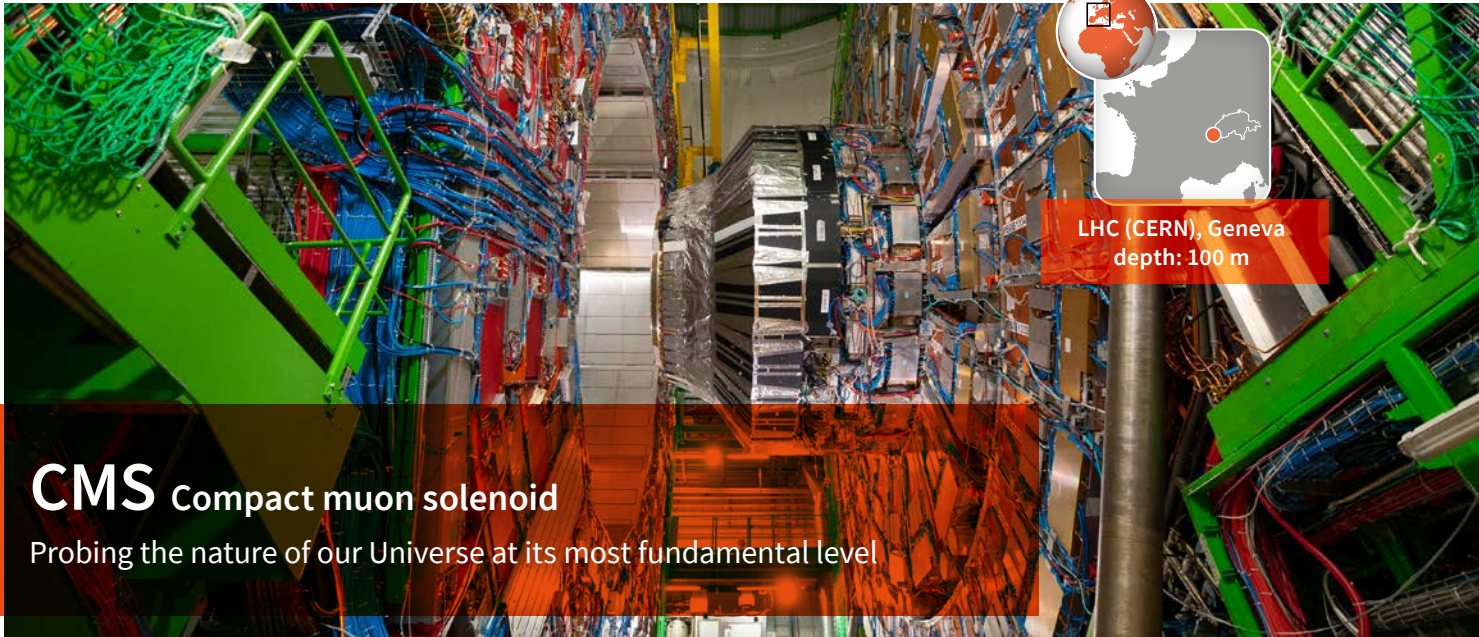


Elementary particles



CMS Compact muon solenoid

Probing the nature of our Universe at its most fundamental level

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- **Scientific leader:** Didier Contardo (IP2I) *
- **Laboratories involved:** CC-IN2P3 (Lyon), IPHC (Strasbourg), IP2I (Lyon), LLR (Palaiseau), OMEGA (Palaiseau)
- **Nature:** research infrastructure
- **Statut:** international project in operation based at Point 5 of the LHC (Cessy, France). France and Switzerland are the host countries of the LHC
- **Website:** <https://cms.cern/> and <http://lhcf-france.fr>

SCIENTIFIC OBJECTIVES

CMS is one of the four major experiments at the LHC. This versatile detector is designed to measure the full range of physics accessible in proton collisions at 13 TeV. Beyond the discovery of the Higgs boson, measuring its properties and searching for new particles will help to unravel the mysteries of dark matter and the absence of antimatter in the Universe. CMS is exploring theories ranging from the existence of super-symmetric particles to extra dimensions of space-time. The data collected by CMS and its analysis has led to the publication of a thousand scientific results that push forwards the boundaries of our knowledge.

RESOURCES DEPLOYED

- CMS is a 14 000 tonnes, 15 m high, 30 m long detector capable of processing 40 million images of particles per second. It includes the world's largest superconducting solenoid magnet and detection systems (trajectograph, calorimeters and gas detectors) that are unique in their accuracy, speed and radiation tolerance.
- A large infrastructure of facilities exists on the experimental site: assembly halls for the experiment and accommodation of services, control and computing rooms for data processing.
- 24/7 operation is ensured, outside of maintenance periods.

229 research institutions

4 288 collaborators

51 participating countries

30 years of operation

340 million euros (construction cost)

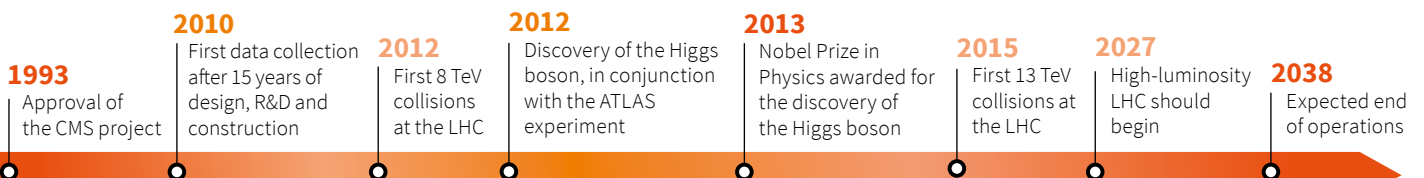
14 kt detector weight

IN2P3 CONTRIBUTIONS

- Construction of a sub-assembly of the silicon track trajectograph and development of the data acquisition system.
- Production and qualification of the photodetectors of the electromagnetic calorimeter crystals, design of the crystal support mechanics, and development and production of the on-board trigger electronics.
- Storage and processing of part of the 5 PetaBytes of raw data produced annually by the experiment.
- Design and development of mechanical elements and ASIC electronics for the future HL-LHC high granularity trajectograph and calorimeter, development of the readout electronics for the new RPC gas detectors.
- Operation of the detectors and exploitation of the data, with significant contributions to the analyses of the two discovery channels of the Higgs boson decaying into two Z bosons or two photons.

OTHER FRENCH LABORATORIES INVOLVED

Irfu (CEA Saclay)



* Since 2018