

<https://particle.uni-graz.at/en/event-generators-and-resummation/>

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# The Roadmap discussion and update of the European Strategy

Simon Plätzer — Thomas Bergauer, Robert Schöfbeck, Christoph Schwanda

Austrian EPPSU Roadmap meeting  
Wien | 10 June 2024



# Goals of the strategy process and opportunities

Define the scientific priorities of the particle physics community:

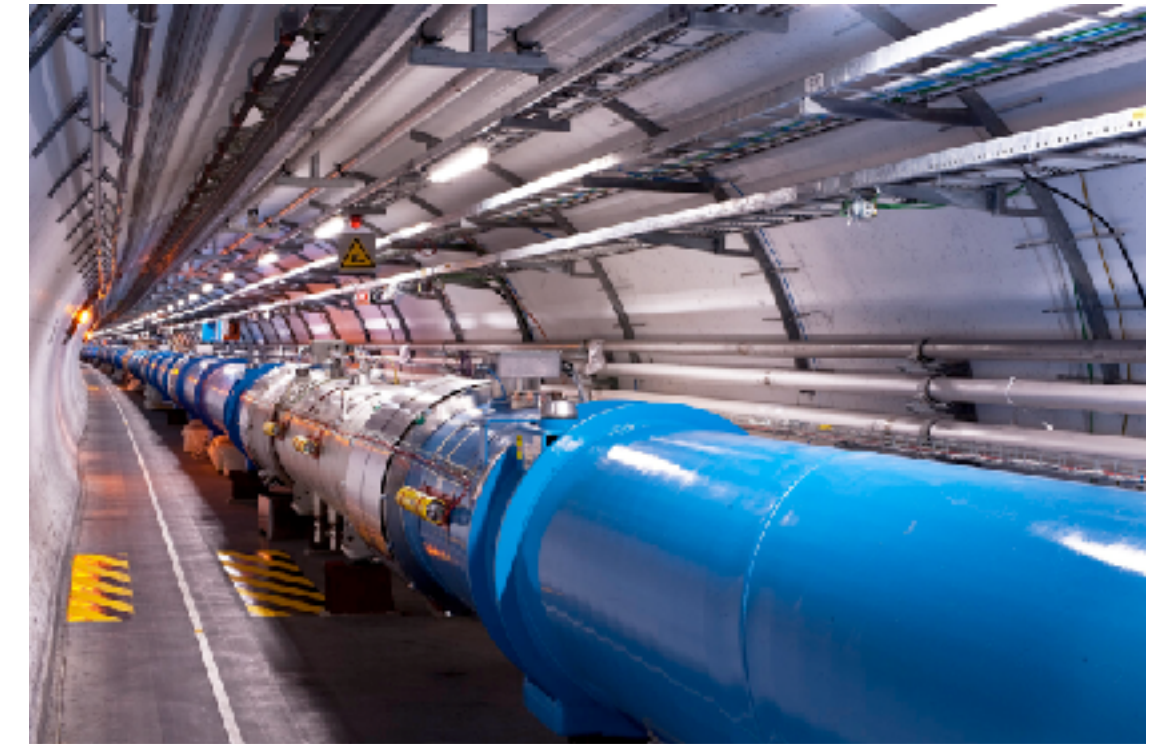
- For the next 6 (12) years
- In the long term through prioritising main research topics and facilities

We must define CERN's perspective and role beyond the HL-LHC:

- CERN as hub for particle physics in Europe, with a unique governance model
- Complemented by many other facilities for which the community engages
- We need to be able to fully exploit the HL-LHC

Secure long-term and diverse perspectives for young researchers.

This must be a scientific, bottom-up process addressing what we need to make progress in understanding the fundamental building blocks of our Universe.





“Through the Council's adoption of the first European Strategy for Particle Physics in July 2006 and the subsequent Update of this Strategy in May 2013, **CERN has assumed its mandate of organising and sponsoring international cooperation in particle physics and related fields not only inside, but also outside the Laboratory.**”

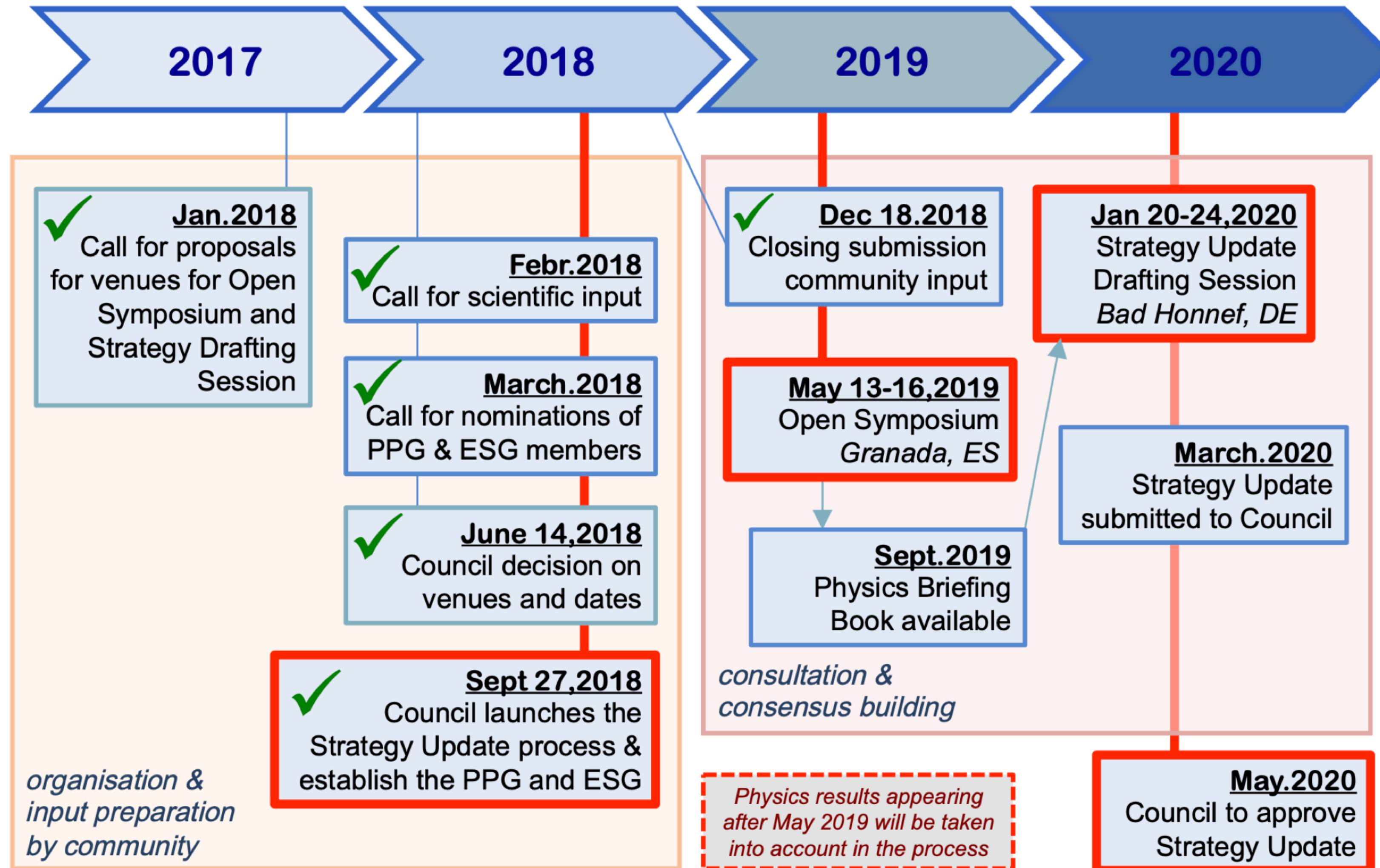
- First defined 2006.
- Update 2013: Decision on High Luminosity LHC
- Update 2020: Pathway to post-HL-LHC

**Update 2026 ahead.**





# Strategy update 2018 - 2020



## High-priority future initiatives

A. An electron-positron Higgs factory is the highest-priority next collider. For the longer term, the European particle physics community has the ambition to operate a proton-proton collider at the highest achievable energy. Accomplishing these compelling goals will require innovation and cutting-edge technology:

- *the particle physics community should ramp up its R&D effort focused on advanced accelerator technologies, in particular that for high-field superconducting magnets, including high-temperature superconductors;*

- *Europe, together with its international partners, should investigate the technical and financial feasibility of a future hadron collider at CERN with a centre-of-mass energy of at least 100 TeV and with an electron-positron Higgs and electroweak factory as a possible first stage. Such a feasibility study of the colliders and related infrastructure should be established as a global endeavour and be completed on the timescale of the next Strategy update.*

~~*The timely realisation of the electron-positron International Linear Collider (ILC) in Japan would be compatible with this strategy and, in that case, the European particle physics community would wish to collaborate.*~~

## Other essential scientific activities for particle physics

A. The quest for dark matter and the exploration of flavour and fundamental symmetries are crucial components of the search for new physics. This search can be done in many ways, for example through precision measurements of flavour

B. Theoretical physics is an essential driver of particle physics that opens new, daring lines of research, motivates experimental searches and provides the tools needed to fully exploit experimental results. It also plays an important role in capturing

C. The success of particle physics experiments relies on innovative instrumentation and state-of-the-art infrastructures. To prepare and realise future experimental research programmes, the community must maintain a strong focus on instrumentation. **Detector R&D programmes and associated infrastructures should be supported at CERN, national institutes, laboratories and universities.**

D. Large-scale data-intensive software and computing infrastructures are an essential ingredient to particle physics research programmes. The community faces major challenges in this area, notably with a view to the HL-LHC. As a result, the



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5



Synergies with neighbouring fields

7



Environmental and societal impact

## Other essential scientific activities for particle physics

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## Research Strategy of the Austrian Particle Physics Community Input to the European Strategy on Particle Physics

Editors: Manfred Jeitler, Axel Maas, Jochen Schieck\*

December 18, 2018

The description below provides a comprehensive overview of the ongoing particle physics activities in Austria and presents the plans for the next decade. The Austrian particle physics community is working on setting up a tightly woven network of cooperation among Austrian institutions in addition to its multitude of international collaborations. This is an ongoing effort,

...

Austria's institutions plan to actively participate in several future particle physics experiments. Work on the CMS upgrade for HL-LHC has already started. A contribution to experiments at the next generation of accelerator complexes is envisaged, in particular at the proposed linear collider ILC in Japan. The Austrian science community also emphasises that approaches centered around low-energy precision experiments have an enormous potential and reach out into several

...

It is the opinion of the Austrian community that intense accelerator and detector R&D efforts will be an important aspect of the future long-term strategy of particle physics in Europe. As in the past, CERN should play a leading role in this effort. Personpower and funding resources will have

... a detailed summary of our activities and synergies, as well.

# The 2024 - 2026 Update



Launched in March 2024 on proposal by CERN management.

Decisions taken by three bodies:

- Secretariat: secretary, CERN SPC chair, ECFA chair, LDG chair
- Physics Preparatory Group (PPG): 13 people plus secretariat
- European Strategy Group (ESG): secretariat plus representatives from member states, labs, CERN, other committees

June 2024: selection of secretary of the EPPSU and establishment of ESG

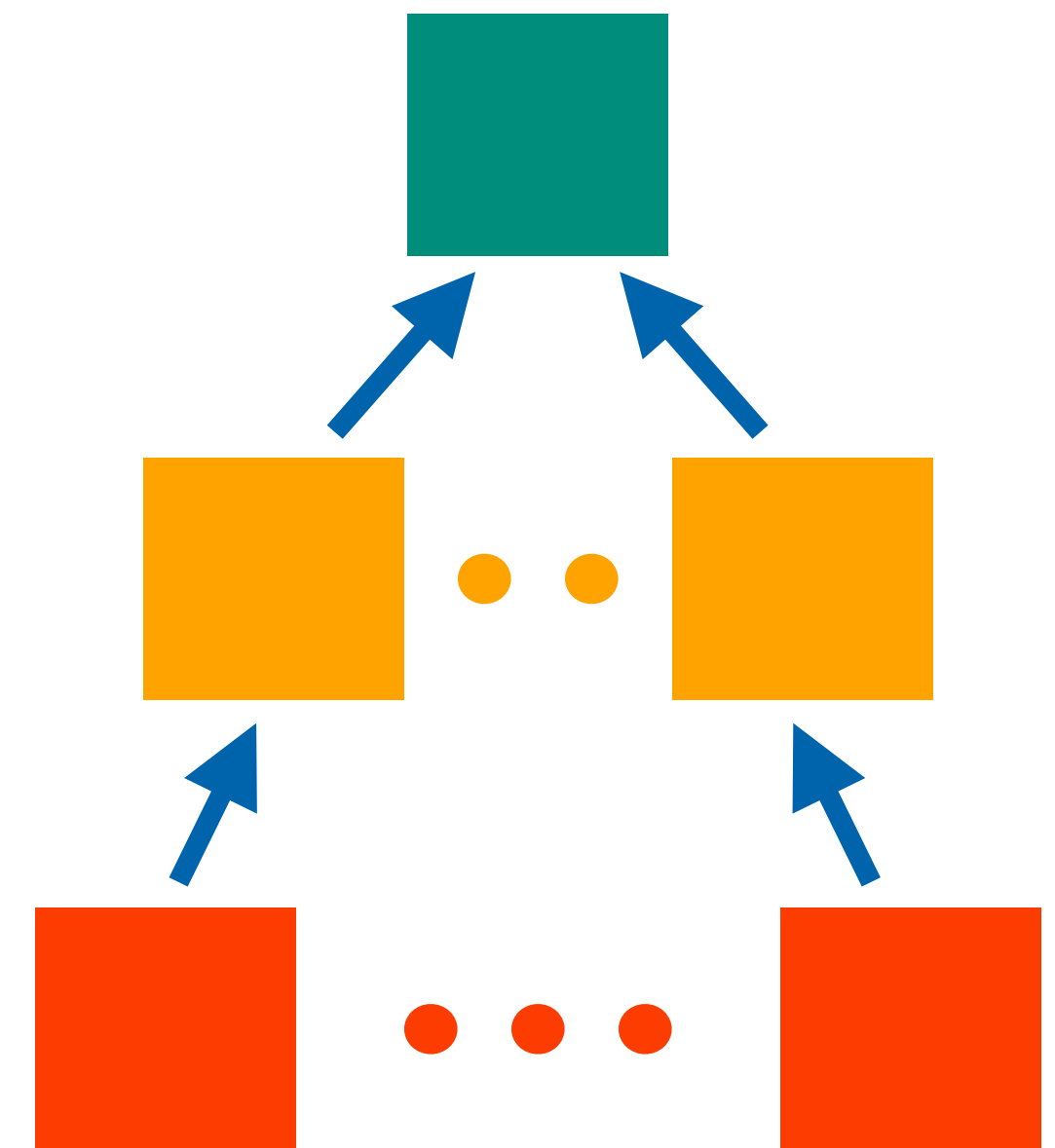
September 2024: appointment of PPG members

March 2025: Submission of community contributions

June 2025 “Granada style workshop”

... briefing book, drafting ...

June 2026: Final adoption by CERN council





# The 2024 - 2026 Update — Input from Austria



Launched in February 2024 pre-empting CERN decisions ...

April 2024 — informal community talks

June 2024 — Round-table meeting

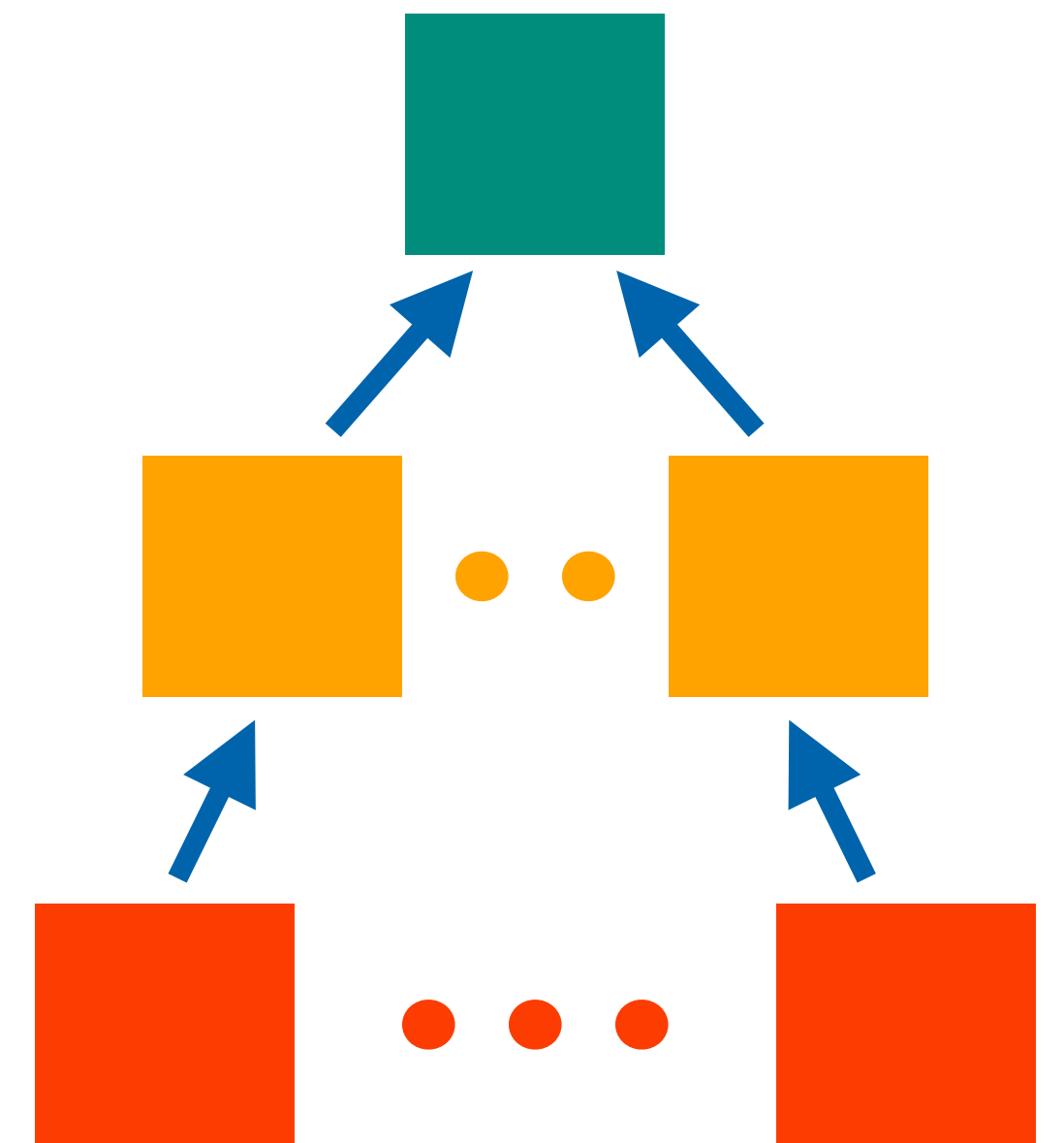
... document drafting ...

December 2024 — Document draft for final community discussion

## Editorial board and organisers:

Simon Plätzer (Uni Graz)

Thomas Bergbauer, Robert Schöpfbeck, Christoph Schwand (HEPHY)



# Goals of the strategy process and opportunities



A unique opportunity to:

- Collect and identify points of contact and synergies in Austria
- Define, connect and present the main goals of our community

Outcome will be twofold:

- Input to the European strategy on particle physics
- Priorities, synergies and strategic planning for the AT community

A common strategy will promote our community:

- Need to focus, connect, develop new avenues with visible impact
- No chance of a self-propelling, “too big to fail” community unlike Germany or UK

In essence a “small version” of the European one:

- Taking stock of activities and plans, and opinions
- Gathering people in a bigger meeting to discuss input to the European process
- Developing a common input and expression of interest
- **A chance for the Austrian community to network**



Exact questions expected from June CERN council meeting

- We might need to have another meeting to address all scenarios

We like to prioritise our research goals and focus

- Including to point out what facilities are central to achieve this
- How we envisage to guarantee the future role of CERN
- Baseline to judging future collider scenarios

A big picture of what we are doing and where we want to go is prerequisite to discussing all options: flash talks this morning

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# CERN as a hub for particle physics in Europe



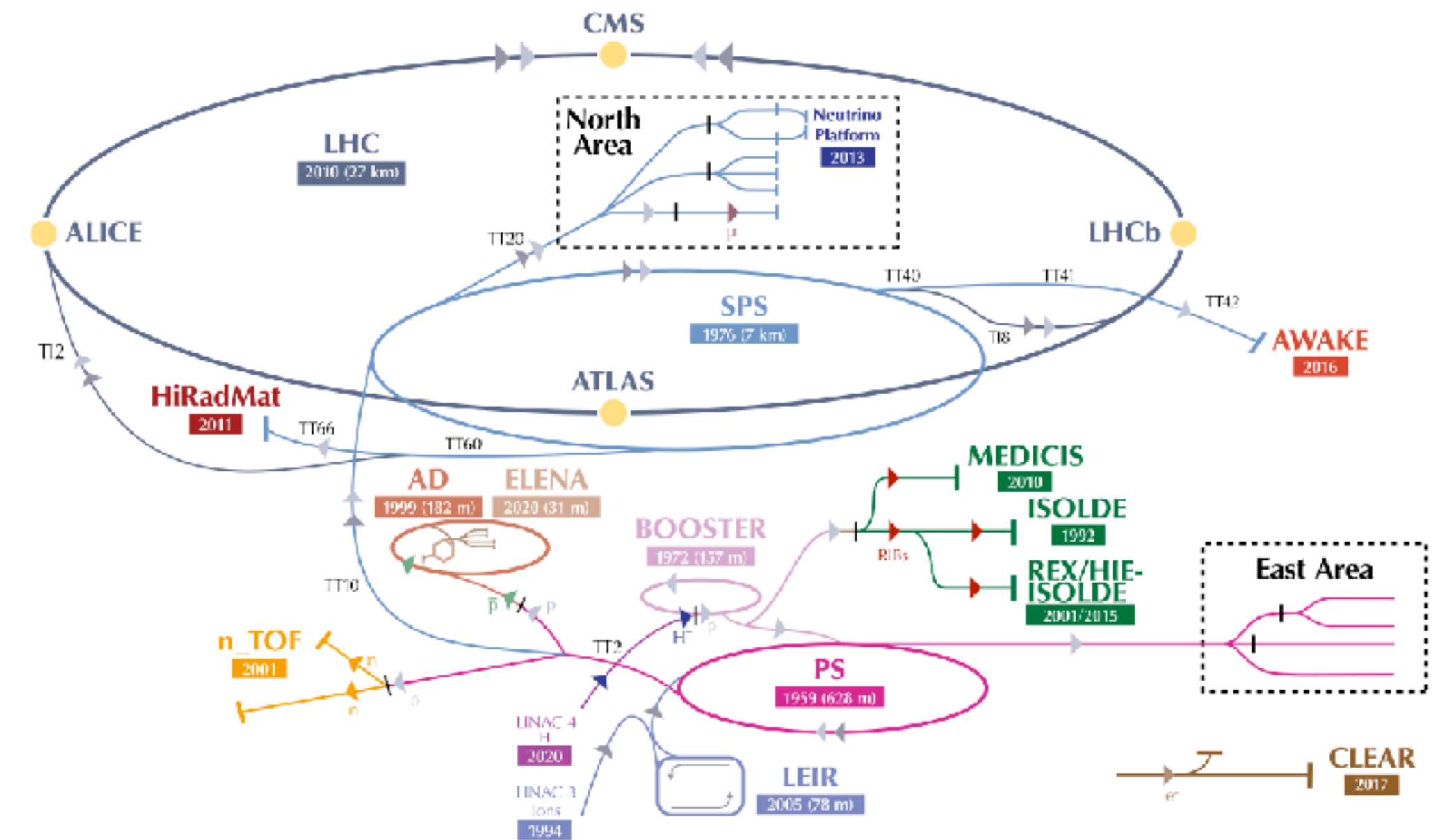
CERN is our hub for particle physics in Europe.

- 23 member states, 9 associate states
- 17k scientists (2k CERN staff)

Link to other activities are crucial, and complementary efforts must be closely integrated and supported.

Driving a lot of initiatives:

- CERN Quantum Initiative
- Particle physics beyond colliders
- ...



▶  $H^-$  (hydrogen anions) ▶ p (protons) ▶ ions ▶ RIBs (Radioactive Ion Beams) ▶ n (neutrons) ▶  $\bar{p}$  (antiprotons) ▶  $e^-$  (electrons) ▶  $\mu$  (muons)

LHC - Large Hadron Collider // SPS - Super Proton Synchrotron // PS - Proton Synchrotron // AD - Antiproton Decelerator // CLEAR - CERN Linear Electron Accelerator for Research // AWAKE - Advanced WAKEfield Experiment // ISOLDE - Isotope Separator OnLine // REX/HIE-ISOLDE - Radioactive Experiment/High Intensity and Energy ISOLDE // MEDICIS // LEIR - Low Energy Ion Ring // LINAC - LINear ACcelerator // n\_TOF - Neutrons Time Of Flight // HiRadMat - High-Radiation to Materials // Neutrino Platform



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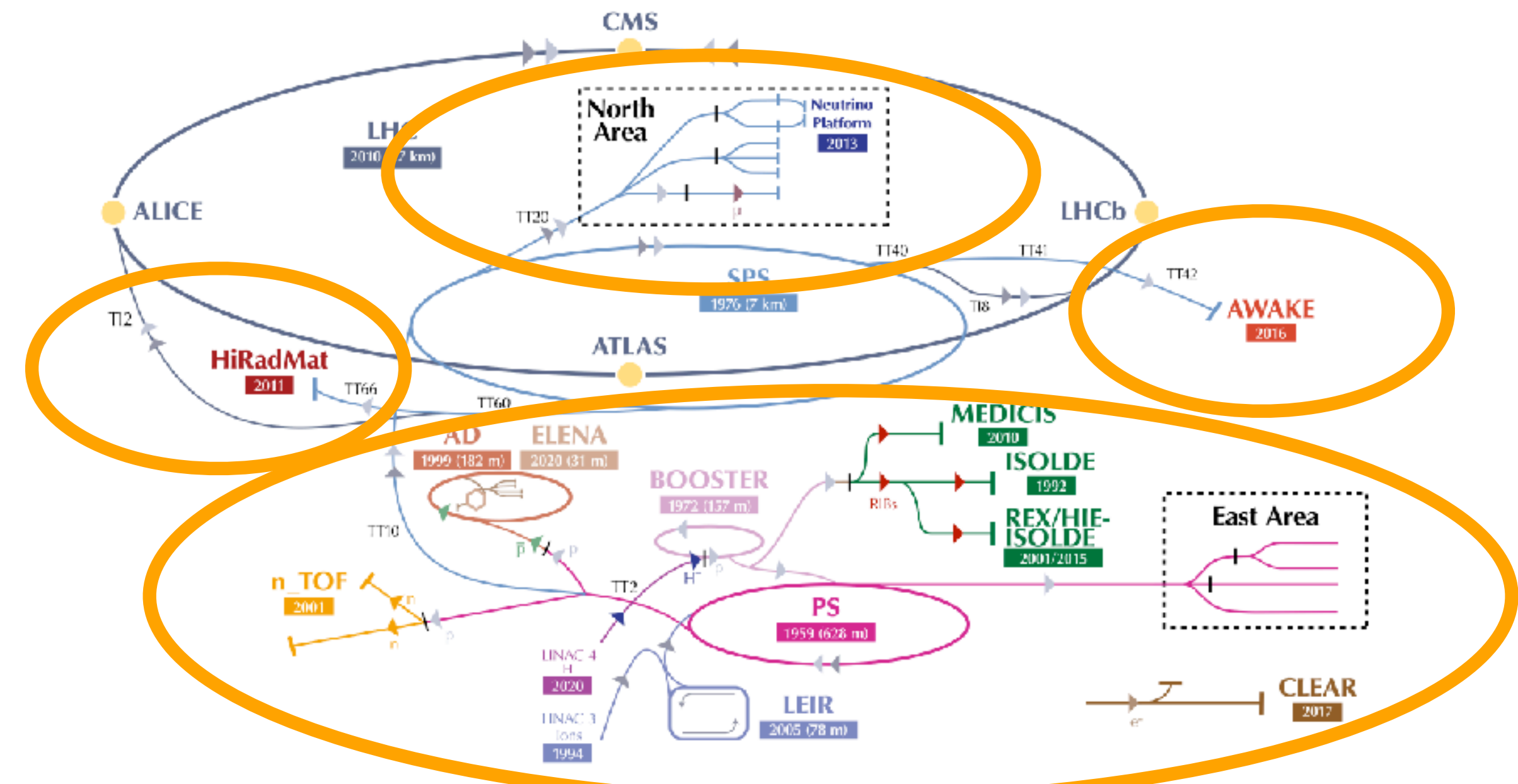
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Many opportunities and experiments beyond the LHC.

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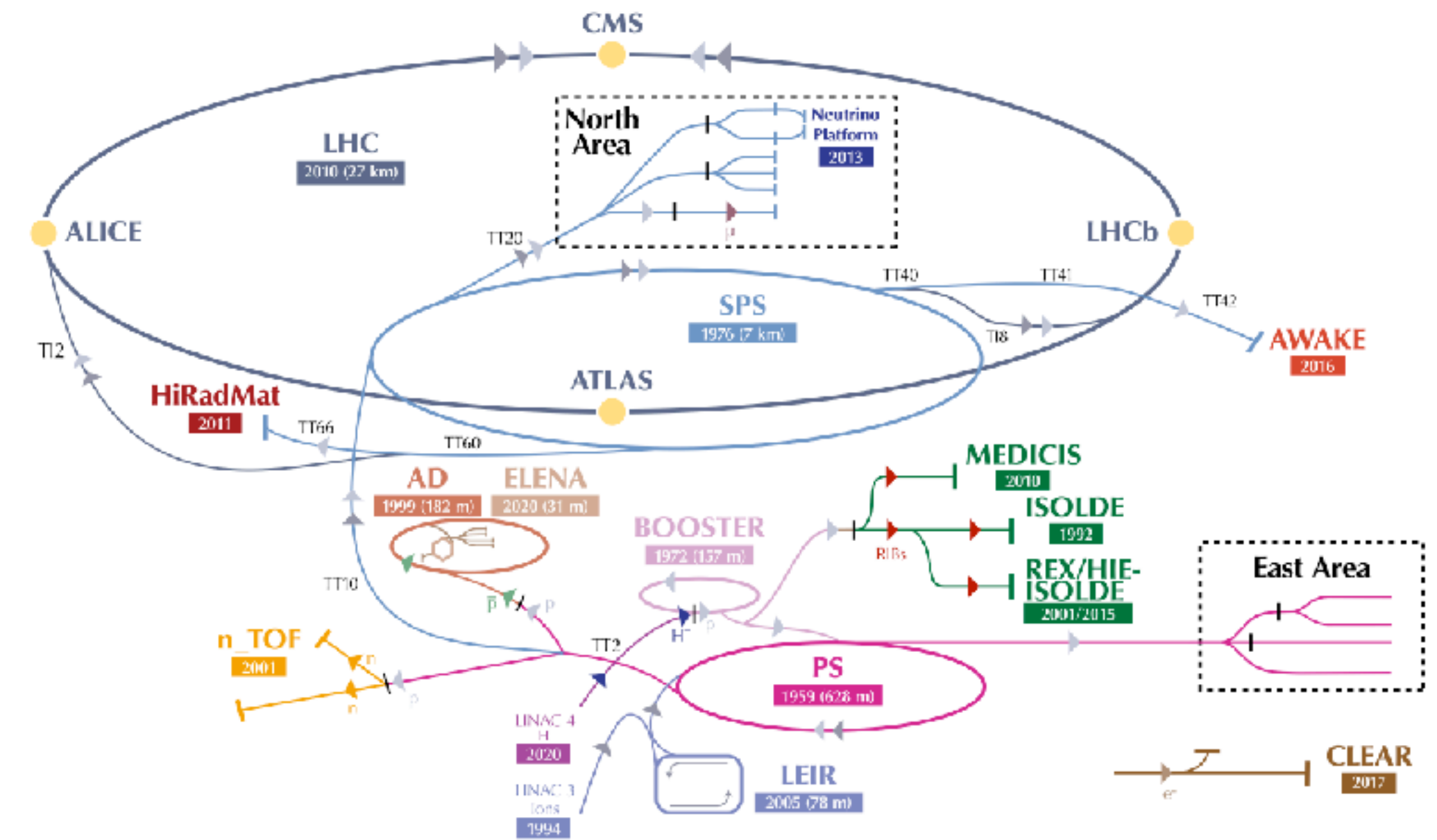


HL-LHC is big step ahead, we should be fully committed to exploiting its physics.

Study the feasibility (including finances) to built a Future Circular Collider (FCC) at 100 TeV first as  $e^+e^-$ , then as hadron-hadron machine.

Possibilities of building a linear collider at CERN have recently been revived.

Further input ahead of us: situation in the US, China's CEPC initiative as alternative to FCC, the horizon for a muon collider.



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Discuss how we can prioritise research questions and ultimately facilities.

Flash talks to point out group/field activities and to what priorities these questions lead.

**Please keep these short and concise** — no fancy representation of activities and achievements needed.

Input from our junior colleagues, as we take decisions on their research environment and frame.

Plenty of discussion time to develop a first baseline of a common strategy document:  
for our Austrian community and as input to the European Strategy.

This needs to be a scientific, democratic and inclusive process.

We will therefore also conduct a survey now — <https://forms.gle/NstbQcMXysRSaMr46>

**Coffee breaks morning and afternoon, buffet lunch — use the time to discuss.**

**Dinner: let me know, we will organise something informally.**

Thank you!

