrade of the ATLAS detector at CERN.
• The continuous exploration of synergies between the research interests of the Slovenian theoretical and experimental groups in high-energy physics is excellent, and such collaborations should be supported.
• The Slovenian groups working in detector R&D are to be commended for their strong ambition and experience, but the overall lack of technical support for high-energy physics research needs to be addressed.
• Thanks to its standards of excellence, the computing team is deeply involved in both international and Slovenian computing developments, which should result in a leading role for them when the planned High-Performance Computing resources are deployed in Slovenia.
• The Committee is of the opinion that, given the strength of the research groups, more PhD students could be trained in experimental particle physics, assuming that additional funding can be allocated to this.
• The Committee recommends that the Ministry sustain the excellent level of participation in the Slovenian teachers programme at CERN.

In closing, on behalf of ECFA, I would like to thank the Slovenian particle physics community and the Slovenian government for their hospitality.
d. Poland, May 2019

It was a great pleasure for the European Committee for Future Accelerators (ECFA) to visit Poland on 24 and 25 May 2019. Please find enclosed a brief summary of our recommendations, together with a more extensive letter in which we elaborate on these themes.

- We congratulate the Ministry for making funding towards the LHC experiments at CERN possible, particularly outside a competitive grant system and while keeping an eye on the remaining budget requests for the LHC detector upgrades.
- Although the Polish groups at the LHC experiments are a minority in the country’s particle physics landscape, they excel in all aspects of the experiments, making contributions to both hardware and software developments, as well as to physics analyses.
- Updating the Polish roadmap for research infrastructures provides an opportunity to streamline investments: a meaningful dialogue with the research community on reforming the science and higher education system could mitigate the currently perceived high level of insecurity when it comes to planning the typically long-term projects in particle physics.
- In addition to the ample opportunities for collaboration on an international level, Polish particle physicists could be encouraged to apply in a concerted way for grants, in order to enhance domestic collaboration.
- Developing a clear funding path for pure detector R&D projects is essential.
- The Polish system of Industry Liaison Officers is well organised, with two-way communication between companies and researchers, and they are demonstrably ready to pursue their ambition to organise the 2022 Big Science Business Forum in Poland.
- A more profound integration of particle physics topics into the curricula of Bachelor’s education could attract more Master’s students, ultimately enabling Polish research groups in particle physics to take on more PhD students.

In closing, on behalf of ECFA, I would like to thank the Polish particle physics community and the Polish government for their hospitality.

4. Ongoing and initiated working groups, workshops and panels

Some ECFA-initiated working groups and panels, as well as some workshops that are relevant in the context of future colliders, are listed below.

a. Higgs Physics at Future Colliders working group

To prepare for the discussions in the context of the update of the European Strategy for Particle Physics, ECFA initiated a working group with the mandate to compare the expected performance of future colliders in the field of Higgs
physics. The report from the working group was delivered to the community prior to the Open Symposium in Granada and was essential for the discussions. The report is available at http://arxiv.org/abs/arXiv:1905.03764. The results were presented during the Open Symposium. Work is being done to complete the report, taking into account the discussions during the Open Symposium, as well as additional studies. The working group was chaired by Aleandro Nisati (INFN Sezione di Roma, Italy).

b. Detector R&D

In 2016, ECFA created a detector R&D panel to review detector development efforts for future projects. The aim of the panel is to provide advice on such efforts for projects in their preliminary and preparatory phases. It helps to create coherence in global detector R&D efforts by encouraging synergies between different activities and advising funding agencies on request. The panel has only a reviewing and advisory role: it does not assume any coordination of the R&D programmes, nor does it take part in any science policy decisions. The current chair of the panel is Phil Allport (University of Birmingham, UK). During the Plenary ECFA meetings, the panel reported extensively on the outcome of a survey that provided input for the process of updating the European Strategy for Particle Physics. The survey assessed the deployment and strength of R&D activities in astroparticle, neutrino, nuclear and particle physics in Europe. The report is available on the ECFA website and via the following direct link: http://ecfa.web.cern.ch/sites/ecfa.web.cern.ch/files/ECFA_detector_panel_ESPP_U_input_Dec2018.pdf. These results have also been presented to the European Strategy Group as input for one of its working groups.

c. Recognition of individual achievements in large collaborations

ECFA acknowledges the importance of the correct recognition of individual achievements and affirms the challenges therein when dealing with scientific collaborations of between one hundred and many thousands of researchers. A working group conducted an extensive survey within the community and presented the results during open and webcast Plenary ECFA meetings. A debate was held in the Main Auditorium at CERN to further the discussion on the observations of the survey. The results of the working group are available on the ECFA website and via the following direct link: https://indico.cern.ch/event/759130/contributions/3148323/attachments/1753311/2874608/ECFA-Survey-Recognition-Results.pdf. These have also been presented to the European Strategy Group as input for one of its working groups. The next step agreed between ApPEC, ECFA and NuPECC is to invite the relevant scientific collaborations in our fields to assign delegates to join a working group to further the discussions across collaborations. The key objectives within the working group’s advisory and exploratory mandate are to exchange and discuss best practices and reflect on alternative or additional procedures, and to potentially perform a second survey in 2020-2021 to monitor progress on the
topic. The group will, however, not be an ombuds committee for individual problems. The collaborations themselves remain responsible for implementing (or not) recommendations arising from within the working group. ApPEC, ECFA and NuPECC will facilitate the organisation of the working group.

d. Joint working group with ApPEC and NuPECC: joint seminar

ApPEC and NuPECC have many elements in common with ECFA, scientifically, technically and in the organisation of our research. A joint ApPEC-ECFA-NuPECC seminar (JENAS), very similar to the triennial ICFA seminars, will be organised every three years. The first will be held at LAL Orsay (France) on 14-16 October 2019 (https://jenas-2019.lal.in2p3.fr). Priority registration was organised for the members of ApPEC, ECFA and NuPECC, as well as key representatives in our research fields. Thereafter, registration was opened for the community at large, resulting in more than 225 participants registered already. Presentations will provide an overview of scientific and technical achievements and upcoming challenges, as well as potential synergies and organisational, outreach and valorisation aspects. The event will be webcast.

e. Joint working group with ApPEC and NuPECC: diversity charter

Diversity is an important aspect for all organisations, including the scientific organisations and collaborations within our community.

APPEC, ECFA and NuPECC recognise the importance of diversity as a motor to boost productivity and innovation, fight prejudice and discrimination and contribute to the improvement of social and economic standards. The three organisations joined together to propose a diversity charter, to be signed by research organisations, collaborations and conferences within the fields of particle, nuclear and astroparticle physics who value diversity and commit to promoting equal opportunities at all levels. In the first phase, diversity within the different signatory bodies will be monitored. To simplify this task for all partners involved, a survey is being prepared, which will be filled out on a voluntary and anonymous basis by people affiliated with and collaborating with the signatory bodies. Initially, few basic variables are proposed for data collection, in order to simplify privacy issues. If any signatory entity prefers to monitor the data itself, it is free to use any other method and simply communicate the results of its analysis. An ApPEC-ECFA-NuPECC working group has been established to prepare the survey and present its results, with a view to delivering a charter for signatures by the time of the above-mentioned JENAS meeting in October 2019, and to follow up the monitoring of the survey and the collection of signatures. Both the charter and the survey will be made available on the ECFA website.

f. The International Workshop on Future Linear Colliders was held at the University of Texas (US) on 22-26 October 2018. The agenda is available at https://agenda.linearcollider.org/event/7889/. The workshop was devoted to the study of the physics case for a high-energy linear electron–positron collider,
taking into account the recent results from the LHC, and to reviewing the progress in the detector and accelerator designs for both the ILC and CLIC projects. A town meeting of the linear collider community was held on 8-9 April 2019: https://indico.cern.ch/event/789524/. The meeting had three main objectives: to initiate the formation of a strategy for future linear collider activities, to discuss how to present the case for linear colliders at the Open Symposium in Granada and to address the future organisation of international linear collider activities beyond the LCC. The open meeting was arranged on the initiative of LCB/IFCA and was supported by ECFA. After the meeting, a statement from the linear collider community was published: https://indico.cern.ch/event/789524/contributions/3380195/attachments/1826537/3016235/lc-strategy-May2019.pdf.

g. The fifth annual meeting of the Future Circular Collider study was held in Brussels (Belgium) on 24-28 June 2019. The agenda is available at https://indico.cern.ch/event/727555/. This conference was also the final event of the H2020 EuroCirCol Design Study. FCC week 2019 marked the completion of the conceptual feasibility study for a post-LHC research infrastructure, which is documented in the four volumes of the FCC Conceptual Design Report. FCC Week 2019 brought together leading minds in science, engineering and economics to review the results of the first phase of the FCC study and to discuss and set the short-term goals for the coming years. The status of key technology R&D programmes was reviewed. The meeting was an excellent opportunity to reinforce the bonds between the collaborating institutes and to draft the work plans for the next design phase. FCC Week 2019 followed the traditional layout of plenary and parallel sessions covering all aspects of the study: physics, experiments, machine design, technologies, infrastructures and civil engineering. The first day featured a set of plenary keynote presentations by top-ranking international speakers from the worlds of science, industry and European affairs. The “Economics of Science” session brought together leading experts from the fields of economics and political science, as well as from leading research infrastructures, to discuss the potential socio-economic impacts of a future particle collider programme.

5. ECFA and international relations

ECFA is represented in several international committees through its Chair. The Chair represents the interests of the European particle physics community and serves as a link between ECFA and a given committee. Within the reporting period, the following is worth noting:

a. ICFA (http://icfa.fnal.gov)

The International Committee for Future Accelerators (ICFA) has as its mission to facilitate international collaboration in the construction and use of accelerators for high-energy physics. ICFA was created in 1976 by IUPAP. It is composed of the directors of leading international particle physics laboratories
and representatives of the worldwide particle physics community, and has a total of 16 members. ICFA held its 83rd meeting in Tokyo (Japan) on 7-8 March 2019 and its 84th meeting in Toronto (Canada) on 7 August 2019. On the occasion of its annual meeting in Tokyo, ICFA heard an update from the Japanese government about its statement relating to hosting the ILC project in Japan. On behalf of Japan’s Ministry of Education, Culture, Sports, Science and Technology (MEXT), Dr Keisuke Isogai (Director-General of MEXT’s Research Promotion Bureau) gave his inaugural presentation to ICFA and the Linear Collider Board (LCB). ICFA views the statement of continuing interest in the ILC within MEXT and related ministries and agencies as an important milestone along the path to the ILC. In his address to ICFA/LCB on 6 March, Hon. Takeo Kawamura, Member of the House of Representatives and Chair of the Federation of Diet Members for the ILC, affirmed the support for the ILC within the Diet. In its statement following the Japanese addresses, ICFA confirmed the international consensus that the highest priority for the next global machine is a “Higgs factory” capable of precision studies of the Higgs boson. At the ICFA meeting in Tokyo, options for a Higgs factory were discussed: namely the ILC, as well as other collider technologies. ICFA reaffirmed the scientific significance of the ILC and the fact that it is in a sufficient state of technical readiness for construction to be approved. ICFA also underlined in its statement that both the European Strategy for Particle Physics Report of 2013 and the United States Particle Physics Project Prioritization Panel (P5) Report of 2014 had expressed support for the Japanese physics community’s initiative to host the ILC in Japan. ICFA recognises that, although MEXT is interested in the ILC and will continue to discuss the project with other governments, Japan is not yet able to declare its willingness to host the facility. A clear statement of Japan’s position towards hosting the ILC would have had significant impact in the ongoing discussions on the formulation of the European Strategy for Particle Physics update. ICFA notes with satisfaction the great progress made concerning the various proposed Higgs factories across the world. All options will be considered in the European Strategy for Particle Physics update and by ICFA. The Committee’s statement can be found on the ICFA website: https://icfa.fnal.gov.

b. ICFA and LCB matters

The Linear Collider Board (LCB) typically meets on the occasion of ICFA meetings. During its meeting in Tokyo (Japan) on 7-8 March 2019, the Board discussed the statement made by the Japanese officials relating to hosting the ILC in Japan. The Chair of the committee, Professor Tatsuya Nakada, expressed his gratitude for the information received at this stage. Previously, the LCB had agreed on three desirable points to be mentioned in a Japanese statement on the ILC, which were also endorsed by the International Committee for Future Accelerators (ICFA) at its meeting in November 2017 in Ottawa (Canada). The Summary says: “After the discussion, the LCB members reached the following conclusion. In order to adhere to the plan, it would be crucial to have a statement from the Japanese government in time for the March 2019 LCB/ICFA meeting, expressing its strong interest to host the ILC in Japan and its intention to initiate international discussion, together with an indication of possible Japanese
contribution along the lines suggested in the LCB conclusion endorsed by ICFA in Ottawa in November 2017.” In its response to the MEXT officials, the LCB acknowledged that MEXT had positively addressed some of those points by stating its interest in the ILC project and its intention to continue the discussion with other governments. The LCB took note on the same occasion that the endorsement by the Japanese academic community, through the process conducted by the Science Council of Japan (SCJ), is important if the Japanese government is to draw a positive conclusion for hosting the ILC. The LCB will pay close attention to the progress of the SCJ’s discussions and hopes for a positive outcome in a timely manner. Furthermore, in its reply to the MEXT officials, the LCB stated that the ILC hosted by Japan is extremely attractive and that the community will continue to support the initiative. However, in the present situation, the LCB stated that it should be expected that other collider options would also be considered in the forthcoming community discussions. While it is understood that MEXT needs further consultation and evaluation of domestic and international development in the matter, with growing support for the ILC from various sectors in Japan, the LCB still hopes that the Japanese government may issue a statement proposing to host the ILC in sufficient time for the facility to be well integrated into the European Strategy discussions. The LCB’s letter can also be found on the ICFA website.

c. EPS-HEPP (https://eps-hepp.web.cern.ch/eps-hepp/)

The ECFA Chair is an invited member of the EPS-HEPP Board. The latest EPS-HEP conference was held in Ghent (Belgium) on 10-17 July 2019. A joint EPS-ECFA session relating to the process of updating the European Strategy for Particle Physics was also held on 13 July. The session was very well attended by both ECFA members and participants in the EPS-HEP conference. The session was also webcast. ECFA Newsletter #3 reports on the session.

d. ApPEC (http://www.appec.org)

The ECFA Chair is an invited member of the General Assembly of ApPEC. Likewise, the ApPEC Chair, or a delegate, joins the Restricted and Plenary ECFA meetings. During ApPEC meetings, the ECFA Chair takes the opportunity to inform the members of ApPEC about the progress made in updating the European Strategy for Particle Physics.

e. NuPECC (http://www.nupecc.org)

The ECFA Chair is an Observer member of NuPECC. Likewise, the NuPECC Chair, or a delegate, joins the Restricted and Plenary ECFA meetings. During NuPECC meetings, the ECFA Chair takes the opportunity to inform the members of NuPECC about the progress made in updating the European Strategy for Particle Physics.
6. Schedule of upcoming ECFA meetings

RECFA will visit Cyprus on 25-26 October 2019. RECFA and PECFA meetings will be held at CERN on 14-15 November 2019. The Plenary ECFA meeting is scheduled for Thursday, 14 November and Friday, 15 November.

A full-day open session of Plenary ECFA will be held on 14 November 2019 in the Council Chamber at CERN. The session is open for all to participate and will revolve around novel accelerator technologies: towards colliders using plasma wakefield acceleration, colliders with muons, and high-temperature superconducting (HTS) magnets.

A full-day ECFA session for early-career researchers will be held on 15 November 2019 in the Main Auditorium at CERN. Participation will be by invitation only and limited to early-career researchers. With a deadline of 9 September, up to 10 early-career researchers can be nominated by each RECFA member, i.e. 10 for each country (plus CERN). Both PhD students and postdocs active in particle physics and/or adjacent fields are eligible, and eligible nominees will receive an invitation from the ECFA Chair.

On 15 November 2019, in parallel to the event mentioned above, a meeting of Restricted ECFA will take place, followed by a meeting of Plenary ECFA.

The details of these events will be announced in due course on the ECFA website: https://ecfa.web.cern.ch. The presentations will be webcast and the recordings shared with the community.

RECFA visits to Serbia, France and Ukraine are being planned for the first half of 2020, and to Denmark for the second half. Plenary ECFA meetings will be held at JINR in Dubna (Russia) on 13-14 July 2020 and at CERN on 19-20 November 2020.