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ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

PLENARY ECFA
101st Meeting
CERN – 16 and 17 November 2017

Draft Minutes

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LIST OF PARTICIPANTS

The meeting was called to order at 2.00 p.m. on Thursday, 16 November 2017.

1. ADOPTION OF THE AGENDA
(Item 1 of the Agenda) (ECFA/17/303)

The Agenda (ECFA/17/303) was adopted.

2. APPROVAL OF THE DRAFT MINUTES OF THE 100TH MEETING OF PLENARY ECFA HELD AT CERN ON 24 AND 25 NOVEMBER 2016
(Item 2 of the Agenda) (ECFA/16/302)

The Minutes of the 100th meeting of Plenary ECFA (ECFA/16/302) were approved.

3. ENDORSEMENTS AND WELCOME – NEW MEMBERS
(Item 3 of the Agenda)

The CHAIR reported that, at its last meeting on 7 October 2017 in Istanbul, Restricted ECFA had converged on a candidate to propose as the new Chair of ECFA.

The Committee unanimously endorsed the appointment of J. D'Hondt (Vrije Universiteit Brussel) as the Chair of ECFA for a period of three years as of 1 January 2018.

Applause.

The CHAIR presented[1] the list of new members of Plenary ECFA and new representatives to Restricted ECFA.

The Committee unanimously endorsed the appointment of the following new members of PECFA:

- R. Schoefbeck of Austria;
- M. Voutilainen of Finland, replacing K. Osterberg;
- G. Bernardi of France, replacing D. Lacour;
- V. Manzari, S. De Curtis, A. Cardini, L. Lista and S. Falciano of Italy, replacing V. Muccifora, A.D. Polosa, P. Giannetti, P. Paolucci and D. Bettoni respectively;
- E. Adli of Norway, replacing P. Osland;
- P. Conde Moino of Portugal;
- R. Pasechnik of Sweden, replacing J. Rathsman;

[1] See Indico: https://indico.cern.ch/event/667672/

- S. Sultanov of Turkey.

The Committee unanimously endorsed the appointment of the following new RECFA country representatives[2] as of 1 January 2018:

- M. Jeitler of Austria, replacing C. Wulz;
- P. Razis of Cyprus;
- M. Dam of Denmark, replacing P. Hansen;
- K. Lassila-Perini, replacing P. Eerola;
- E. Gross of Israel, replacing S. Tarem;
- A. Read of Norway, replacing G. Eigen;
- D. Milstedt of Sweden, replacing R. Brenner;
- S. Cetin of Turkey.

Finally, the CHAIR invited the Committee to endorse the updated ECFA Terms of Reference, which had been approved by RECFA in July and circulated to PECFA members via e-mail on 31 October 2017.

The Committee unanimously endorsed the updated ECFA Terms of Reference (ECFA/81/52/Rev. 5).

4. CHAIR'S REPORT

(Item 4 of the Agenda)

The CHAIR presented her report on ECFA's activities in 2017[3], highlighting the geographical enlargement of ECFA and country visits by RECFA to Bulgaria, Belgium, Finland and Turkey. ECFA-supported Linear Collider Workshops had been held three times over the past year and a Future Circular Collider study meeting had taken place in Berlin in June 2017. She provided updates on the composition of ICFA and of the Linear Collider Collaboration, and noted that the triennial ICFA Seminar had taken place in Ottawa, Canada between 6 and 9 November 2017, during which ICFA had made a formal statement in support of a staged approach to the International Linear Collider (ILC), starting with operation at 250 GeV but preserving the possibility of future extensions to higher energies. In 2018, Plenary ECFA would meet twice, at the ALBA synchrotron light facility in Barcelona in July and at CERN in November, and Restricted ECFA was scheduled to make country visits to Romania, Austria, Slovakia and Cyprus. Lastly, the Secretariat for the next update of the European

[2] Short CVs of the new RECFA members available on Indico: https://indico.cern.ch/event/667672/
[3] See Indico: https://indico.cern.ch/event/667672/

Strategy for Particle Physics had recently been established, along with a preliminary timeline aimed at completing the update process by May 2020.

In reply to a question from GIANOTTI (CERN Director-General) regarding the timeline for the update of the European Strategy for Particle Physics, the CHAIR said that the Strategy Secretariat had arrived at the decision to hold an Open Symposium in May 2019 by working backwards from the goal of approving the updated Strategy in May 2020, allowing sufficient time for the drafting of the briefing book and its discussion by the Strategy Group. The idea of holding two public meetings had been dismissed on cost grounds, but the EPS-HEP meeting in July 2019 would potentially provide an opportunity to resolve any issues not concluded satisfactorily at the May 2019 Open Symposium.

In reference to the proposed staged approach to the ILC, NAKADA (EPFL) noted that the Linear Collider Board had not insisted that the 250 GeV ILC design incorporate all the necessary infrastructure for a higher-energy machine, but rather that it should allow for the possibility of an energy upgrade in the future if deemed appropriate.

The Committee took note of the Chair's report and of the additional information provided.

5. CERN REPORT

(Item 5 of the Agenda)

GIANOTTI presented[4] CERN's scientific programme, based on three pillars derived from the 2013 update of the European Strategy for Particle Physics, namely full exploitation of the LHC, a broad scientific diversity programme and the preparation of CERN's future. She also outlined the current status of the Organization's financial and human resources and reported on recent developments with regard to geographical enlargement and the approval of the Mini-ATTRACT initiative in the framework of Horizon 2020.

In reply to a question from WULZ (HEPHY Vienna) as to how many of the 180 projects selected for funding through Mini-ATTRACT were likely to be CERN-based, GIANOTTI said that it was too early to tell, as an independent committee would judge each proposal on its merits and particle physics projects would be in competition with projects from other disciplines, associated with the other organisations promoting the initiative. Given the large amount of funding available, ECFA members should encourage their communities

[4] See Indico: https://indico.cern.ch/event/667672/

to begin preparing applications, with a particular focus on promoting the opportunity among young people, in advance of the call for proposals expected in early 2018.

The Committee took note of the presentation by Gianotti and of the additional information provided.

6. DESY REPORT
(Item 6 of the Agenda)

On behalf of the Director of DESY, J. Mnich, who was unable to attend the meeting, HEINEMANN (DESY) presented a report[5] on recent activities at DESY, with a particular focus on the start of operations at the European XFEL, preparations in Germany for the update of the European Strategy for Particle Physics, the development of DESY's own future strategy, and other activities in progress, namely the LHC detector upgrades, the operations of the DESY II Test Beam Facility, progress with the installation of the ALPS-II axion experiment and ideas under consideration for other future axion experiments, namely IAXO, MADMAX and LUXE.

The Committee took note of the presentation by Heinemann.

7. FRASCATI REPORT
(Item 7 of the Agenda)

CAMPANA (INFN Frascati) presented a status report[6] on activities at the *Laboratori Nazionali di Frascati*, noting that the use of the DAFNE facility for physics would come to an end in 2019, when it was expected to be converted into a test bed for accelerator R&D. The Laboratory had therefore begun looking for a replacement flagship project, with a particular focus on potentially hosting a facility based on the EuPRAXIA design study, i.e. a free-electron laser driven by a plasma-based accelerator, which could reuse elements of Frascati's existing SPARC_LAB facility.

In reply to NAKADA, who asked about prospects for reducing the cost of the X-band technology required for the EuPRAXIA@SPARC_LAB facility, CAMPANA said that two areas offered potential for savings, namely improvements to the techniques used for the construction of mechanical elements for the radiofrequency cavities, and the manufacture of the klystron modulator, which had not yet been fully industrialised. Collaboration with other laboratories intending to use the technology would be vital in driving down the cost.

[5] See Indico: https://indico.cern.ch/event/667672/
[6] See Indico: https://indico.cern.ch/event/667672/

In reply to a question from WORMSER (LAL Orsay) regarding the link between the EuPRAXIA study and other R&D on plasma wakefield acceleration, CAMPANA noted that a major advantage of EuPRAXIA was its specific focus on plasma acceleration, as opposed to the broader and more ambitious goals of the European XFEL, for example. Such a focus would hopefully encourage convergence between the various communities that had already accumulated up to 20 years of R&D on the technique.

The Committee took note of the presentation by Campana and of the additional points made during the discussion.

8. IPPOG REPORT

(Item 8 of the Agenda)

BECK (IPPOG Chair) reported[7] on the activities of the International Particle Physics Outreach Group (IPPOG), outlining the Group's purpose, details of its flagship International Masterclass programme for high-school students, examples of topics discussed at its twice-yearly meetings and the nature of its regular participation in major international high-energy physics conferences. IPPOG had become a formal collaboration in December 2016, with an associated membership fee or in-kind contribution from each of its member countries, experiments and laboratories. Expansion of the Group's activities to astroparticle physics was under consideration and innovative new ideas to reach a wider audience had also been trialled; a particularly successful example in recent years having been the Group's organisation of extensive programmes of physics-related activities at two major music festivals.

The Committee took note of the presentation by Beck.

9. REPORT OF THE ECFA DETECTOR R&D PANEL

(Item 9 of the Agenda)

KOFFEMAN (NIKHEF) presented[8] an update on the work of the recently re-established ECFA detector R&D panel, which was aiming to reignite interest in R&D for detectors, beginning with a review of CALICE but later extending to support for less established, more novel concepts in the field, including through work in partnership with other review panels.

The Committee took note of the presentation by Koffeman.

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[7] See Indico: https://indico.cern.ch/event/667672/
[8] See Indico: https://indico.cern.ch/event/667672/

The meeting was adjourned at 4.35 p.m. and resumed at 4.55 p.m with C. Alexa in the Chair.

10. MID-TERM REPORT FROM FRANCE
(Item 10 of the Agenda)

WORMSER presented[9] the mid-term report on the status of particle physics in France, explaining that two main research organisations, IN2P3-CNRS and IRFU-CEA, were responsible for the majority of high-energy physics activities in France, but that a national plan for investment in universities was also opening up some interesting opportunities for new infrastructure. He further provided details of French activities in particle and hadronic physics, nuclear physics and applications, astroparticle physics and cosmology, the LHC experiments, preparations for the ILC, neutrino experiments, theory, accelerator technology, computing, and outreach and communication.

The Committee took note of the presentation by Wormser.

11. MID-TERM REPORT FROM SERBIA
(Item 11 of the Agenda)

ADŽIĆ (University of Belgrade) presented[10] the mid-term report on the status of particle physics in Serbia, starting with a brief history of the country's relationship with CERN and then outlining Serbian participation in high-energy physics, both from a theory perspective and through the participation of Serbian scientists and engineers in CERN experiments. Various statistics, e.g. the number of users, staff members and the industrial return coefficient, showed that Serbia's relationship with CERN since it had become an Associate Member State in 2012 was on a positive footing, but problems remained in terms of financial support for the work of Serbian users at CERN, a problem which had been highlighted during RECFA's country visit in 2012.

REKOVIĆ (University of Wisconsin-Madison) noted that CMS would soon be holding a workshop in Belgrade, the first time that a major LHC experiment had held such an event in Serbia.

The Committee took note of the presentation by Adžić and of the additional comment by Reković.

[9] See Indico: https://indico.cern.ch/event/667672/
[10] See Indico: https://indico.cern.ch/event/667672/

12. LEPTON UNIVERSALITY AND FLAVOUR CONSERVATION
(Item 12 of the Agenda)

WORMSER introduced a session on the hints of new physics identified in the B-physics data of various experiments and the future experimental work planned on direct flavour violation.

1. Theory overview

CAMALICH (CERN) presented[11] an overview of the theory relating to lepton-flavour violation in B-meson decays.

In reply to a question from WINTER (CNRS) about the appropriate energy level for an e^+e^- collider to investigate the theories outlined, CAMALICH said that it was not possible to answer precisely at present, as theorists were still working on classifying the possibilities.

In reply to MCCULLOUGH (CERN), who noted that in addition to the anomalies at high-energy, i.e. above the TeV scale, concerns also remained at low energies, CAMALICH agreed and added that a lack of constraints on the light mediator was a particular factor that needed to be addressed at low energy.

The Committee took note of the presentation by Camalich and of the additional points made during the discussion.

2. $b \to sll$ anomalies

PATEL (Imperial College London) gave a presentation[12] on lepton flavour universality and anomalies in $b \to sl^+l^-$ decays.

In reply to a question from the CHAIR about the influence of radiative decays, PATEL said that the issue was under intense study and discrepancies in the low q^2 region could be explained as hadronic effects or as new physics. The model for J/Ψ was difficult to understand as it depended on study of the tails of a Breit-Wigner distribution, for which uncertainties remained.

In reply to a question from EIGEN (University of Bergen), also about the radiation effect, PATEL presented an additional slide (slide 20) on the subject of cross-checks aimed at controlling the electron bremsstrahlung.

[11] See Indico: https://indico.cern.ch/event/667672/sessions/257572/
[12] See Indico: https://indico.cern.ch/event/667672/sessions/257572/

The Committee took note of the presentation by Patel and of the additional points made during the discussion.

3. Semitauonic decays

HAMILTON (University of Maryland) presented[13] an overview from the experimental perspective of lepton universality in measurements in semi-leptonic b-hadron decays.

The Committee took note of the presentation by Hamilton.

4. Searches for direct lepton flavour violations

PAPA (Paul Scherrer Institut) presented[14] details of charged lepton flavour violation searches at PSI.

In reply to WORMSER, who noted that the presentation had not covered the B→Kμτ reaction being studied by LHCb, PAPA agreed that that reaction was indeed a good way of uniting the subjects of all the presentations in the present session.

In reply to a question from BRACCO (INFN) about competition with Japan, PAPA said that many of her colleagues were working in both Europe and Japan, for example on MEG at PSI and COMET at JPARC, and that the detector technology overlapped considerably.

The Committee took note of the presentation by Papa and of the additional points made during the discussion.

The meeting was adjourned at 7.25 p.m. on Thursday, 16 November 2017 and resumed at 9.00 a.m. on Friday, 17 November 2017 with J. D'Hondt in the Chair.

13. ECFA LINEAR COLLIDER PHYSICS AND DETECTOR STUDY

(Item 13 of the Agenda)

FUSTER (IFIC Valencia) presented a status report[15] on the activities of the ECFA linear collider physics and detector study, covering a small change to the membership of the Linear Collider Collaboration with the appointment of the new ICFA Chair, the current status of the ILC including the new ILC@250 proposal from the Japan Association of High Energy Physics (JAHEP), ongoing physics and detector activities, news on funding including EU

[13] See Indico: https://indico.cern.ch/event/667672/sessions/257572/
[14] See Indico: https://indico.cern.ch/event/667672/sessions/257572/
[15] See Indico: https://indico.cern.ch/event/667672/

support in the framework of the Horizon 2020 programme, preparation for the next European Strategy update, and the various linear collider workshops held in 2017 and planned for 2018.

The Committee took note of the presentation by Fuster.

14. CLIC DETECTOR AND PHYSICS
(Item 14 of the Agenda)

LINSSEN (CERN) gave a presentation[16] on the CLIC detector and physics, covering the planned energy staging scenario and corresponding layouts, CLIC's programme of Higgs, top quark and beyond standard model (BSM) physics, the new detector model, some ongoing aspects of R&D, and a proposed timeline for the development, preparation and construction of CLIC.

In reply to a question from BISCARI (ALBA Synchrotron) about how much CLIC and its upgrades would cost, LINSSEN explained that the intermediate cost estimate produced in 2016 had put the CLIC construction cost at 6.7 BCHF. The new estimate currently being prepared for the European Strategy update was likely to be slightly lower.

STAPNES (CERN), confirming that the goal was to bring the construction cost down to around 6 BCHF, explained that a 2012 estimate had put upgrades at a cost of 4 MCHF per GeV, in other words 4 BCHF per TeV. A new estimate in that regard would be produced for the European Strategy update, but was not expected to differ significantly from the previous one.

GIANOTTI (CERN) remarked that it would be useful to have an idea of the operational costs of all future machines by the end of 2018, as that would be a major factor in the European Strategy update.

The Council took note of the presentation by Linssen and of the additional information provided during the discussion.

15. FCC REPORT FROM BERLIN
(Item 15 of the Agenda)

BENEDIKT presented an update[17] on the status of the FCC study and a summary of the FCC Week 2017 in Berlin, covering physics and performance targets and technical schedules

[16] See Indico: https://indico.cern.ch/event/667672/
[17] See Indico: https://indico.cern.ch/event/667672/

for FCC-ee, FCC-hh and HE-LHC, the worldwide R&D programme on high-field magnets, Nb_3Sn superconductors and superconducting radio frequency systems, the growth of the international FCC collaboration, EU support for the EuroCirCol design study and the EASITrain Innovative Training Network, and the work under way on the conceptual design report in preparation for the European Strategy update.

In reply to a question from NAKADA (EPFL) about whether the proposed adiabatic HE-LHC upgrade, which would involve replacing magnets in stages rather than all at once, was still under consideration, BENEDIKT said that such an upgrade would require the new items installed in the machine to be compatible with the existing infrastructure, which was extremely challenging. The current focus was on exploiting the existing machine to its full potential, using up all the installed engineering margin.

GIANOTTI (CERN) added that a working group was currently studying options for increasing the energy of the LHC adiabatically, with the initial aim of reaching 14 TeV after LS2. The magnets would then be pushed from 8.3 to 9 T in order to reach 15 TeV. The group was then studying the possibility of replacing one third of the dipoles with 11 T dipoles of the type that would be installed for HL-LHC, and that was planned as input for the European Strategy update. The preliminary conclusion, however, was that the gain in energy compared to the cost, and the operational difficulties made that option rather unlikely.

In reply to ELSEN (CERN), who asked whether the LHC's 1200-magnet configuration was also suitable for the FCC, BENEDIKT explained that the optics of the LHC had been changed during the HE-LHC study. Since the overall goal was to achieve the highest possible energy, it was important both to make a magnet that could reach that value and to increase the filling factor. An improved optics design could help achieve that.

In reply to a question from FORTY (CERN) about whether a 20 T option was still under consideration, BENEDIKT explained that, if the hadron machine were preceded by an electron machine, the resulting ten- or fifteen-year interval would enable more research and development to be carried out to make the required high-energy superconductor technology economically viable and usable. A magnetic field of 20 T could therefore be considered in the long term.

In reply to BORRAS (DESY/RWTH Aachen University), who asked why preparation of the HE-LHC would take six years, BENEDIKT explained that the LHC first needed to be decommissioned and dismantled, requiring radiation cool-down time, much of the technical infrastructure needed to be replaced, since 16 T magnets would have a different cryogenic load and would therefore require different equipment, and new magnets needed to be

installed, interconnected and tested. The six-year time frame was therefore already considered to be a somewhat aggressive schedule.

The Committee took note of the presentation by Benedikt and of the additional information provided during the discussion.

16. PROGRESS ON NOVEL ACCELERATOR TECHNIQUES
(Item 16 of the Agenda)

MUGGLI gave a presentation[18] on novel accelerator techniques, covering dielectric laser accelerators, laser wakefield accelerators, structure wakefield accelerators and plasma wakefield accelerators. In particular, he highlighted the need for the advanced and novel accelerator community to work together to build a collider and the progress made towards that goal at the 2017 Advanced and Novel Accelerators for High Energy Physics Roadmap Workshop and through the EuroNAcc2 Roadmap. Finally, he introduced the new Advanced LinEar collider study GROup (ALEGRO), which would hold workshops in 2018 with the aim of producing a roadmap and strategy to contribute to the European Strategy update.

In reply to a question from SCHOENING (Heidelberg University) about whether injecting more laser power into a dielectric accelerator to increase the acceleration gradient would produce destructive effects similar to those occurring in structure wakefield accelerators, MUGGLI said that, although some issues might arise, particularly relating to radiation and charging, they were generally technological rather than scientific and could be resolved.

In reply to NAKADA, who asked which staging technologies were the most promising, MUGGLI explained that it was not yet clear which of the available technologies was generally best suited to a collider, and that most colliders, with the exception of plasma ones, had a similar inter-stage system. It was therefore best to keep all four options under consideration for the time being.

The Committee took note of the presentation by Muggli and of the additional information provided during the discussion.

17. NUPECC LONG RANGE PLAN
(Item 17 of the Agenda)

[18] See Indico: https://indico.cern.ch/event/667672/

BRACCO gave a presentation[19] on the 2017 update of the Nuclear Physics European Collaboration Committee's (NuPECC) Long Range Plan for Nuclear Science in Europe, which would comprise six chapters on major aspects of contemporary nuclear physics, including one on applications and societal benefits, plans for the various existing and future nuclear physics facilities in Europe, information on EU funding, and recommendations for actions to support projects, facilities, theory, research and development and training.

The Committee took note of the presentation by Bracco.

18. APPEC LONG RANGE PLAN
(Item 18 of the Agenda)

MASIERO gave a presentation[20] on the Astroparticle Physics European Consortium's (ApPEC) European Astroparticle Physics Strategy for 2017-2026, covering nine major aspects of contemporary astroparticle physics and the annual investment of ApPEC agencies therein, aims for the next ten years, collaboration and coordination within Europe and globally, and societal issues, such as gender balance, education and outreach and industry.

The Committee took note of the presentation by Masiero.

19. CLOSING
(Item 19 of the Agenda)

D'HONDT (Vrije Universiteit Brussel) thanked all the speakers for their contributions. On the occasion of her final meeting as ECFA Chair, he also wished to thank Halina Abramowicz on behalf of ECFA for her availability and guidance throughout her three-year term of office, remarking that he looked forward to seeing her talents deployed in the role of Strategy Secretary for the next update of the European Strategy for Particle Physics.

The meeting rose at 12.30 p.m.

[19] See Indico: https://indico.cern.ch/event/667672/
[20] See Indico: https://indico.cern.ch/event/667672/