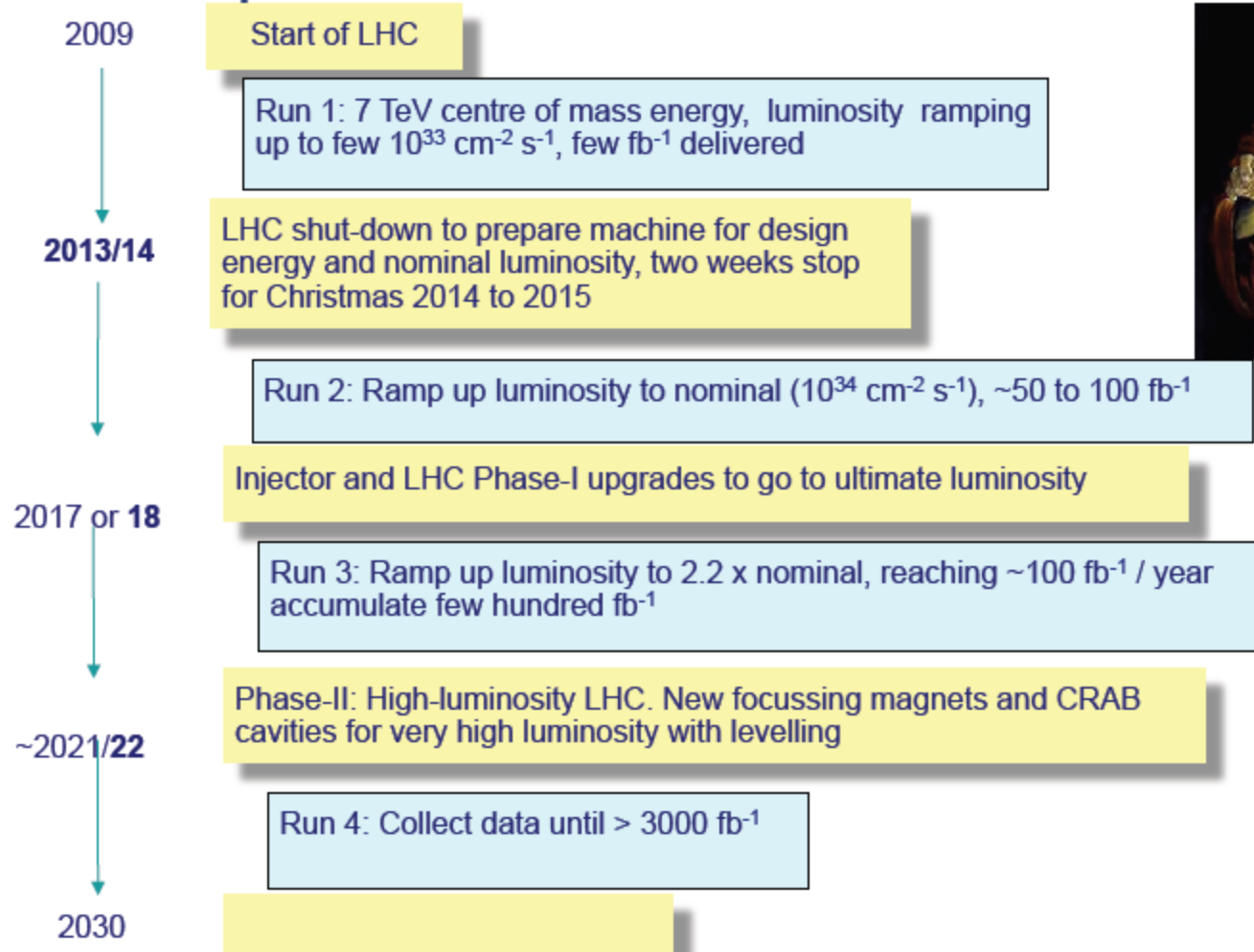


# The predictable future: LHC Time-line



## The European strategy for particle physics

The CERN Council, in a special meeting held the 14th of July 2006 in Lisbon, agreed on the European strategy for particle physics.

The strategy is defined by the 17 statements approved by Council, and contained in the [Strategy Statement](#).

A "[discussion document](#)", assembled by the Preparatory Group of the Strategy Group using the outcome of the Zeuthen Workshop, discusses the initiatives listed in the strategy statements.

An illustrated [brochure](#) places the strategy in the context of the aims and achievements of particle physics.

# *The European strategy for particle physics*

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Particle physics stands on the threshold of a new and exciting era of discovery. The next generation of experiments will explore new domains and probe the deep structure of space-time. They will measure the properties of the elementary constituents of matter and their interactions with unprecedented accuracy, and they will uncover new phenomena such as the Higgs boson or new forms of matter. Long-standing puzzles such as the origin of mass, the matter-antimatter asymmetry of the Universe and the mysterious dark matter and energy that permeate the cosmos will soon benefit from the insights that new measurements will bring. Together, the results will have a profound impact on the way we see our Universe; *European particle physics should thoroughly exploit its current exciting and diverse research programme. It should position itself to stand ready to address the challenges that will emerge from exploration of the new frontier, and it should participate fully in an increasingly global adventure.*

*Unanimously approved by the CERN  
Council at the special Session held in  
Lisbon on 14 July 2006*

# CERN ACCELERATOR STRATEGY

S. Myers

*CERN, Geneva, Switzerland*

planet for the foreseeable future. The higher-luminosity LHC (HL-LHC) is a proposed luminosity upgrade for installation in 2020–2021 and operation until around 2030. The HL-LHC also includes an upgrade of the LHC injector complex.

A study for an electron–proton collider based on the LHC, namely a Large Hadron electron Collider (LHeC) is supported by NuPECC and ECFA, and a Conceptual Design Report (CDR) is due to be finalized at the end of 2010 or early in 2011.

In the long-term strategic view of CERN, a Linear Collider would be constructed probably after the HL-LHC (>2030). BUT the question arises what will happen if the

(>2030). BUT the question arises what will happen if the Linear Collider “does not fly” (e.g., for reasons of politics, finances, governance, energy and climate situation). What alternatives would exist in such a case? It seems there are two, namely HE-LHC and neutrinos. A

The CERN accelerator strategy comprises the following ingredients:

- LHC operation at 7 TeV/beam up to design luminosity;
- HL-LHC for installation in 2020/2021;
- Linear collider TDR for 2016–2020;
- Investigation of the HE-LHC as a feasibility study;
- R&D on high power proton drivers; and
- CDR for a LHeC (with ring–ring and ring–linac options).

The LHeC is a proposed colliding beam facility at CERN, which will exploit the new world of energy and intensity provided by the LHC for lepton-nucleon scattering.

An existing 7 TeV LHC proton or heavy ion beam will collide with a new electron beam simultaneously with proton-proton or heavy ion collisions taking place at the existing LHC experiments.

Two possibilities are being pursued for the electron beam. In the first, it circulates in the existing LHC tunnel with a nominal energy of 50 GeV, resulting in an unprecedented kinematic range for lepton-nucleon scattering: the centre of mass energy of 1.2 TeV is 4 times larger than the previous highest at HERA. The luminosity of over  $10^{33} \text{ cm}^{-2}\text{s}^{-1}$  is two orders of magnitude larger than previous similar proposals. An alternative solution is an electron linac, resulting in reduced luminosities, but larger centre of mass energies (nominally 2 TeV).