Report from CERN Council

Partikeldagarna 2018

Kerstin Jon-And, Stockholm University

CERN's organisation

Council:
Decision making authority
Two delegates per member state (Sweden: Mats Johnsson, KJA, deputy Richard Brenner)
President: Sijbrand de Jong

Main advisory bodies:
Scientific Policy Committee (SPC)
Finance Committee (Swedish reps Catarina Sahlberg/Per Karlsson, Barbro Åsman)

Tripartite Employment Conditions Forum (Chaired by Barbro Åsman)
Audit Committee (KJA council rep.)

Director General: Fabiola Gianotti, manages CERN, elected by Council

Directorate:
Director for Accelerators and Technology: Frédérick Bordry
Director for Research and Computing: Eckard Elsen
Director for Finance and Human Resources: Martin Steinacher
Director for International Relations: Charlotte Warakaulle

10 departments, e.g. Experimental Physics, Information Technology, Theoretical Physics

CERN comprises the following states and organisations (Fabiola Gianotti, SPC, 24 September 2018):

22 Member States:

Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Spain, Sweden, Switzerland, United Kingdom

8 Associate Member States:

Cyprus*, India, Lithuania (8/1/2018), Pakistan, Serbia*, Slovenia*, Turkey, Ukraine
* in the pre-stage to Membership

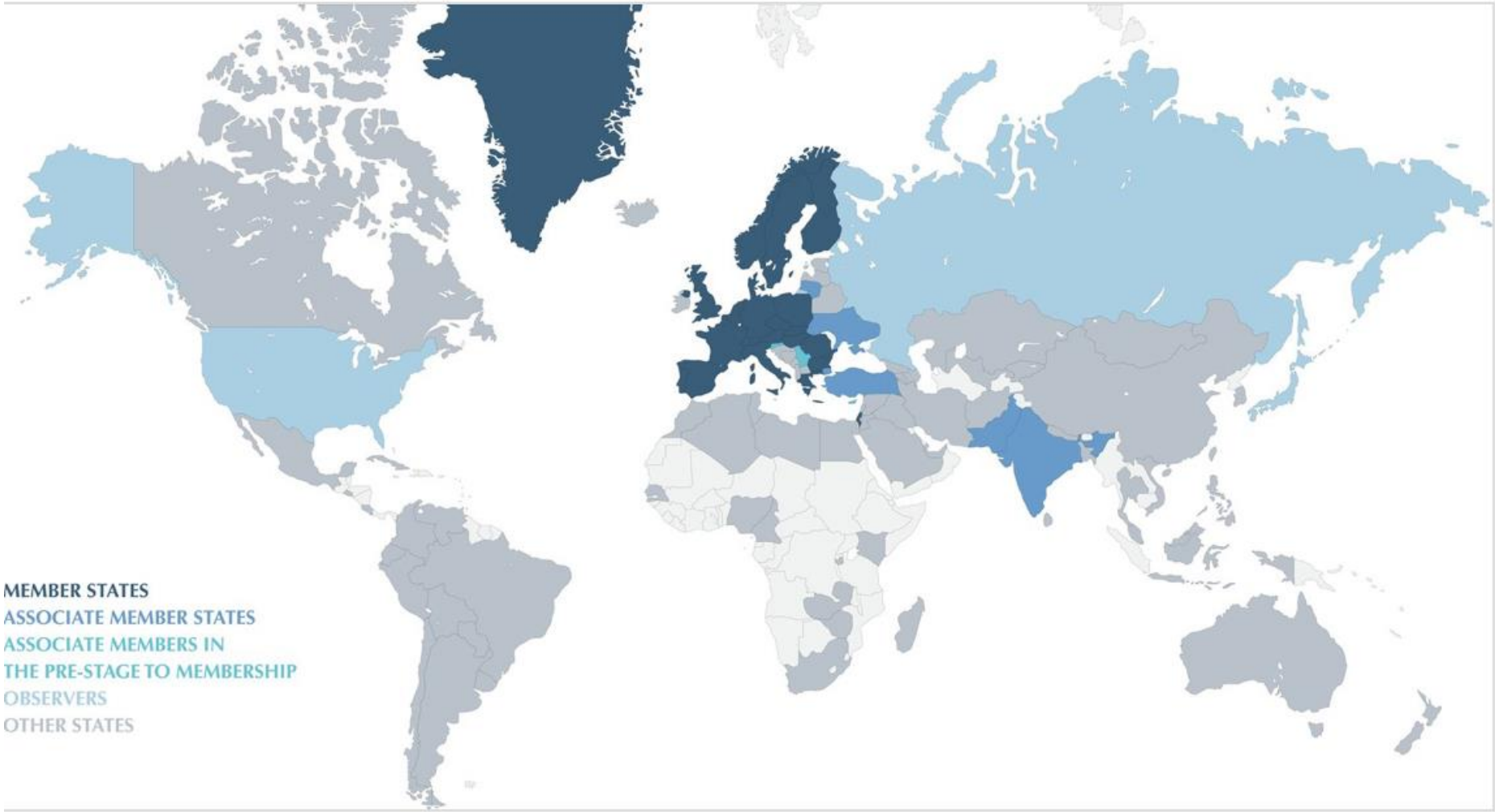
6 Observers:

Japan, Russia, USA, European Union, JINR, UNESCO

~50 ICA (International Cooperation Agreements):

with non-Member States, some with countries with developing particle physics communities (CERN mission is also to help build capacity and foster growth of particle physics worldwide).
On Thursday, Council will be asked to approve ICA with Paraguay

States connected to CERN



Scientific programme : 3 pillars

Fabiola Gianotti,
SPC, 24 Sep 2018

Mainly covered by F. Bordry, F. Forti and experiments Spokespersons

Full exploitation of the LHC:

- ❑ successful operation of the nominal LHC until end 2023 (Run 2, LS2, Run 3) → 300/fb
- ❑ construction & installation of LHC upgrades: LIU (LHC Injectors Upgrade) and HL-LHC → 3000/fb

Note: expect to move to 14 TeV operation in Run 3. Currently also exploring possibility to achieve "ultimate" energy of 15 TeV in Run4++

Scientific diversity programme serving a broad community:

- ❑ ongoing experiments and facilities at Booster, PS, SPS and their upgrades (HIE-ISOLDE, ELENA)
- ❑ participation in accelerator-based neutrino projects outside Europe (presently mainly LBNF in the US) through CERN Neutrino Platform

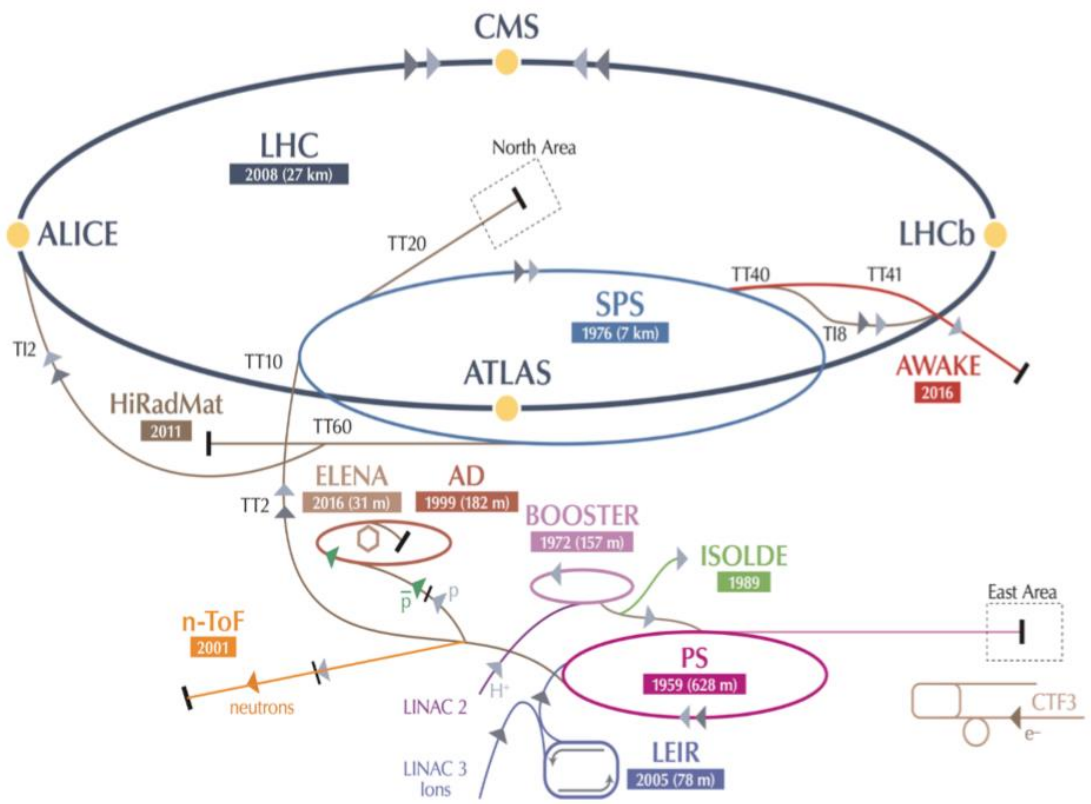
Preparation of CERN's future:

- ❑ vibrant accelerator R&D programme exploiting CERN's strengths and uniqueness (including superconducting high-field magnets, AWAKE, etc.)
- ❑ design studies for future high-energy accelerators: CLIC, FCC (includes HE-LHC)
- ❑ future opportunities of diversity programme: Physics Beyond Colliders Study Group

Important milestone: update of the European Strategy for Particle Physics (ESPP)
→ to be formally launched by Council this week and to be completed in May 2020

CERN scientific diversity programme

Fabiola Gianotti,
SPC, 24 Sep 2018



Future opportunities being studied by "Physics Beyond Colliders" Study Group: proton EDM, rare decays, beam dump or electron scattering facilities to search for dark-sector particles, etc.

AD: Antiproton Decelerator for antimatter studies

CAST, OSQAR: axions

CLOUD: impact of cosmic rays on aeorosols and clouds → implications on climate

COMPASS: hadron structure and spectroscopy

ISOLDE: radioactive nuclei facility

NA61/Shine: heavy ions and neutrino targets

NA62: rare kaon decays

NA63: interaction processes in strong EM fields in crystal targets

NA64: search for dark photons

Neutrino Platform: ν detectors R&D for experiments in US, Japan

n-TOF: n-induced cross-sections

UA9: crystal collimation

Future Circular Collider (FCC)

From Fabiola Gianotti, SPC, 24 Sep 2018

FCC-hh:	$\sqrt{s}$=100 TeV	L~3x10^{35}	100 km ring
FCC-ee:	$\sqrt{s}$= 90-365 GeV	L~200-1.5 x 10^{34}	100 km ring
FCC-eh:	$\sqrt{s}$=3.5 TeV	L~1.5x10^{34}	100 km ring
HE-LHC:	$\sqrt{s}$=27 TeV	L~1.6x10^{35}	LHC tunnel

Major focus: development of new generation 16T Nb_3Sn magnets (conductor programme, industrialisation toward dipole long models).

Preparing Conceptual Design Report for ESPP.
Preliminary purely technical schedule for first beams, assuming decision taken at next-but-one ESPP (~ 2026):
FCC-hh: 2043 FCC-ee: 2039 HE-LHC: 2040

CLIC

Start at $\sqrt{s}$= 380 GeV for Higgs and top studies (11 km tunnel) and upgrade up to 3 TeV (50 km tunnel)

Conceptual Design Report in 2012 → now preparing a Project Implementation Plan for ESPP

Current activities include:
- ❑ cost and power reduction
- ❑ development of high-efficiency, cost-effective klystrons and modulators
- ❑ operation of X-band test stands for 12 GHz accelerating structures
- ❑ linear collider beam dynamics and design optimisation

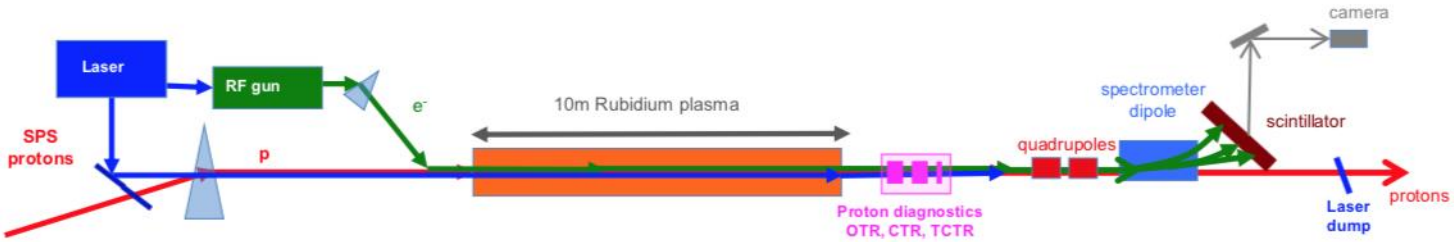
Technically, construction could start in ~2026 → first beams in 2035

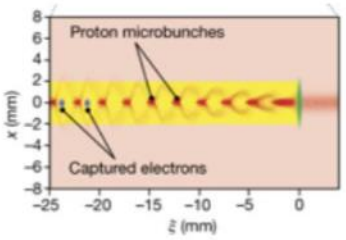
AWAKE

Advanced Proton Driven Plasma Wakefield Acceleration Experiment

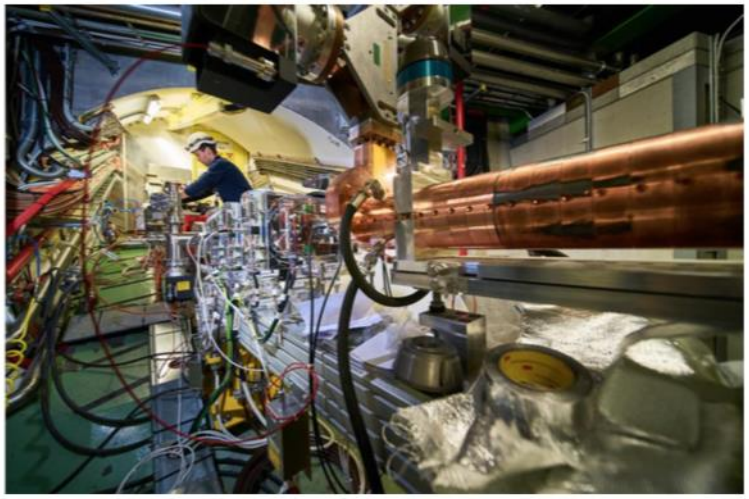
Fabiola Gianotti, Council, 27 Sep 2018

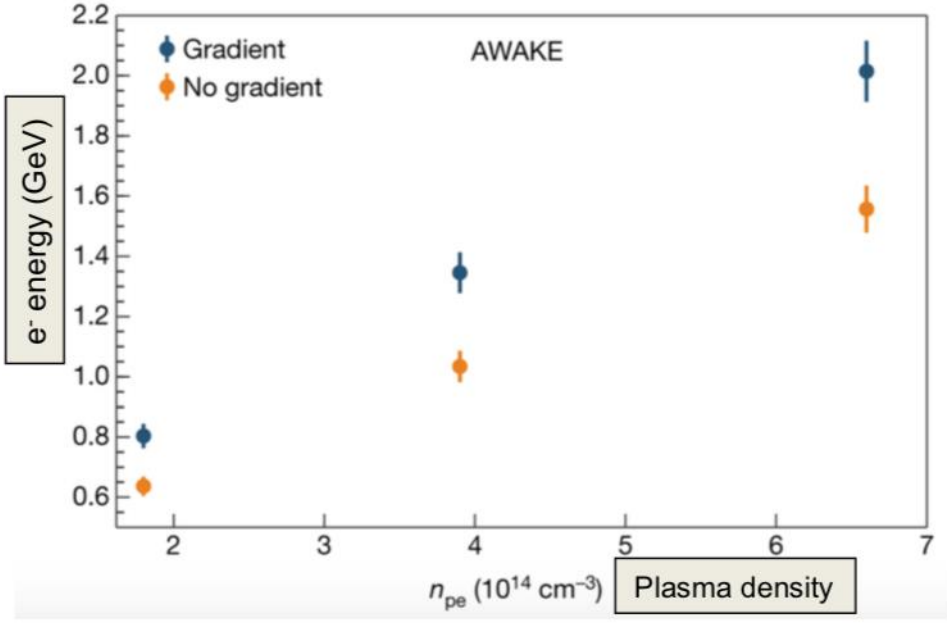
400 GeV protons from SPS generate strong EM fields in a 10 m plasma cell → externally injected e^- beam accelerated in the wake of the p beam





Recently: **first demonstration of p-driven e^- acceleration** (paper published in *Nature* 29 August): **20 MeV → 2 GeV** over 10 m: corresponds to **gradient of 200 MV/m**





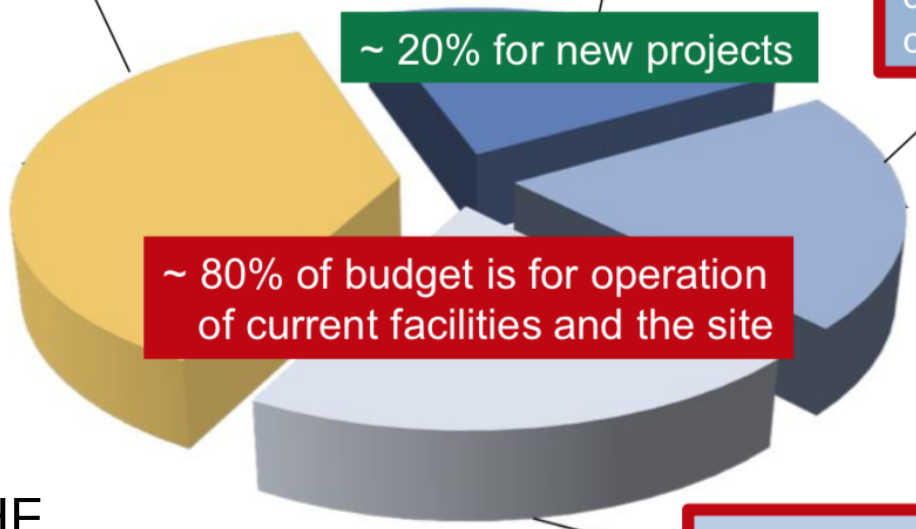
Reminder of Budget's main components

M+P
2019 budget

Infrastructure, services and centralized expenses(*): ~ 430 M (~ 34%)
Energy and water (22 M(**)), Safety (52 M), Site maintenance, logistics, security (86 M), Site renovation & buildings (21 M), Informatics (66 M), Int. Rel. (19 M), Administration (54 M), etc.
(*) Several expenses have corresponding revenues
(**) Shut-down year

New scientific projects and studies: ~ 288 M (23%)
LIU, HL-LHC, HIE-ISOLDE, AD-ELENA, Neutrino Platform, FCC, CLIC, Physics Beyond Colliders, AWAKE, R&D

LHC: ~ 285 M (22%)
Operation and consolidation of accelerator (180 M), detectors (61 M), computing (42 M)



Other scientific programme:
~ 260 M (21%)
- Non-LHC experiments, theory, KT
- Operation and consolidation of injectors and exp. areas (175 M)

Swedish share
2.66%, ~30 MCHF

Annual revenues: **1.26 BCHF**
1.12 BCHF from Member States
0.14 BCHF (e.g. contributions from Ass. Member States)

First report from the
"Council Working Group to review certain aspects of the geographical enlargement policy of 2010"
(Swedish rep. Mats Johnsson, deputy KJA)

- To review CERN's strategy and criteria for enlargement
- Aiming at producing a report to Council in March 2019

Applications to become a Member or Associate Member state:

- Serbia is in the process of becoming a full Member
- Croatia is in the process of becoming an Associate Member
- Estonia has applied to become a full Member

  Fact-finding task force appointed

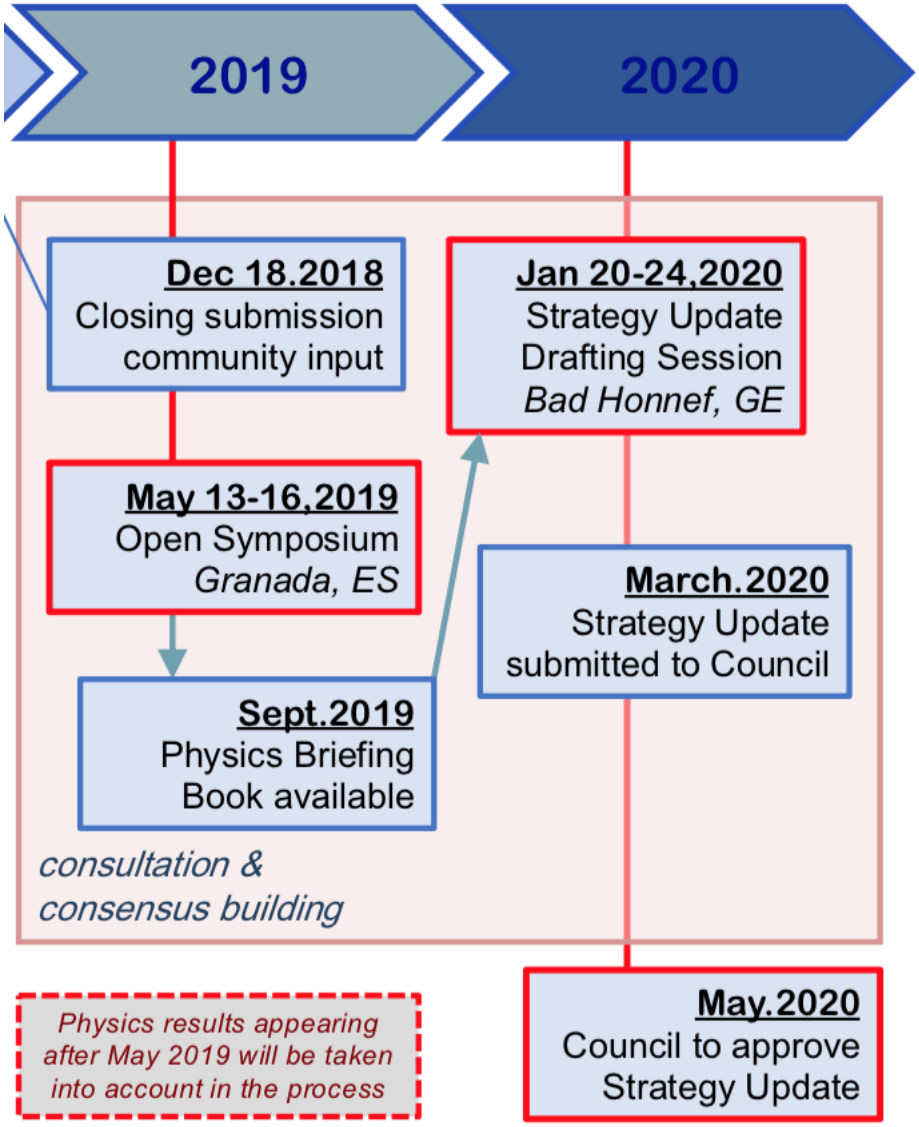
Elections, with effect 1 January 2019 :

- Ursula Bassler, France, elected President of the Council
- Péter Lévai, Hungary, elected Vice-President of the Council

From Council September agenda

Formal launch of the Update of the European Strategy for Particle Physics:

- Establishment of the Physics Preparatory Group (PPG) and the European Strategy Group (Swedish rep. KJA)
- Time line presented
- Proposed format of the Open Symposium (plenary and parallel sessions)



Physics Preparatory Group

PPG MEMBERS	
Strategy Secretariat	
Scientific Secretary (Chair)	Prof. Halina Abramowicz (IL)
SPC Chair	Prof. Keith Ellis (UK)
ECFA Chair	Prof. Jorgen D'Hondt (BE)
Chair EU Lab. Directors' Mtg	Prof. Leonid Rivkin (CH)
SPC	
Prof. Caterina Biscari (ES)	
Prof. Belen Gavela (ES)	
Prof. Beate Heinemann (DE)	
Prof. Krzysztof Redlich (PL)	
ECFA	
Prof. Stanislaus Bentvelsen (NL)	
Prof. Paraskevas Sphicas (GR)	
Dr Marco Zito (FR)	
Prof. Antonio Zoccoli (IT)	
CERN	
Dr Gian Giudice (CERN)	

ASIA/AMERICAS
Prof. Marcela Carena (USA)
Prof. Brigitte Vachon (Canada)
Prof. Xinchou Lou (China)
Prof. Shoji Asai (Japan)

From Council September agenda

Decision to support the implementation of the Science Gateway Project

CERN receives ~130000 visitors every year, BUT gets > 300000 requests

A new hub for education, training and outreach.
Activities will target the general public of all ages, 5 - 100+.

Designed by renowned architect Renzo Piano

Funding of Science Gateway Project

- Total cost estimated at 79 MCHF
- Project will be financed by external donations
- So far 12 MCH secured and 45 MCH pledged
- Operating cost ~ 4 MCH/year
- After revenues, < 2 MCHF/year from CERN budget

Time line (preliminary and ambitious…)

- Architect and engineering consultants contract: Dec 2018
- Building permit: 2nd half of 2019
- Start tendering process: Mar 2019
- Construction of building and content installation: Mar 2020 – Jun 2022
- Inauguration and open to public second half of 2022*

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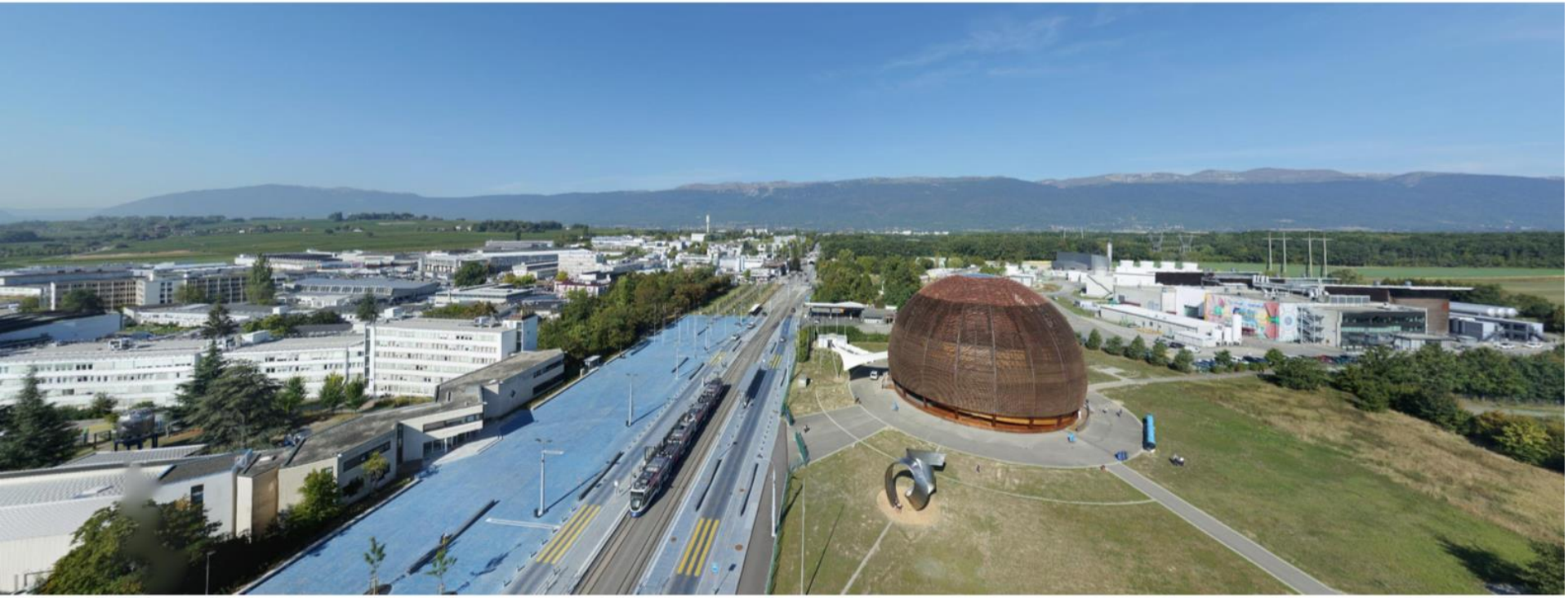
*2022:

- ❑ Centenary of IUPAP (International Union of Pure and Applied Physics)
- ❑ Proposed as International Year of Basic Sciences for Development
  → Geneva and CERN expected to be focal points of celebrations

Esplanade des particules

Fabiola Gianotti,
Council, 24 Sep 2018

Friday 28 September at 15:30: Inauguration of the “Esplanade des particules” and flag raising ceremony

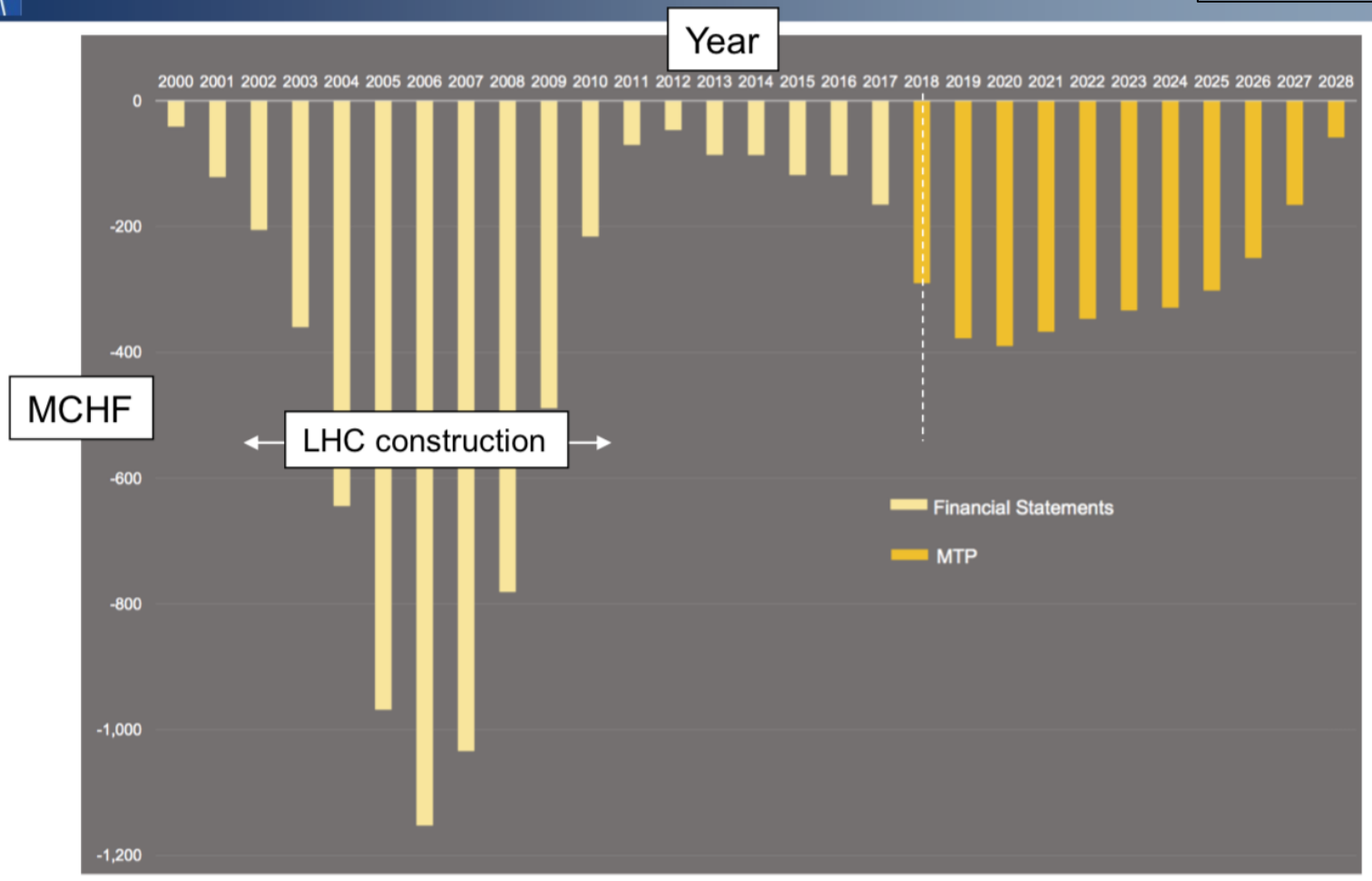


CERN’s new street address: 1, Esplanade des particules, 1217 Meyrin

SPARES

Cumulative Budget Deficit (CBD) vs time

Fabiola Gianotti,
SPC, 24 Sep 2018



- Completion of LIU and concentration of LS2 activities → peak of expenditures in 2019-2020
- Peak CBD in 2020: -390.1 M
- European Investment Bank credit facility, approved by Council in Sep 2016, will allow funding HL-LHC (**950 MCHF** materials cost, injectors and experiments not included) without delays and without jeopardizing the rest of the scientific programme. No drawdowns needed until 2020.

EPPSU 2020

PPG Composition

Halina Abramowicz – Tel Aviv University, Israel (chair); high energy experiments
Shoji Asai - Tokyo University, Japan; experimental non-accelerator particle physics and high-energy colliders
Stan Bentvelsen – Nikhef, Netherlands; experimental particle and astroparticle physics
Caterina Biscari – ALBA, Spain; accelerator science
Marcela Carena – University of Chicago and Fermilab, US; dark matter and BSM theory
Jorgen D'Hondt – University of Brussels (VUB), Belgium; high energy collider experiments
Keith Ellis –University of Durham, UK – QCD theory and colliders phenomenology
Belen Gavela – University of Madrid (UOM), Spain; beyond-the-Standard Model theory
Gian Giudice: CERN; theory (everything)
Beate Heinemann – DESY and Freiburg University, Germany; high-energy collider experiments
Xinchou Lou - Institute of High Energy Physics, China; heavy flavour physics and detectors
Krzysztof Redlich – Wroclaw University, Poland; QCD (strong interaction) theory
Lenny Rivkin – EPFL/PSI, Switzerland; accelerator science
Paris Sphicas – University of Athens, Greece, and CERN; high-energy collider experiments
Brigitte Vachon - McGill University, Canada; detector physics
Marco Zito – Saclay, France; experimental neutrino physics
Antonio Zoccoli – INFN Bologna, Italy; experimental heavy flavour physics

Among 17 members – 15 countries and CERN, 4(T) and 13(E), 6(F) and 11(M)

European Strategy Group (ESG)

Members

- The Strategy Secretary (chair)
- One representative appointed by each CERN MS (22)
- One representative appointed by each of the Labs participating in the European Laboratory Directors Group including its Chairperson (9)
- CERN DG
- SPC chair
- ECFA chair

Invitees

- President of CERN Council
- One representative from each AMS and OS (6+3)
- One representative from the European Commission
- One representative from JINR
- Chairs of ApPEC, NuPECC, FALC, ESFRI
- Members of the PPG (17 - Secretariat)

EPPSU 2020

Proposed format of Open Symposium

Monday	Tuesday	Wednesday	Thursday
Morning **Plenary session** "Where do we stand"	**Morning** **Parallel sessions** B5 - BSM B6 – Strong interactions B7 - Detectors and computing B8 – Dark matter, axions, rare decays	**Morning** **Parallel sessions** B5 - BSM B6 – Strong interactions B7 - Detectors and computing B8 – Dark matter, axions, rare decays	**Plenary session** Summary Reports (8) Close-out
Afternoon **Parallel sessions** B1 – Electroweak B2 - Heavy flavours, lepton flavours B3 – Neutrinos B4 - Accelerators	**Afternoon** **Parallel sessions** B1 – Electroweak B2 - Heavy flavours, lepton flavours B3 – Neutrinos B4 - Accelerators	**Afternoon** **Plenary session** "Future facilities"	

Good match between PPG and needs of the OS