

European Strategy for Particle Physics Update

Discussion on the Dutch (Nikhef) input

“CERN: a world leading laboratory for fundamental research”

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Assure that CERN continues to be **highly successful world-wide laboratory for fundamental research:**

- ☑ The mission of CERN is to push the boundaries of knowledge about the elementary constituents of our Universe and the fundamental forces that interact upon them.
- ☑ CERN has a pivotal role in the coordination of global Big Science projects for Particle Physics. The Netherlands is member of CERN and this means that for the Netherlands the large infrastructure projects on fundamental physics have to funnel through CERN.
- ☑ We strongly support CERN Geneva as the world leading laboratory of projects that challenges the imagination, with meaningful physics goals. CERN is a concentrated eco-system and focal point of theory, phenomenology, instrumentation, R&D, ICT infrastructure, innovation, talent; and all these aspects should continue to get attention.
- ☑ CERN should continue to be the centre for theoretical particle phenomenology in order to perform state-of-the art calculations relevant to hadron colliders, lepton colliders, and astroparticle physics. In particular, the Netherlands support the proposal as is put forward by CERN and APPEC to establish a network of European institutions active in theoretical Astroparticle physics with the central hub positioned at CERN.
- ☑ CERN should maintain its high standard of technical skills and instrumentation and push for innovation that derives from these efforts. This includes innovation of the computing infrastructure.
- ☑ CERN should commit to a more open access to experimental data and collaboration membership. Cross-experiment/collaboration projects should be allowed where desirable.
- ☑ CERN collaborations should be encouraged to give more opportunities to young scientists to individually express themselves in conferences and publications. For example, in the form of shortened author-lists or more free format presentations.

CERN mission

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CERN as a global hub of excellence

☑ We strongly support CERN Geneva as the **world leading laboratory of projects** that challenges the imagination, with meaningful physics goals. CERN is a concentrated ecosystem and focal point of **theory, phenomenology, instrumentation, R&D, ICT infrastructure, innovation, talent**; and all these aspects should continue to get attention.

Should CERN do **more/less** of any of the above?

Should CERN support also **external HEP activities**, as it is doing with DUNE? Which ones?

Are all the **innovation, spin-offs, and outreach activities** carried by CERN visible enough?

Should CERN continue to promoting cutting-edge **technical and applied spin-offs** to **industry and society** (technology transfer)?

Theory and phenomenology

☑ CERN should continue to be the **centre for theoretical particle phenomenology** in order to perform state-of-the art calculations relevant to hadron colliders, lepton colliders, and Astroparticle physics. In particular, the Netherlands support the proposal as is put forward by CERN and APPEC to establish a network of European institutions active in **theoretical Astroparticle physics** with the central hub positioned at CERN.

Currently CERN-TH has limited activities in **lepton colliders** and **astroparticle** physics

Which topics would we like to see **more/less in CERN-TH**? Pheno, formal theory, heavy ions, neutrinos,...

How to maximise **Dutch interactions** with CERN-TH?
Associates, fellows, visitors, ...

How can theory optimally support the **physics program** of the HL-LHC and of future lepton and hadron colliders?

Technical skills, instrumentation, computing

☑ CERN should maintain its high standard of **technical skills and instrumentation** and push for innovation that derives from these efforts. This includes innovation of the **computing infrastructure**.

Thriving CERN WG community on **Machine Learning** - we want more or less? Do we need more leadership and organisation, perhaps **international infrastructure**? What about connections with industry?

What do we expect from CERN in terms of **instrumentation support**? Should CERN fund only accelerator and theory or also **detector development and construction**?

Many HEP PhDs and postdocs land in **Data Science jobs**, where their coding and problem solving skills are very appreciated

Open science

☑ CERN should commit to more **open access to experimental data** and collaboration membership. Cross-experiment/collaboration projects should be allowed where desirable.

More flexible approaches for
**collaborations between theory
and experiment** as well?

How to efficiently pursue genuinely
inter-experimental projects, *e.g.* a
global SM fit?

Often data becomes available only
after several months of publication:
can the **process be streamlined?**

Recognition in big collaborations

☑ CERN collaborations should be encouraged to give **more opportunities to young scientists** to individually express themselves in conferences and publications. For example, in the form of shortened author-lists or more free format presentations.

How to balance this with other requirements, *e.g.* **qualification tasks**?

Intrinsic imbalance: **crucial tasks within experiments** are often not the most attractive for faculty jobs?

Making part of the analysis framework **open source** would also increase visibility of the authors?

Right balance with other responsibilities of PhD students: **teaching, outreach, training**
Recognition both within institutes and within the collaborations?