Update of the European Strategy for Particle Physics

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

NB CERN Council has a dual role: running the CERN Geneva Laboratory *and* Coordinating European Particle Physics

Mandate of the European Strategy Group

- The remit of the ESG is to establish a proposal for an Update of the medium and long-term European Strategy for Particle Physics, for approval by the Council. It is proposed that the proposal will take the following elements into account:
- The Update of the European Strategy for Particle Physics shall in particular aim at:
- enhancing the visibility of existing European particle physics programmes;
- increasing collaboration among Europe's particle physics laboratories, institutes and universities;
- promoting a coordinated European participation in global projects and in regional projects outside Europe;
- encouraging knowledge transfer to other disciplines, industry, and society.
- The proposal shall include a review of the implementation of the 2006 Strategy, as well as of the structures and procedures currently in place with regard to the Strategy.
- The proposal shall outline priorities following a thematic approach, with special emphasis on future large infrastructures/projects, including preparatory steps for a next project at CERN after LHC in a global context, and consider time scales and resources. It shall also consider possible future participation by CERN in experiments outside the Geneva Laboratory as part of the Strategy implementation.
- The proposal shall comprise a series of ordered and concise statements of 1-2 lines each, or 1-2 pages in total followed by more detailed presentations that shall not exceed 25 pages.

Preparatory Group

Strategy Secretariat Members Prof. T. Nakada Scientific Secretary (Chair) Prof. F. Zwirner SPC Chair Dr M. Krammer ECFA Chair Dr Ph. Chomaz Repres. EU Lab. Directors

SPC Prof. R. Aleksan (FR) Prof. P. Braun-Munzinger (DE) Prof. M. Diemoz (IT) Prof. D. Wark (UK)

ECFA Prof. K. Desch (DE) Prof. K. Huitu (FI) Prof. A. P. Zarnecki (PL) Prof. C. De Clercq (BE)

CERN Dr P. Jenni

ASIA/AMERICAS Prof. Y. Kuno (Asia) Prof. P. McBride (Americas)

Prof. E. Tsesmelis Scientific Assistant

Strategy Group Compositon

Member States Austria Prof. A.H. Hoang Belgium Prof. W. Van Doninck Bulgaria Prof. L. Litov Czech Republic Prof. J. Chyla Denmark Prof. J.J. Gaardhoje Finland Prof. P. Eerola France Prof. E. Augé Germany Prof. S. Bethke Greece Prof. P. Rapidis Hungary Prof. P. Levai Italy Prof. R. Petronzio Netherlands Prof. S. De Jong Norway Prof. A. Read Poland Prof. A. Zalewska Portugal Prof. G. Barreira Slovakia Dr L. Sandor Spain Prof. C. Pajares Sweden Prof. B. Asman Switzerland Prof. K. Kirch U.K. Prof. J. Butterworth

CERN Director General Prof. R. Heuer

Major European National Laboratories CIEMAT C. Lopez DESY J. Mnich IRFU Ph. Chomaz LAL A. Stocchi NIKHEF F. Linde LNF U. Dosselli LNGS L. Votano PSI L. Rivkin STFC-RAL J. Womersley

Strategy Secretariat Members Scientific Secretary (Chair) Prof. T. Nakada SPC Chair Prof. F. Zwirner ECFA Chair Dr M. Krammer Repres. EU Lab. Directors' Mtg Dr Ph. Chomaz

Candidate for Accession Romania Dr S. Dita

Associate Member in the pre-stage of Membership Israel Prof. E. Rabinovici

Observer States India Prof. T. Aziz Japan Prof. Sh. Asai Russian Federation Prof. A. Bondar Turkey Prof. Dr M. Zeyrek United States Prof. M. Shochet

EU Dr R. Lecbychová **ApPEC** Dr S. Katsanevas **Chair FALC** Prof. Y. Osaka **Chair ESFRI** Dr B. Vierkorn-Rudolph **Chair NuPECC** Prof. G. Rosner **Scientific Assistant** Prof. E. Tsesmelis

Timeline

- Web-portal is already open for community input
- Deadline for the community input for Open Symposium
  - 31.7.2012
- Open Symposium in Cracow
  - 10-12.9.2012
- Deadline for community input for Strategy drafting session
  - 15.10.2012
- Strategy Group drafting session (Erice)
  - 21-26.1.2013
- Finalisation of the draft Strategy by the Council March 2013
- Adaptation of the Strategy by special Council meeting May/ June 2013

Working Groups

1. Mandate and organisational structure for the Council for the European Strategy and its implementation
2. Organisational structure for European participation in global projects, including the role and definition of the National Laboratories and the CERN Laboratory in the European Strategy
3. Relations with external bodies, in particular EU-related issues
4. Knowledge and technology transfer, relations with industry
5. Outreach and education.

Preparatory Working Groups

- High energy frontier physics
- Flavour (quarks and charge leptons) and symmetry (T, CP, CPT, Lorentz invariance, Baryon number, etc.)
- Physics of strong interactions (both at low and high energies)
- Neutrino physics (mainly the oscillation parameters)
- Astroparticle physics (for those which are directly dealing with particle physics, i.e. proton decays, ν-less 2β decays, direct dark matter search, i.e. Non-accelerator particle physics and interface to astroparticle physics)
- Theory
- Accelerator (including non-particle physics areas, R&D, ...)
- General infrastructure (construction of large detectors, computing)

Since this is an update…

… What happened last time?

(slides from Tatsuya Nakada, from the first meeting – his comments in red)

Strategy Statements

- *General Issues*
  - European particle physics is founded on strong national institutes, universities and laboratories and the CERN Organization; ***Europe should maintain and strengthen its central position in particle physics.***
  - Increased globalization, concentration and scale of particle physics make a well coordinated strategy in Europe paramount; ***this strategy will be defined and updated by CERN Council as outlined below***

Strategy Statements

- *Scientific Issues*
  - The LHC will be the energy frontier machine for the foreseeable future, maintaining European leadership in the field; ***the highest priority is to fully exploit the physics potential of the LHC, resources for completion of the initial programme have to be secured such that machine and experiments can operate optimally at their design performance. A subsequent major luminosity upgrade (SLHC), motivated by physics results and operation experience, will be enabled by focused R&D; to this end, R&D for machine and detectors has to be vigorously pursued now and centrally organized towards a luminosity upgrade by around 2015.*** (Can be seen in CERN midterm plans for example. A bit of delay but making steady progress)

Strategy Statements

- *Scientific Issues (continued)*
  - In order to be in the position to push the energy and luminosity frontier even further it is vital to strengthen the advanced accelerator R&D programme; ***a coordinated programme should be intensified, to develop the CLIC technology and high performance magnets for future accelerators, and to play a significant role in the study and development of a high-intensity neutrino facility.*** (Various FP7 programs)
  - It is fundamental to complement the results of the LHC with measurements at a linear collider. In the energy range of 0.5 to 1 TeV, the ILC, based on superconducting technology, will provide a unique scientific opportunity at the precision frontier; ***there should be a strong well-coordinated European activity, including CERN, through the Global Design Effort, for its design and technical preparation towards the construction decision, to be ready for a new assessment by Council around 2010.*** (Participation in the ILC TDR)

Strategy Statements

- *Scientific Issues (continued)*
  - Studies of the scientific case for future neutrino facilities and the R&D into associated technologies are required to be in a position to define the optimal neutrino programme based on the information available in around 2012; ***Council will play an active role in promoting a coordinated European participation in a global neutrino programme*** (FP7 programs, IDS-NF, ECFA Neutrino Panel)
  - A range of very important non-accelerator experiments take place at the overlap between particle and astroparticle physics exploring otherwise inaccessible phenomena; ***Council will seek to work with ApPEC to develop a coordinated strategy in these areas of mutual interest.*** (ApPEC representation in the European Strategy Session of Council; a joint CERN-ApPEC work plan for the period until this update of the European Strategy for particle physics (2011-2012). **Scientific enlargement pending for the strategy update.**

Strategy Statements

- *Scientific Issues (continued)*
  - Flavour physics and precision measurements at the high-luminosity frontier at lower energies complement our understanding of particle physics and allow for a more accurate interpretation of the results at the high-energy frontier; ***these should be led by national or regional collaborations, and the participation of European laboratories and institutes should be promoted.*** (ECFA consideration for INFN SuperB factory, Novosibirsk Tau-charm factory and Turkish Tau-charm factory, European participation in Belle II)
  - A variety of important research lines are at the interface between particle and nuclear physics requiring dedicated experiments; ***Council will seek to work with NuPECC in areas of mutual interest, and maintain the capability to perform fixed target experiments at CERN.*** (NuPEC Chair invited to ECFA plenary, NnPEC Chair in SG)

Strategy Statements

- *Scientific Issues (continued)*
  - European theoretical physics has played a crucial role in shaping and consolidating the Standard Model and in formulating possible scenarios for future discoveries. Strong theoretical research and close collaboration with experimentalists are essential to the advancement of particle physics and to take full advantage of experimental progress; ***the forthcoming LHC results will open new opportunities for theoretical developments, and create new needs for theoretical calculations, which should be widely supported.*** (At CERN-GE, LPCC and many workshops elsewhere. General consensus on the interplay between the direct and indirect search for New Physics being established.)

Strategy Statements

- *Organisational Issues*
  - There is a fundamental need for an ongoing process to define and update the European strategy for particle physics; ***Council, under Article II-2(b) of the CERN Convention, shall assume this responsibility, acting as a council for European particle physics, holding a special session at least once each year for this purpose. Council will define and update the strategy based on proposals and observations from a dedicated scientific body that it shall establish for this purpose.*** (Strategy Session of Council, Scientific Secretary, and Scientific Secretariat installed.)

Strategy Statements

- *Organisational Issues (continued)*
  - Future major facilities in Europe and elsewhere require collaborations on a global scale; ***Council, drawing on the European experience in the successful construction and operation of large-scale facilities, will prepare a framework for Europe to engage with the other regions of the world with the goal of optimizing the particle physics output through the best shared use of resources while maintaining European capabilities.*** (CERN geographical enlargement)
  - Through its programmes, the European Union establishes in a broad sense the European Research Area with European particle physics having its own established structures and organizations; ***there is a need to strengthen this relationship for communicating issues related to the strategy.*** (MoU with EU and various working plans are in place)

Strategy Statements

- *Organisational Issues (continued)*
  - Particle physicists in the non-Member States benefit from, and add to, the research programme funded by the CERN Member States; ***Council will establish how the non-Member States should be involved in defining the strategy.*** (ECFA presentations by the non-member states, Inclusion of non member states in Preparatory and Strategy Groups)

Strategy Statements

- *Complementary Issues*
  - Fundamental physics impacts both scientific and philosophical thinking, influencing the way we perceive the universe and our role in it. It is an integral part of particle physics research to share the wonders of our discoveries with the public and the youth in particular. Outreach should be implemented with adequate resources from the start of any major project; ***Council will establish a network of closely cooperating professional communication officers from each Member state, which would incorporate existing activities, propose, implement and monitor a European particle physics communication and education strategy, and report on a regular basis to Council.*** (European Particle Physics Communication Network)

Strategy Statements

- *Complementary Issues (continued)*
  - Technology developed for nuclear and particle physics research has made and is making a lasting impact on society in areas such as material sciences and biology (e.g. synchrotron radiation facilities), communication and information technology (e.g. the web and grid computing), health (e.g. the PET scanner and hadron therapy facilities); ***to further promote the impact of the spin-offs of particle physics research, the relevant technology transfer representatives at CERN and in Member states should create a technology transfer forum to analyse the keys to the success in technology transfer projects in general, make proposals for improving its effectiveness, promoting knowledge transfer through mobility of scientists and engineers between industry and research.*** (CERN Technology Transfer Network)

Strategy Statements

- *Complementary Issues (continued)*
  - The technical advances necessary for particle physics both benefit from, and stimulate, the technological competences available in European industry; ***Council will consolidate and reinforce this connection, by ensuring that future engagement with industry takes account of current best practices, and continuously profits from the accumulated experience.*** (CERN Technology Transfer Network)