

Report from ECFA

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Outlook:

- mission of the Committee and its recent activities
- ECFA's role in connection with the European Strategy for Particle Physics
- summary of the conclusions and recommendations of the strategy update

- The European Committee for Future Accelerators (ECFA) was founded in 1963
- ECFA is advisory to CERN Management, CERN Council and its Committees, and to other organizations, national or international
- One of its main activities being to monitor and support the development of particle physics in the CERN member countries through regular visits
- ECFA consists of Plenary ECFA, Restricted ECFA, Chairman and Secretary and permanent or ad hoc working groups

- Plenary ECFA:
 - decides on all ECFA activities
 - appoints members after nomination by their country
 - normally holds two meetings per year, meetings are public unless otherwise decided

- Restricted ECFA:
 - composed of one member per country, the Director General and the Research Director of CERN, the Scientific Secretary of the Strategy Session of the CERN Council, the DESY Director in charge of high-energy physics and astroparticle physics, and the Director of the INFN Frascati Laboratory

- Aims of ECFA:
 - Long-range planning of European high-energy facilities
 - Equilibrium between the roles of international and national laboratories and university institutes
 - Adequate conditions for research and a just and equitable sharing of facilities between physicists, irrespective of nationality and origin
- ECFA activities:
 - Regular meetings of Restricted and Plenary ECFA
 - Sponsor or organize ad hoc symposia and conferences
 - Set up study groups and review groups
 - Visits to CERN members states and review organization and resources, repeated at regular intervals
 - Monitoring of the ongoing implementation of the European Strategy for Particle Physics in the CERN Member States, presentation of corresponding status reports to the European Strategy Session of Council
 - Represents European PP community in other organizations

- ECFA sponsored Workshops in 2013:
 - European Linear Collider Workshop ECFA LC2013 27-31 May 2013, DESY, Hamburg
<http://lc2013.desy.de>
 - ECFA High Luminosity LHC Experiments Workshop:
Physics and technology challenges 1-3 October 2013 Aix-les-Bains, France
Preparation work in several working groups ongoing.
<https://indico.cern.ch/conferenceDisplay.py?confId=252045>



- ECFAs role in connection with the European Strategy :
 - Monitoring of the ongoing implementation of the European Strategy for Particle Physics
 - Monitoring through country visits
 - Discuss and overlook R&D for possible future large scale facilities
 - Follow up of the recent strategy update: assess status of R&D for a future post-LHC accelerator project at CERN, i.e. CLIC, HE-LHC, VHE-LHC (TLEP)
 - Propose/support/oversee studies to be completed in time for the next strategy update
 - Sponsor Workshops
 - Review Proposals

- Update of the European Strategy for Particle Physics :

The Update of the European Strategy for Particle Physics, Tatsuya Nakada, Scientific Secretary to the Strategy Session of CERN Council, EPS HEP 2013, Stockholm 20 July 2013, <https://indico.cern.ch/getFile.py/access?contribId=738&sessionId=25&resId=0&materialId=slides&confId=218030>

- Brief history:

- The first European Strategy for Particle Physics adopted by the CERN Council in June 2006 in Lisbon
- The first update has officially started in September 2011 by the Council establishing the Preparatory Group (science input) and Strategy Group (strategy drafting)
- Open Symposium organised by the Preparatory Group in September 2012 in Krakow
- The draft proposal by the European Strategy Group as out come of the meeting in January 2013 in Erice
- First Council discussion in March 2013, finalising the agreed draft for the formal approval later
- Formal adoption by the CERN Council in its special Strategy Session in Brussels in May 2013



CERN Council

Update of the European Strategy for Particle Physics

<http://europeanstrategygroup.web.cern.ch/EuropeanStrategyGroup/welcome.htm>

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Related links

The European Strategy for Particle Physics

Open Symposium - Krakow, 10-12 September 2012

- [Book](#) of Abstracts submitted to the Open Symposium

- Physics Briefing [Book](#) to the European Strategy Group (compiled by the Preparatory Group) **(220 pages)**

Strategy Group Meeting to draft Update of Strategy - Erice, 21-26 January 2013

At appropriate intervals, at most every 5 years, the European Strategy Session of Council will re-enact the process aimed at updating the medium and long-term European Strategy for Particle Physics, by setting up a Working Group, the [European Strategy Group](#) (ESG), similar to the Strategy Group in 2005/2006. The ESG will be a Working Group of Council which will cease to exist each time Council has adopted the new medium and long-term Strategy. The remit of the ESG will be to establish a proposal for the European Strategy Session of Council to update the medium and long-term European Strategy for Particle Physics.

Council, September 2007

For the purposes of the Strategy Update, the ESG will be assisted by an ad hoc [Preparatory Group](#).

The European Strategy for Particle Physics - Update 2013:

CERN-Council-S/106, 7 May 2013

<http://council.web.cern.ch/council/en/EuropeanStrategy/esc-e-106.pdf>

- *General Issues (a, b)*
- *High-priority large-scale scientific activities (c, d, e, f)*
- *Other scientific activities essential to the particle physics programme (g, h, i, j, k)*
- *Organisational issues (l, m)*
- *Wider impact of particle physics (n, o, p)*

General Issues

- a) The success of the LHC is proof of the effectiveness of the European organisational model for particle physics, founded on the sustained long-term commitment of the CERN Member States and of the national institutes, laboratories and universities closely collaborating with CERN. *Europe should preserve this model in order to keep its leading role, sustaining the success of particle physics and the benefits it brings to the wider society.*
- b) The scale of the facilities required by particle physics is resulting in the globalisation of the field. *The European Strategy takes into account the worldwide particle physics landscape and developments in related fields and should continue to do so.*

High-priority large-scale scientific activities

The strategy update must strike a balance between maintaining the diversity of the scientific program and setting priorities since the available resources are limited.

- Only large scale projects/facilities of global and supra-regional dimension are prioritized
- Competitive small and medium size projects (national, regional) are important to keep the diversity of our field, since a breakthrough often emerges in unexpected areas

After careful analysis of many possible large-scale scientific activities requiring significant resources, sizeable collaborations and sustained commitment, the following four activities have been identified as carrying the highest priority.

A priori these 4 activities are not prioritized, it is meant that all 4 should be pursued - a challenge the CERN mid (and long) term plan has to address!

High-priority large-scale scientific activities

- c) The discovery of the Higgs boson is the start of a major programme of work to measure this particle's properties with the highest possible precision for testing the validity of the Standard Model and to search for further new physics at the energy frontier. The LHC is in a unique position to pursue this programme. *Europe's top priority should be the exploitation of the full potential of the LHC, including the high-luminosity upgrade of the machine and detectors with a view to collecting ten times more data than in the initial design, by around 2030.* This upgrade programme will also provide further exciting opportunities for the study of flavour physics and the quark-gluon plasma.
- d) *To stay at the forefront of particle physics, Europe needs to be in a position to propose an ambitious post-LHC accelerator project at CERN by the time of the next Strategy update, when physics results from the LHC running at 14 TeV will be available. CERN should undertake design studies for accelerator projects in a global context, with emphasis on proton-proton and electron-positron high-energy frontier machines. These design studies should be coupled to a vigorous accelerator R&D programme, including high-field magnets and high-gradient accelerating structures, in collaboration with national institutes, laboratories and universities worldwide.*
- e) There is a strong scientific case for an electron-positron collider, complementary to the LHC, that can study the properties of the Higgs boson and other particles with unprecedented precision and whose energy can be upgraded. The Technical Design Report of the International Linear Collider (ILC) has been completed, with large European participation. The initiative from the Japanese particle physics community to host the ILC in Japan is most welcome, and European groups are eager to participate. *Europe looks forward to a proposal from Japan to discuss a possible participation.*
- f) Rapid progress in neutrino oscillation physics, with significant European involvement, has established a strong scientific case for a long-baseline neutrino programme exploring CP violation and the mass hierarchy in the neutrino sector. *CERN should develop a neutrino programme to pave the way for a substantial European role in future long-baseline experiments. Europe should explore the possibility of major participation in leading long-baseline neutrino projects in the US and Japan.*

Other scientific activities essential to the particle physics programme

g) Theory is a strong driver of particle physics and provides essential input to experiments, witness the major role played by theory in the recent discovery of the Higgs boson, from the foundations of the Standard Model to detailed calculations guiding the experimental searches. *Europe should support a diverse, vibrant theoretical physics programme, ranging from abstract to applied topics, in close collaboration with experiments and extending to neighbouring fields such as astroparticle physics and cosmology. Such support should extend also to high-performance computing and software development.*

h) Experiments studying quark flavour physics, investigating dipole moments, searching for charged-lepton flavour violation and performing other precision measurements at lower energies, such as those with neutrons, muons and antiprotons, may give access to higher energy scales than direct particle production or put fundamental symmetries to the test. They can be based in national laboratories, with a moderate cost and smaller collaborations. *Experiments in Europe with unique reach should be supported, as well as participation in experiments in other regions of the world.*

i) The success of particle physics experiments, such as those required for the high-luminosity LHC, relies on innovative instrumentation, state-of-the-art infrastructures and large-scale data-intensive computing. *Detector R&D programmes should be supported strongly at CERN, national institutes, laboratories and universities. Infrastructure and engineering capabilities for the R&D programme and construction of large detectors, as well as infrastructures for data analysis, data preservation and distributed data-intensive computing should be maintained and further developed.*

j) A range of important non-accelerator experiments take place at the overlap of particle and astroparticle physics, such as searches for proton decay, neutrinoless double beta decay and dark matter, and the study of high-energy cosmic-rays. These experiments address fundamental questions beyond the Standard Model of particle physics. The exchange of information between CERN and ApPEC has progressed since 2006. *In the coming years, CERN should seek a closer collaboration with ApPEC on detector R&D with a view to maintaining the community's capability for unique projects in this field.*

k) A variety of research lines at the boundary between particle and nuclear physics require dedicated experiments. *The CERN Laboratory should maintain its capability to perform unique experiments. CERN should continue to work with NuPECC on topics of mutual interest.*

Organisational issues

- l) Future major facilities in Europe and elsewhere require collaboration on a global scale. *CERN should be the framework within which to organise a global particle physics accelerator project in Europe, and should also be the leading European partner in global particle physics accelerator projects elsewhere. Possible additional contributions to such projects from CERN's Member and Associate Member States in Europe should be coordinated with CERN.*
- m) A Memorandum of Understanding has been signed by CERN and the European Commission, and various cooperative activities are under way. Communication with the European Strategy Forum on Research Infrastructures (ESFRI) has led to agreement on the participation of CERN in the relevant ESFRI Strategy Working Group. The particle physics community has been actively involved in European Union framework programmes. *CERN and the particle physics community should strengthen their relations with the European Commission in order to participate further in the development of the European Research Area.*

Wider impact of particle physics

- n) Sharing the excitement of scientific discoveries with the public is part of our duty as researchers. Many groups work enthusiastically in public engagement. They are assisted by a network of communication professionals (EPPCN) and an international outreach group (IPPOG). For example, they helped attract tremendous public attention and interest around the world at the start of the LHC and the discovery of the Higgs boson. *Outreach and communication in particle physics should receive adequate funding and be recognised as a central component of the scientific activity. EPPCN and IPPOG should both report regularly to the Council.*
- o) Knowledge and technology developed for particle physics research have made a lasting impact on society. These technologies are also being advanced by others leading to mutual benefits. Knowledge and technology transfer is strongly promoted in most countries. The HEPTech network has been created to coordinate and promote this activity, and to provide benefit to the European industries. *HEPTech should pursue and amplify its efforts and continue reporting regularly to the Council.*
- p) Particle physics research requires a wide range of skills and knowledge. Many young physicists, engineers and teachers are trained at CERN, in national laboratories and universities. They subsequently transfer their expertise to society and industry. Education and training in key technologies are also crucial for the needs of the field. *CERN, together with national funding agencies, institutes, laboratories and universities, should continue supporting and further develop coordinated programmes for education and training.*

Summary of the conclusions and recommendations of the strategy update:

- Moving into the next phase :
 - **Implementing** particle physics policy and programme inline with the Strategy by the member states and at CERN
 - **Promoting** coordination and collaboration with the relevant organisations and other regions as encouraged in the Strategy
 - **Enhancing** activities and networking in the social relevant issues as outlined in the Strategy
 - **Taking up** the proposed organisational adjustments for the Strategy matter by the ESG working groups
- Looking forward to the plan of the other regions, and stay tuned with development of the field

Thank You !