European Strategy for Particle Physics and its Update Plan

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

The XL International Meeting on Fundamental Physics

Benasque, Spain, 1 June 2012

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Scientific Secretary for Strategy Session of CERN Council

Particle Physics

European "particularity"  CERN Council

Energy frontier — Direct search of new physics at high energy

Flavour physics { quark sector, lepton sector { charged lepton, neutrino

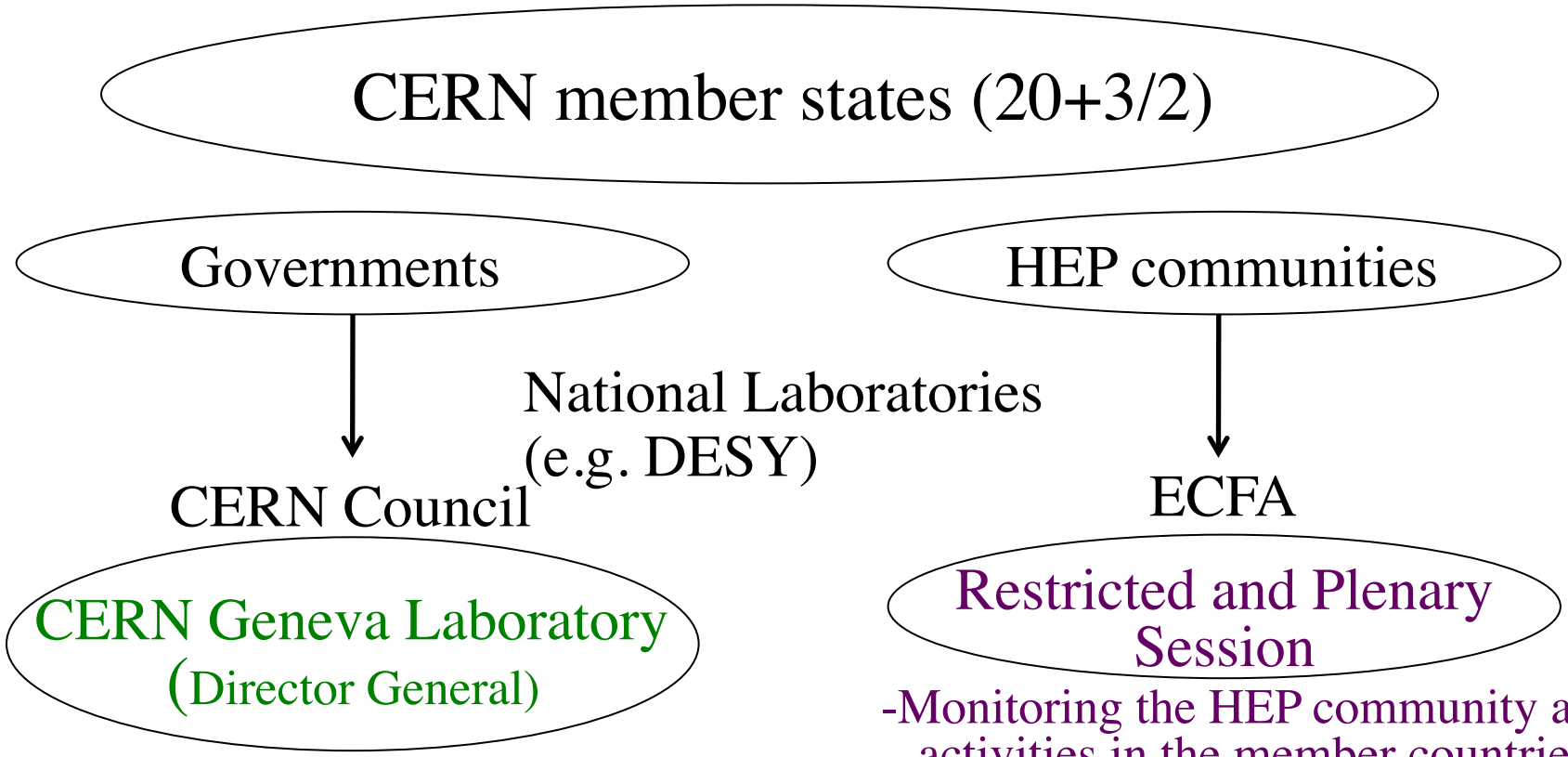
flavour mixing, CP, rare decays, mass

proton decays, 0ββ decays, etc.

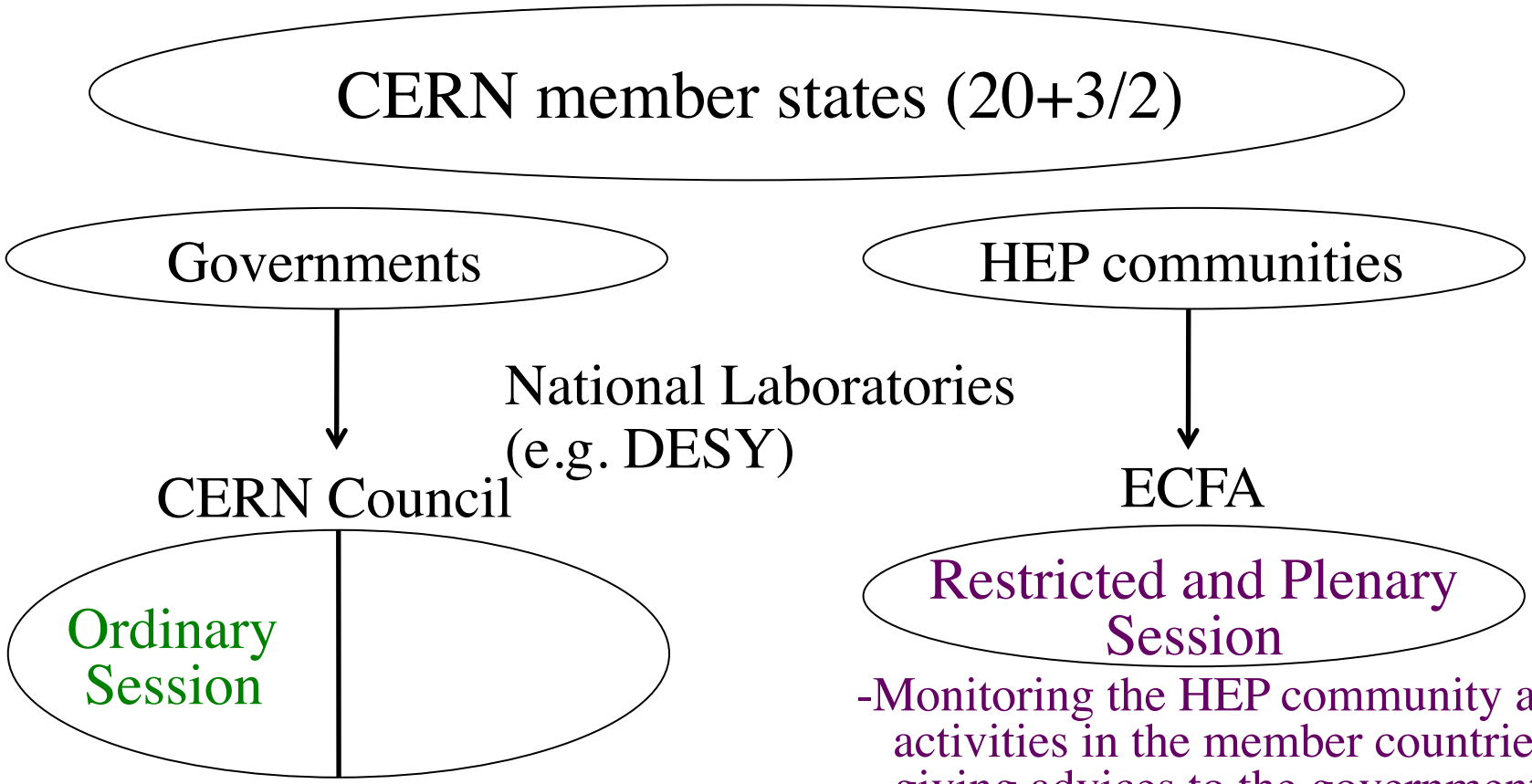
Astroparticle — in/direct search of exotics from the sky

Astroparticle Physics European Strategy

European HEP Structure till 2006



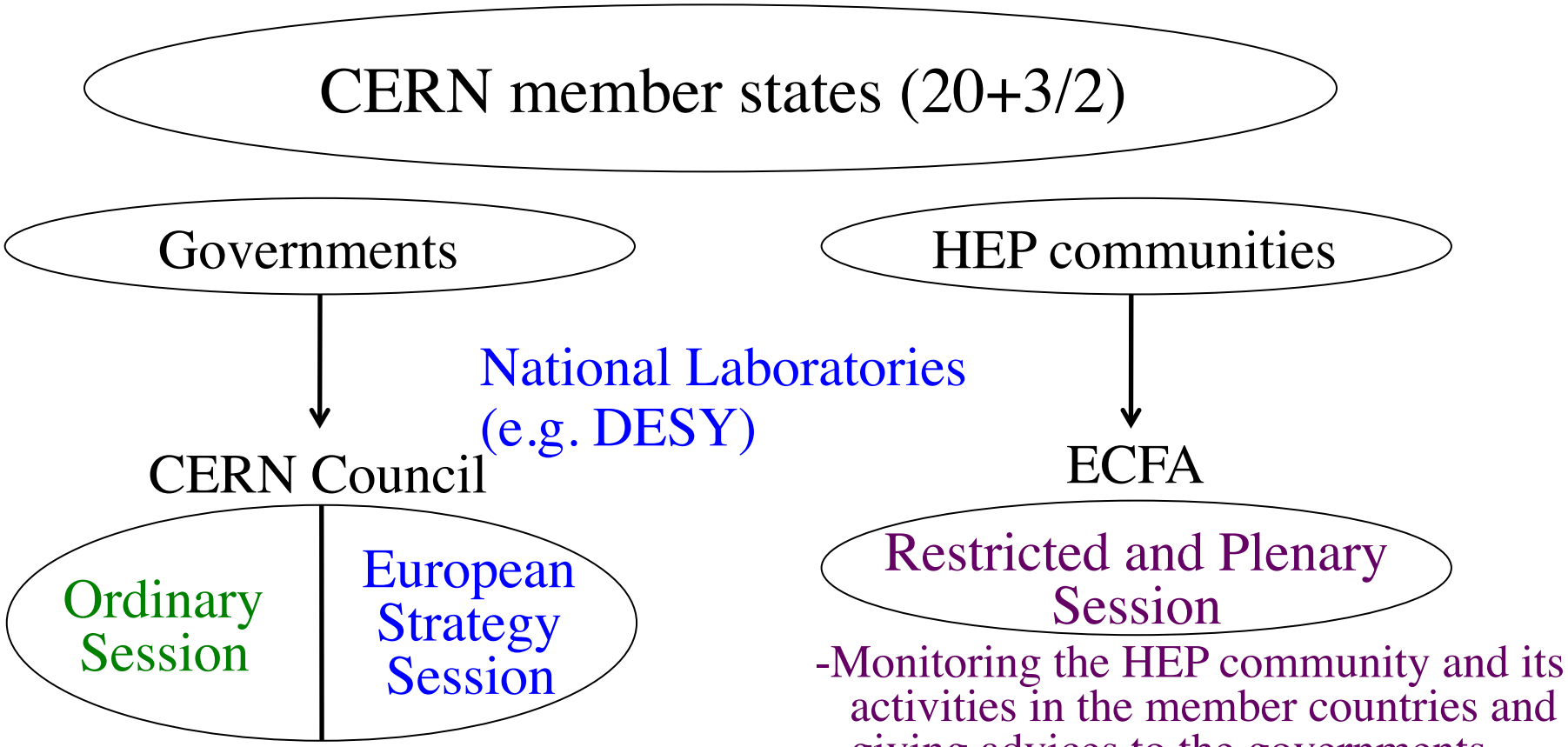
European HEP Structure now



CERN Geneva Laboratory
(Director General)
Running the laboratory

-Monitoring the HEP community and its activities in the member countries and giving advices to the governments
-Incubator for new ideas
-Forming the community opinions

European HEP Structure now



One of the consequences of the European Strategy

European Strategy for Particle Physics

- Current strategy was adapted by the Council in July 2006
- It consists of 17 strategy statements:
  - two General issues; necessity of strategy
  - eight Scientific activities (LHC, Accelerator R&D, ILC, Neutrino, Astroparticle, Flavour, Nucelar physics, Theory)
  - four Organizational issues
    - CERN Council's role in coordinating European particle physics
    - Globalization
    - Non-member state relation
    - Relation with EU
  - three Complementary issues
    - Outreach
    - Technology Transfer Network
    - Relation with industry

Strategy: scientific issues (1)

3. 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*.

Strategy: scientific issues (2)

4. 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.*

Strategy: scientific issues (3)

5. 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.*

Strategy: scientific issues (4)

6. 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***.

Strategy: scientific issues (5)

7. 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*.

Strategy: scientific issues (6)

8. 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*.

Strategy: scientific issues (7)

9. 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*.

Strategy: scientific issues (8)

10. 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.*

Working procedures

- Preparatory Group
  - Produce briefing books on scientific inputs for the Strategy Group based on the written submissions by the communities, funding agencies and policy makers, and on the Open Symposium
  - Organise Open Symposium
- Strategy Group
  - Start discussion on organizational and other non-scientific (Technology and knowledge transfer, Outreach etc.) issues needed for the strategy update
  - Draft the updated strategy for the Council
- Council
  - Finalise the strategy and formally adopt it

Update timeframe

- Written input from the worldwide communities, funding agencies and policy makers: input for the Open Symposium organisation and briefing books by the Preparatory Group, already open for submission
- Open Symposium
  - 10-12 September 2012, Cracow for scientific discussion
- Strategy Group meeting to draft the updated strategy
  - January 2013, Erice one week long meeting to draft the new strategy
- Council meeting in March
  - Finalisation of the draft Strategy by the Council
- Formal adoption at Special Council in May/June with participation of some ministers from the member countries

European Strategy Group

- Member state delegates (one per country)
- CERN DG
- Major European National Laboratory representatives
  - CIEMAT, DESY, IRFU, LAL, NIKHEF, LNF, LNGS L, PSI, STFC-RAL
- Scientific Secretariat for the Strategy Session of the Council
  - chairs of ECFA, SPC, Major national laboratories
- Also invited:
  - Candidates for Accession, Associate Members, Observer States, EU, ApPEC, FALC, ESFRI, NuPECC

Chaired by Scientific Secretary for the Strategy Session of the Council

Preparatory Group

Strategy Secretariat Members

Prof. T. Nakada Scientific Secretary
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

Chaired by the Scientific Secretary of the Strategy Session of the Council

Final Remarks

- Necessary scientific and technical inputs
  - Physics: LHC (Higgs, New Physics from direct and indirect searches), neutrino (θ_{13}, sterile, 0ν-2β, mass), rare decays (muon), astroparticle and nuclear physics etc.
  - Facility studies: S-LHC (high-lumi, high-energy), Linear Colliders, LHeC, neutrinos (long and short baseline, super beams, future facilities), flavours, new astroparticle facilities etc.
- Global aspects taken care by
  - members from the other regions in the Preparatory Group
  - inviting the observer states to the Strategy Group
- Written inputs from the world wide communities, funding agencies, and policy makers are essential
- Please come to the Open Symposium in September in Cracow

Final Remarks

- Possible questions there could be…
  - If a Standard Model like Higgs at ~125 GeV/c^2, in comparison with ATLAS/CMS prospects, should one build a low energy e^+e^- collider? If yes, what kind, where and in which time scale?
  - With the measured value of θ_{13}, mass hierarchy and CP measurements became plausible with a super-beam. Should Europe plan for a long baseline experiment with a super-beam in Europe?
  - What is the optimal balance between the exploiting existing facilities and investing to new ones?
  - and, and, and …