The European Strategy

https://europeanstrategygroup.web.cern.ch/EuropeanStrategyGroup/

CHIPP Plenary Meeting

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Chair of Strategy Group and Preparatory Group

When first strategy was made in 2006

- First Strategy was adopted in July 2006
- LHC was still under construction.
- ILC baseline design completed under the guidance of GDE. The next steps were, the Reference Design Report and finally the Technical Design Report
- HERA, PEP-II, KEKB and Tevatron were still operating.
- Several neutrino experiments, accelerator based and reactor based were under construction.
- Higgs mass prediction from the electroweak fits, but no direct observation of the Higgs particle.
- No convincing sign (neither direct nor indirect) of new physics (except the neutrino masses).
- The third neutrino mixing angle, θ_{13}, not measured.

Current Situation: facilities

- LHC is operating with a good performance but not yet at the designed energy
- Four LHC experiments are operating with expected performance
- Realistic path for the high luminosity upgrade now exists
- ILC TDR completed and Japanese HEP community expressed their proposal to host it
- HERA, PEP-II, KEKB, Tevatron stopped operation
- BEPC-II, DAFNE, VEPP's, high intensity μ/K/n/p at National Laboratories and CERN
- SuperKEKB under construction
- Many neutrino experiments are now fully/partially running and some new projects being started.

Current Situation: physics

- LHC discovery of a new boson at 125 GeV consistent with the Standard Model Higgs 👍
- Direct search of new (heavy) particles at LHC, nothing has been seen so far 👎
- No clear sign of physics beyond the Standard Model in precision physics: b-, c- and s-hadrons, τ and μ decays (muon g−2?), d_n, ⋯, LHC accessible parameter space for "simple" SUSY models diminishing 👎
- neutrino sector, $\sin^2 \theta_{13} \neq 0$ with more than 5σ and ≈ 0.1 👍

Framework of the Update

- Strategy Group and Preparatory Group set-up by the CERN Council
  - Preparatory Group
    - Producing scientific summary in a form of Briefing Book based on the community, funding agencies and policy makers inputs given at Open Symposium and written contributions
  - Strategy Group
    - Draft the updated strategy based on the scientific input from the Preparatory Group and non scientific input from its own working groups.
    - Producing deliberation document providing scientific rational for the strategy statements and discussion on possible governance and organization for strategy implementation
    - Producing glossy brochure for public, funding agencies and politicians

Composition of the Groups

- Preparatory Group
  - Nominated from SPC, ECFA, CERN, Americas and Asia
  - members of the Scientific Secretariat for the Council
- Strategy Group
  - Delegates from the Member States, representing the member state government
  - Delegates from Associate and Observer States
  - Representatives from ApPEC, NuPEC, ESFRI, EU, FALC,
  - Director of Large National Laboratories and CERN DG
  - Members of the Scientific Secretariat for the Council
  - Preparatory Group members are also invited

Timeline of the Strategy Update

- Preparation of the update started in 2011 by setting up Strategy Group and Preparatory Group by the Council
- September 2012: Open Symposium
  Organised by the Preparatory Group
  scientific input from the community
- December 2012: Scientific Briefing Book
  by the Preparatory Group based on the community input (Open Symposium + written submissions)
- January 2013: Strategy Group drafting session
  Draft of updated European Strategy made, submitted to the Council and made available to the community
- March 2013: Council discussion on the draft, reached agreement on the text to be adopted formally in May
- May 30ty 2013: The Council formally adopted the Strategy

Two Major Meetings

Cracow Open Symposium and Erice Drafting Session

Community Meeting with lively discussions

Special Strategy Session of the Council

- Formal adoption by the CERN Council in it special European Strategy Session in Brussels, on 30th of May 2013 in the morning in Brussels (European Commission, Berlaymont Building, Schuman Room)
- There are several accompanied events
  - Press conference (President, DG, SC), morning of 29th
  - Visit to the European Parliament (talk by President & DG), over the lunch time of 29th
  - Round Table Discussion (President), late in the afternoon of 29th
  - Visit to EU Competitive Council meeting (talk by DG), over the lunch time of 30th
  - Exhibition on Outreach items (Communication Network), 29th and 30th in the Berlaymont Building.

Documents related to the Strategy

- Physics Briefing Book by the Preparatory Group as physics input for the Strategy Group, December 2012.
  Community input at the Open Symposium and by the written submissions
- European Strategy Paper adopted by the CERN Council on 30th of May 2013 in its special Strategy Session in Brussels.
- Deliberation Paper by the European Strategy Group for information, May 2013.
  Rational behind the Strategy Statement and recommendations by the ESG working groups
- Brochure for social relevance of particle physics by the Communication Group
  Neither explaining particle physics nor for the Strategy, but it explains the social relevance of particle physics to the politicians and general public, distributed in the occasion of the official ceremonial adoption of the European Strategy by the CERN Council in Brussels in May 30th

All available under

http://council.web.cern.ch/council/en/EuropeanStrategy/ESParticlePhysics.html

http://council.web.cern.ch/council/en/EuropeanStrategy/ESArchive.html

Strategy Paper

- Preamble and 17 statements
  - Two for general issues:
    success of European model, importance of global vision
  - Four for selected high priority large scale projects:
    LHC, HE frontier machine R&D, e^+e^- (ILC), long baseline ν
  - Five for equally important scientific issues:
    theory, precision physics, detector R&D, computing and infrastructure, astroparticle physics, nuclear physics
  - Two for organisational issues:
    EU relation, European participation in global projects
  - Three for issues on social relevance:
    communication, outreach, training and education, knowledge transfer
  - One for recommendation for the future strategy activities:
    needs to reflect on the organisational issues

Some example of Strategy Statements

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*.

Some example of Strategy Statements

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.*

Some example of Strategy Statements

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*.

Some example of Strategy Statements

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.*

Issues for the Strategy

- European achievement in particle physics is based on the sustained long term support for CERN by the member states
- Balance has to be taken between making a priority (required in the current socio-economical environment) and cultivating diversity (fundamental nature of basic science).
- Maintaining the technical infrastructure at the national laboratories, institutes and universities.
- Prepare the framework for the European participation on global projects inside and outside of Europe, CERN as a focal point.
- Strengthening the relation with related scientific fields through APPEC (astroparticle) and NUPEC (nuclear physics), and with European Commission and European Research Area.
- Addressing the social relevance

Three points worth noting

- It sets the priority for the large projects explicitly stating four issues which should be done, rather than discussing all the projects we would like to do.
- While expressing the European ambitions, i.e. physics at the highest energy (exploitation of LHC and R&D for the post LHC machines), declaring the readiness of Europe to participate in the large projects outside of Europe in a concrete way (ILC construction in Japan, long baseline experiment in the US or Japan).
- Unique opportunities at the national laboratories (worldwide) are fully acknowledged and encouraged for the precision experiments

Challenges ahead

- The Strategy outlines both European ambitions and our readiness to engage with a global corporation outside of Europe. Realisation is very challenging:
  - LHC Upgrade: Make solid planning and secure funding for both machine and detectors, solicit even larger international participation, yet remain flexible to reflect on the results from the 14 TeV run
  - R&D for the future machines: Make priority and stay focused on those needed for the European ambition to remain at forefront of the highest energy frontier, while open to the needs of the other field of science
  - e^+e^- programme and ILC: Maximise the global opportunities by exploring the European participation in the possible ILC project in Japan. (Probably, we should not be just waiting…)
  - Neutrinos: Facilitate a bases at CERN for the needs by the long baseline experiment detector R&D and support strong European participation in the experiment at the US or Japan.

Challenges ahead

- Other essential issues need also resources:
  - Theory
  - Precision experiments
  - Detector R&D and infrastructure. Computing infrastructure.
  - Non-accelerator particle and nuclear physics

    The national roles are equally, if not more, important, in those activities, i.e. CERN GE laboratory is one of the (important) partners in those activities
- Europe should be ready for global projects inside and outside of Europe: CERN as natural focal point.
- Social Relevance taken as an integral part of our activities:
  - Communication
  - Outreach and training
  - Knowledge transfer and relation with industry

    Well established national activities exist, i.e. networking is the issue. IPOG needs steady funding.

Conclusions

- We have now the Strategy
- Moving into the next phase
  - Implementing particle physics policy and programme inline with the Strategy in 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
- And staying tuned with development of the field.