


Position of the Czech Republic on the European Strategy in Particle Physics

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-  **Current main activities in particle physics***
-  **Plans for the future**
-  **Recommendations for the European Strategy**

* More on our current activities in „Czech Republic – midterm report“ by Jiří Chýla, PECFA Plenary, PSI, July 2012

Recommendations for the European Strategy

We are firmly committed to the exploitation of LHC **including its HL upgrade**, and **this should be the highest priority of CERN European Strategy.**

We shall pursue R&D for detectors at LC and **European Strategy should express support for the realization of ILC as a global project in Japan.**

We will continue our accelerator neutrino programme in US and consider it important that **US accelerator neutrino program gets appropriate place in European Strategy** as well.

Update of the European Strategy for Particle Physics

High-priority large-scale scientific activities

the following four activities have been identified as carrying the highest priority.

The discovery of the Higgs boson is the start of a major programme of work to measure this particle's properties with the highest possible precision for testing the validity of the Standard Model and to search for further new physics at the energy frontier. **The LHC is in a unique position to pursue this programme.**

*Europe's top priority should be the exploitation of the **full potential of the LHC, including the high-luminosity upgrade** of the machine and detectors with a view to collecting ten times more data than in the initial design, by around 2030. This upgrade programme will also provide further exciting opportunities for the study of flavour physics and the quark-gluon plasma.*

To stay at the forefront of particle physics, Europe needs to be in a position **to propose an ambitious post-LHC accelerator project at CERN** by the time of the next Strategy update, when physics results from the LHC running at 14 TeV will be available.

*CERN should undertake **design studies for accelerator projects in a global context, with emphasis on proton-proton and electron-positron high-energy frontier machines**. These design studies should be coupled to a vigorous accelerator R&D programme, including high-field magnets and high-gradient accelerating structures, in collaboration with national institutes, laboratories and universities worldwide.*

There is a strong scientific case for an electron-positron collider, complementary to the LHC, that can study the properties of the Higgs boson and other particles with unprecedented precision and whose energy can be upgraded. The Technical Design Report of the International Linear Collider (ILC) has been completed, with large European participation. The initiative from the Japanese particle physics community to host the ILC in Japan is most welcome, and European groups are eager to participate.

Europe looks forward to a proposal from Japan to discuss a possible participation.

Rapid progress in neutrino oscillation physics, with significant European involvement, **has established a strong scientific case for a long-baseline neutrino programme** exploring CP violation and the mass hierarchy in the neutrino sector.

CERN should develop a neutrino programme to pave the way for a substantial European role in future long-baseline experiments.

Europe should explore the possibility of major participation in leading long-baseline neutrino projects in the US and Japan.`

Other scientific activities essential to the particle physics programme

Theory is a strong driver of particle physics and provides essential input to experiments, witness the major role played by theory in the recent discovery of the Higgs boson, from the foundations of the Standard Model to detailed calculations guiding the experimental searches.

***Europe should support a diverse, vibrant theoretical physics programme**, ranging from abstract to applied topics, in close collaboration with experiments and extending to neighbouring fields such as astroparticle physics and cosmology. Such support should extend also to high-performance computing and software development.*

Experiments studying quark flavour physics, investigating dipole moments, searching for charged lepton flavour violation and performing other **precision measurements** at lower energies, such as those with neutrons, muons and antiprotons, may give access to higher energy scales than direct particle production or put fundamental symmetries to the test. **They can be based in national laboratories**, with a moderate cost and smaller collaborations.

***Experiments in Europe with unique reach should be supported**, as well as participation in experiments in other regions of the world.*

The success of particle physics experiments, such as those required for the high-luminosity LHC, **relies on innovative instrumentation, state-of-the-art infrastructures and large-scale data-intensive computing.**

Detector R&D programmes should be supported strongly at CERN, national institutes, laboratories and universities. *Infrastructure and engineering capabilities for the R&D programme and construction of large detectors, as well as infrastructures for data analysis, data preservation and distributed data-intensive computing should be maintained and further developed.*

A range of important non-accelerator experiments take place at the **overlap of particle and astroparticle physics**, such as searches for proton decay, neutrinoless double beta decay and dark matter, and the study of high-energy cosmic-rays. **These experiments address fundamental questions beyond the Standard Model** of particle physics. The exchange of information between CERN and ApPEC has progressed since 2006.

*In the coming years, **CERN should seek a closer collaboration with ApPEC** on detector R&D with a view to maintaining the community's capability for unique projects in this field.*

A variety of research lines at the **boundary between particle and nuclear physics** require dedicated experiments.

The CERN Laboratory should maintain its capability to perform unique experiments.
CERN should continue to work with NuPECC on topics of mutual interest.

Otázka:

Chceme formulovat naši vlastní strategii ve světle Evropské strategie a současných znalostí o připravovaných projektech, kterou bychom představili v září při příležitosti oslav 60. výročí založení CERN?

