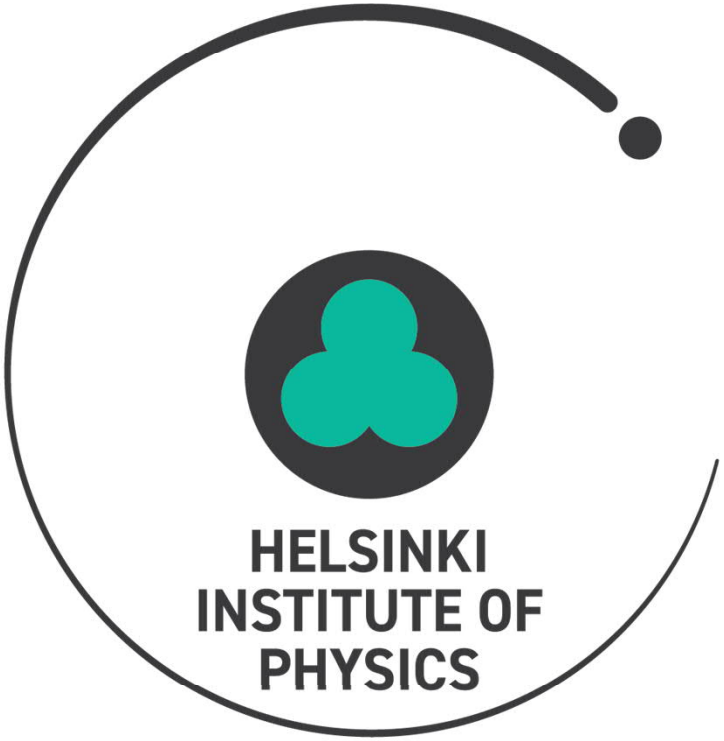
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Helsinki Institute of Physics – Town Meeting

Welcome and opening

Katri Huitu, 3.10.2019

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Why are we here?

- To inform about HIP
- HIP research programme?
- HIP research in future?
- Long term strategy is being drafted, and this meeting provides one possibility to comment.
- European particle physics strategy update is in progress and will be finalised early 2020
- It is important to get to know each other better!

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Helsinki Institute of Physics, HIP

Founded in 1996

- University of Helsinki (UH) 1996-
- Aalto University (AU) 1996-
- University of Jyväskylä (UJ) 2002-
- Lappeenranta-Lahti University of Technology (LUT) 2006-
- Tampere University (TAU) 2008-

- Radiation and Nuclear Safety Authority (STUK)
  - Interim member 2018-2019, 2020-2022 in signing

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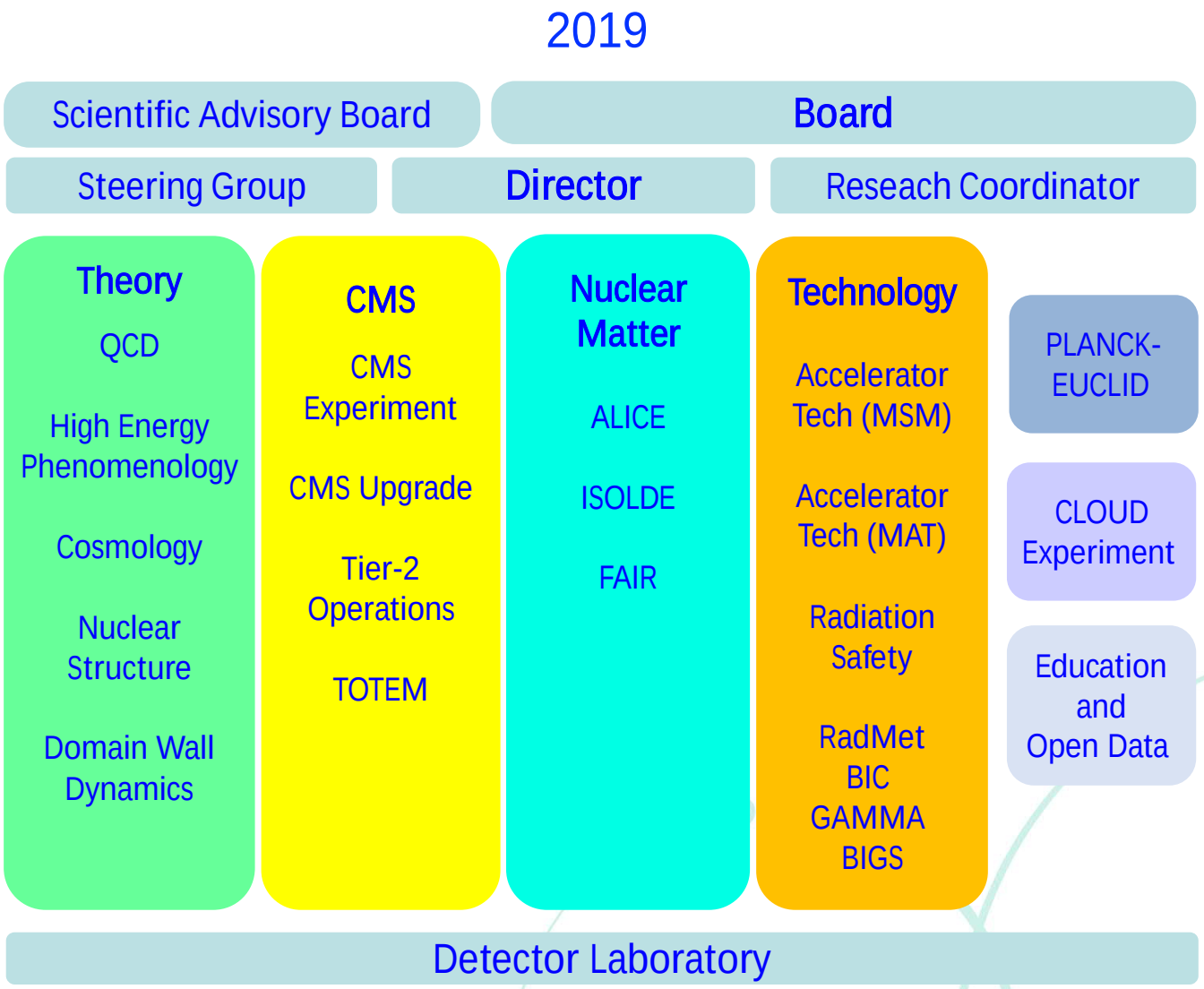
MISSION

- Research in basic and applied physics as well as technology development at international accelerator laboratories
- Finnish research collaboration with CERN, and coordination of the Finnish contribution to the FAIR laboratory
- Researcher education
- Societal impact



Indicators

~ 300 publications and
~ 10 doctoral degrees per year

Plans

Action plan 2020
Research plan 2020
Communication plan
- HIP News, Twitter, HIP Blog

Code of Conduct (CERN, Kumpula)
- Kumpula Physics Wellbeing Group

HIP scientific strategy based on

National mandate: CERN and FAIR utilization

National base:
- CERN Strategy
- Infrastructure Roadmap

International:
- European strategy for particle physics (2013), new in 2020
- NuPECC long range plan (2017)
- APPEC Strategy (2017-2026)

Strategies of HIP member universities

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Recently:

- MoU with APPEC was signed at General Assembly meeting in Granada in May 2019
- Research of the University of Helsinki was evaluated 2018-2019. HIP/Helsinki part was evaluated together with the Department of Physics. The ”Unit” received the highest grade in: scientific quality; societal impact; research environment and unit viability (3 x excellent for 3 out of 39 Units)
- Workshops / other events organized by HIP personnel: Nordic Detector Course Nov. 2018; MasterClass, March 2019; Physics Days, March 2019; IKBest 5, April 2019; NonMinimalHiggs MSCA RISE workshop, May 2019; BootCamp at CERN IdeaSquare, June 2019; Euclid Consortium Meeting, June 2019; CompactLight XLS Midterm Meeting, July 2019; CMS Tracker Week, July 2019; Researchers’ night, Sep 2019
- Personnel participates strongly in Helsinki Physics wellbeing group; in a number of outreach events, like science bazaar, researchers’ night,...

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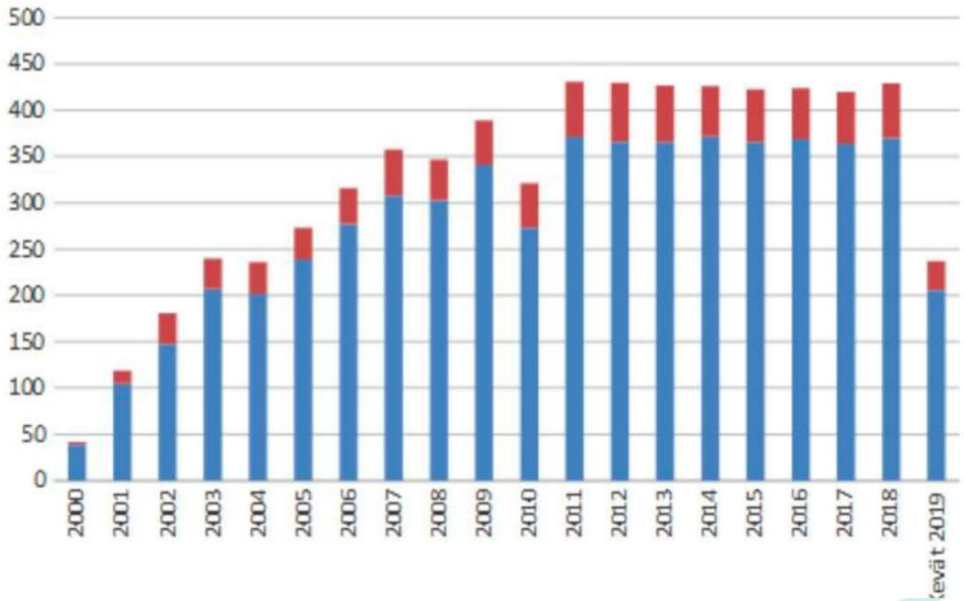
Education and open data:
visits of 5367 high school students and 383 teachers during 2000 – 2019



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*Education and ope*n data project:

Data preservation and open access of the CMS experiment has taken concrete form:

- increasing interest for using open data in schools
- three 2-day trainings for teachers in use of open data organized in Helsinki (2017), Jyväskylä (2018) and Rovaniemi (2019)
- increasing contributions to the CERN open data portal development and resources

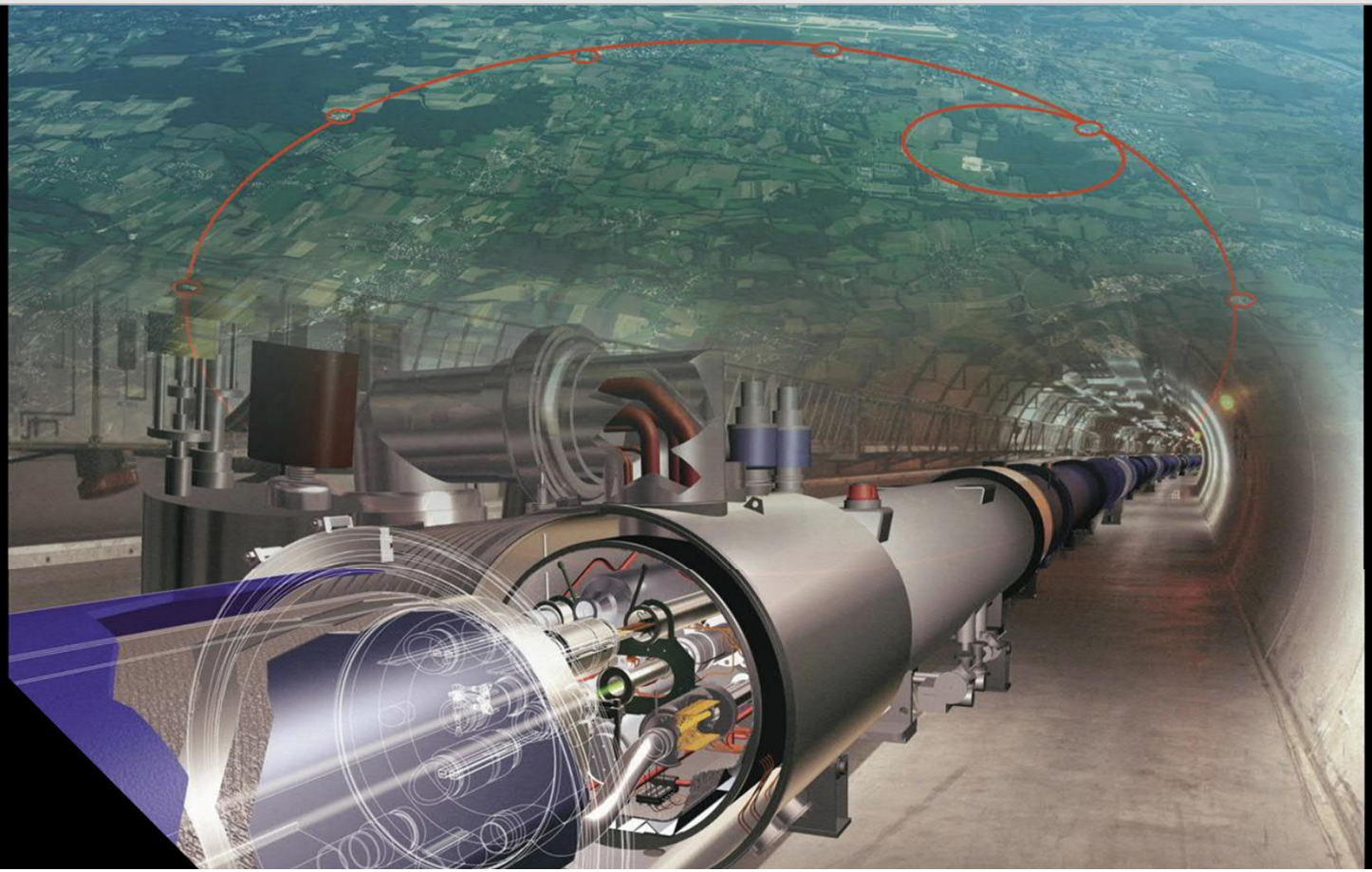


Towards an update of the European Strategy for Particle Physics

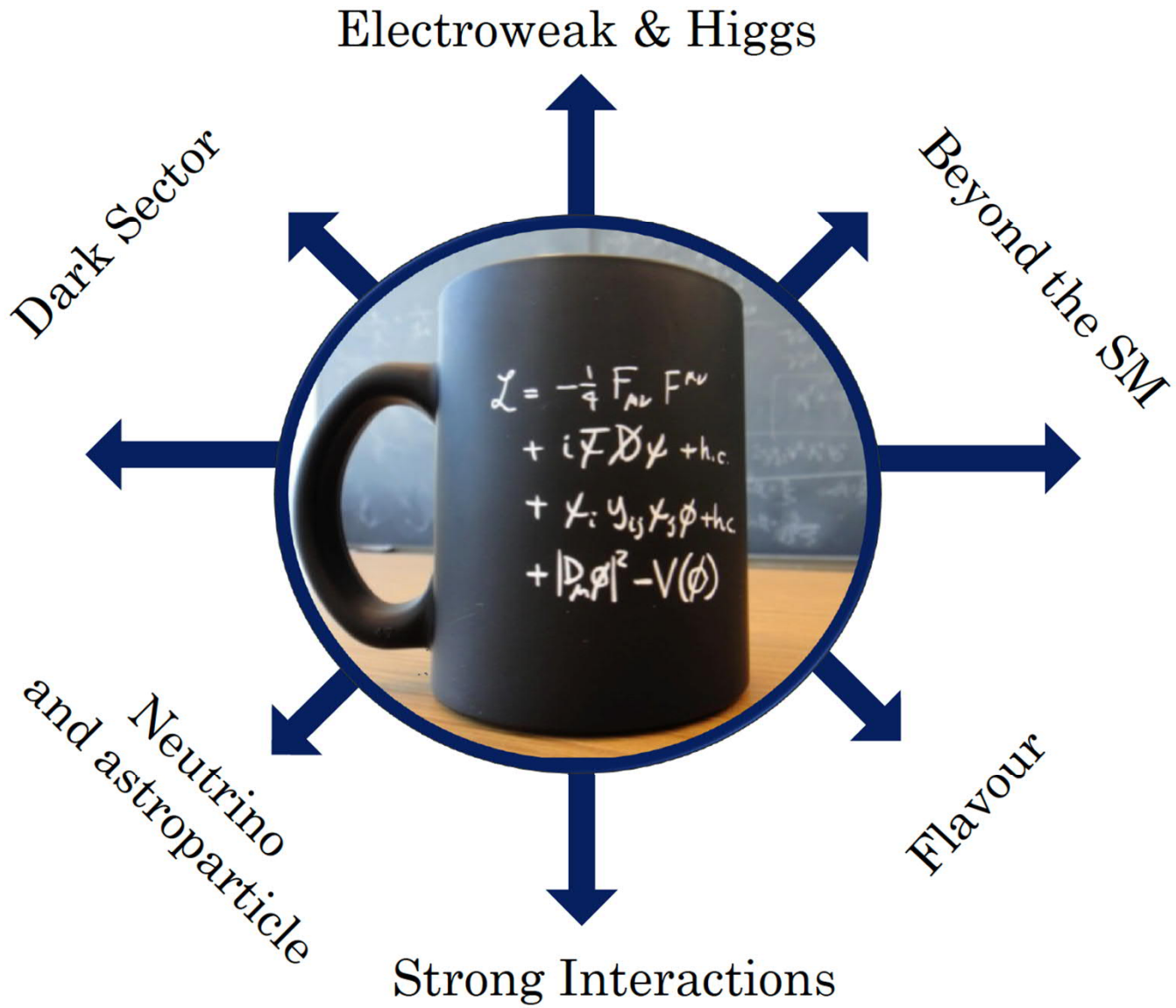
Jorgen D'Hondt
Vrije Universiteit Brussel

on behalf of the
Strategy Update Secretariat

4th ESG meeting
Sept 27, 2019
CERN



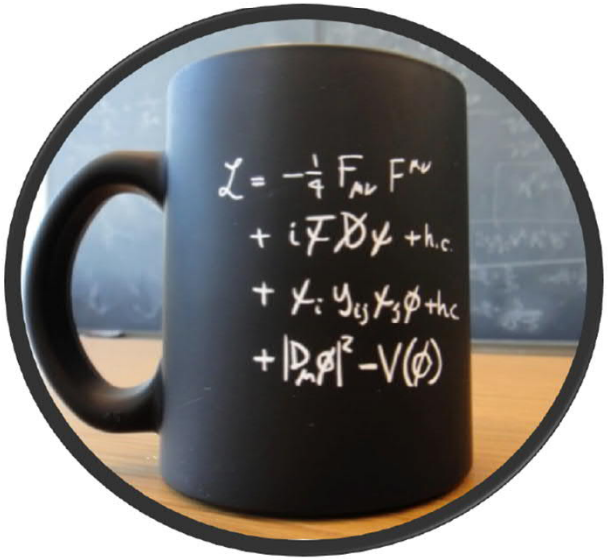
The Granada physics themes



There is "new physics" out there!

and it should be our main objective to discover it

in an effort to understand fundamental interactions



The exploration of the scalar sector with colliders is only one avenue to search for new physics

Accelerator technology at Granada

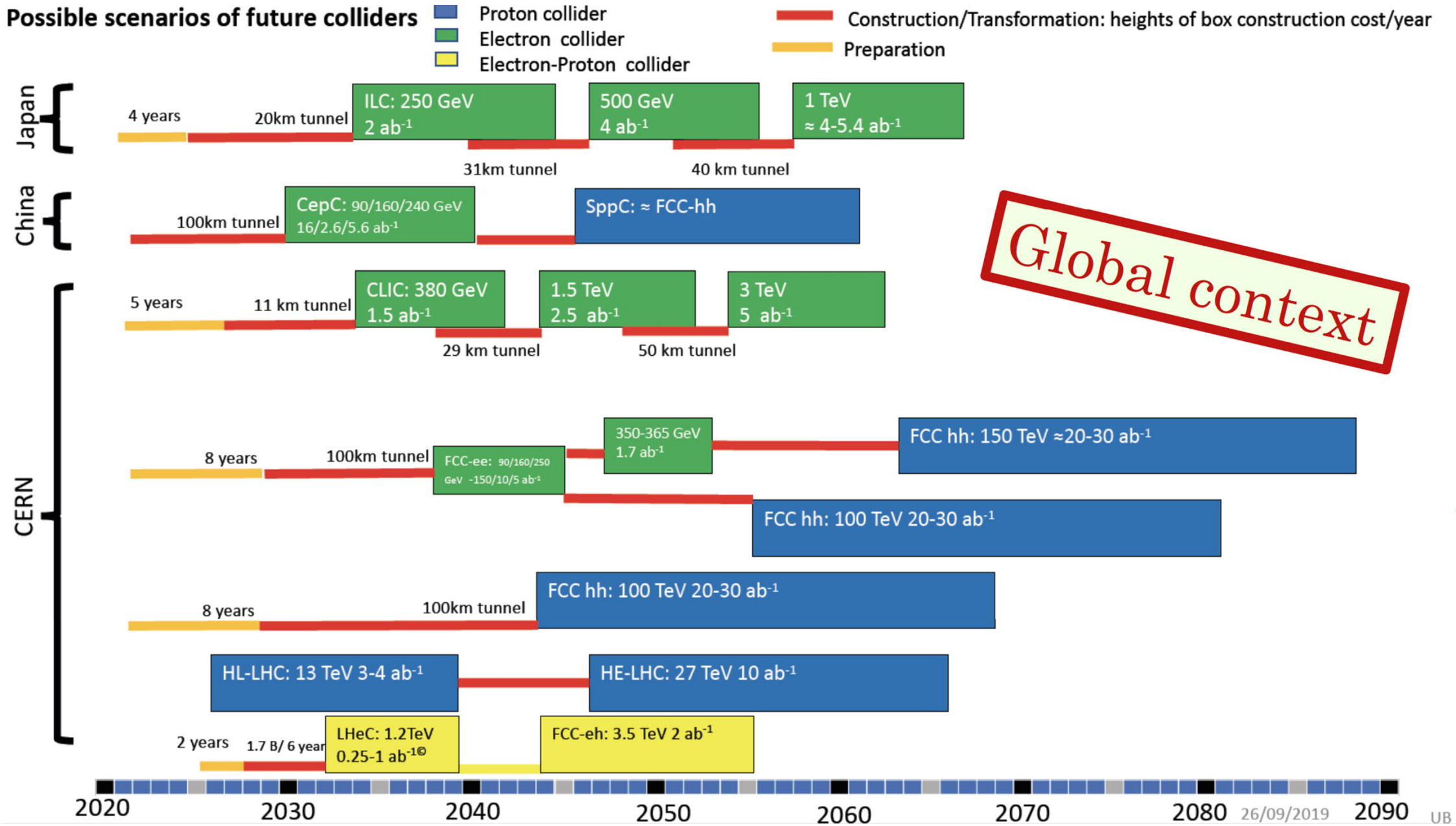
Not written in stone, but on the collider front we might identify three eras

- the *immediate future* (2020-2040)
  e.g. the HL-LHC era
- the *mid-term future* (2040-2060)
  e.g. the Z/W/H/top-factory era
- the *long-term future* (2060-2080)
  e.g. the energy frontier era

The landscape for colliders in Europe

	2020-2040	2040-2060	2060-2080
		1st gen technology	2nd gen technology
CLIC-all	**HL-LHC**	**CLIC380-1500**	**CLIC3000**
CLIC-FCC	**HL-LHC**	**CLIC380**	**FCC-h/e/A (Adv HF magnets)**
FCC-all	**HL-LHC**	**FCC-ee (90-365)**	**FCC-h/e/A (Adv HF magnets)**
LE-FCC+HE-FCC	**HL-LHC**	**LE-FCC (6T magnets)**	**FCC-h/e/A (Adv HF magnets)**
Others/Options	LHeC@CERN	demo muon-collider	Adv Acc Technologies
	demo ERL (PERLE)	demo plasma-collider	
	EIC@USA	demo Adv HF magnets (16T)	
	Diversity Program @ CERN	ILC@Japan	
	SuperKEKB@Japan	CEPC@China	

1) Identify the financial challenges in the context of the CERN budget
2) Elements to be considered in this and the next strategy update


Possible scenarios of future colliders
Proton collider
Electron collider
Electron-Proton collider
Construction/Transformation: heights of box construction cost/year
Preparation
Japan
4 years
20km tunnel
ILC: 250 GeV
2 ab-1
500 GeV
4 ab-1
1 TeV
≈ 4-5.4 ab-1
31km tunnel
40 km tunnel
China
100km tunnel
CepC: 90/160/240 GeV
16/2.6/5.6 ab-1
SppC: ≈ FCC-hh
Global context
CERN
5 years
11 km tunnel
CLIC: 380 GeV
1.5 ab-1
1.5 TeV
2.5 ab-1
3 TeV
5 ab-1
29 km tunnel
50 km tunnel
8 years
100km tunnel
FCC-ee: 90/160/250 GeV -150/10/5 ab-1
350-365 GeV
1.7 ab-1
FCC hh: 150 TeV ≈20-30 ab-1
FCC hh: 100 TeV 20-30 ab-1
8 years
100km tunnel
FCC hh: 100 TeV 20-30 ab-1
HL-LHC: 13 TeV 3-4 ab-1
HE-LHC: 27 TeV 10 ab-1
2 years
1.7 B/ 6 year
LHeC: 1.2TeV
0.25-1 ab-1©
FCC-eh: 3.5 TeV 2 ab-1
2020
2030
2040
2050
2060
2070
2080
2090
26/09/2019
UB

One can debate, but with a granularity of 20 years and in the absence of clear indications for new physics, the following general principle is probably wise:

in each era you would want to take important steps forward for the largest variety of directions where new physics can be found

With the input from the Physics Briefing Book, and with a view of updating the current strategy, the next step is to define some overall long-term scenarios and discuss their coverage, feasibility and community support

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Schedule

10:00 – 10:30 Welcome and opening, Katri Huitu
10:30 – 11:10 LHC-experiments and future high-energy frontier, Kenneth Österberg
11:10 – 11:30 Other experimental activities at CERN, Ari Jokinen

11:30 – 12:30 Lunch

12:30 – 13:00 FAIR facility, Juha Äystö
13:00 – 13:40 Theoretical physics, cosmology and astroparticle research, Kari Rummukainen
13:40 – 14:10 Technological connections and knowledge transfer, Filip Tuomisto

14:10 – 14:30 Coffee

14:30 – 15:00 Outreach and wellbeing, Eija Tuominen
15:00 – 15:30 Discussion

Thank You.