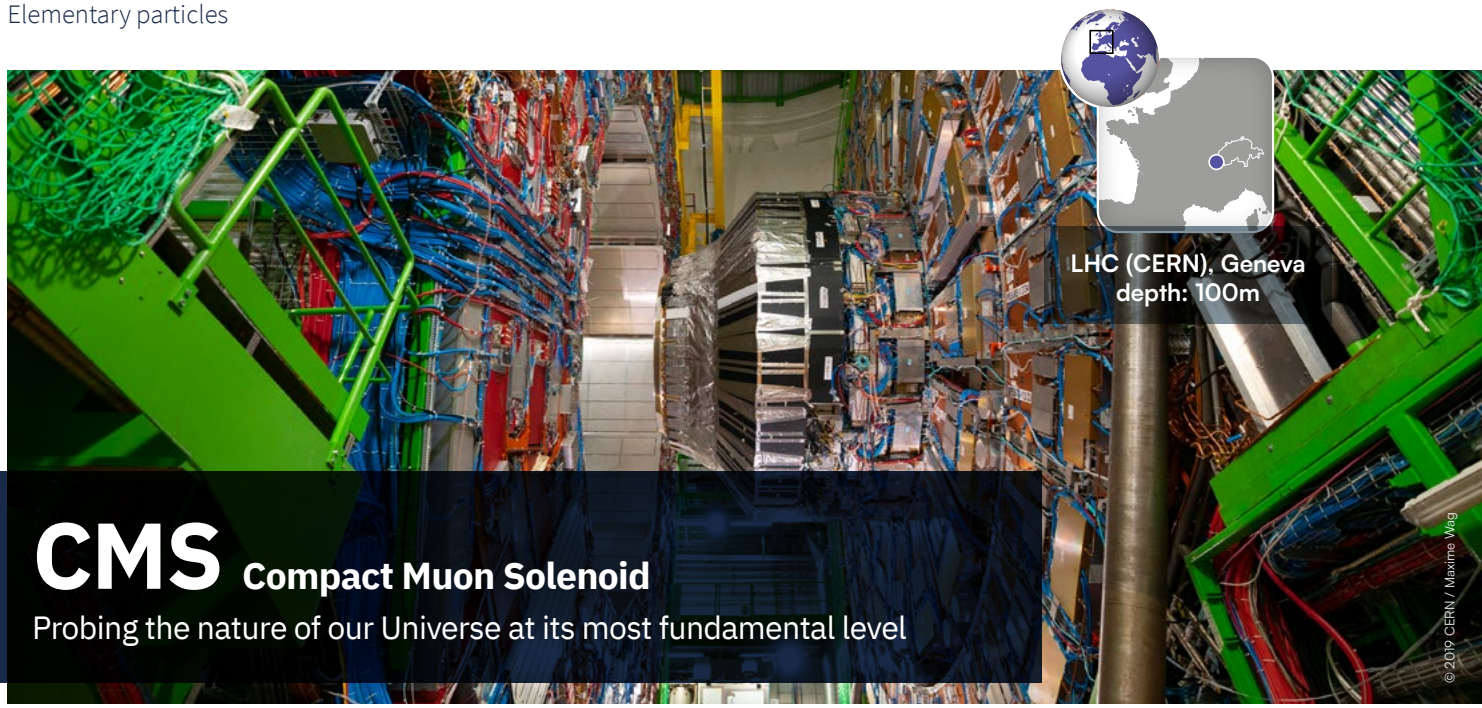

CMS Compact Muon Solenoid

Probing the nature of our Universe at its most fundamental level

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/

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 13TeV. 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 metre-high, 30 metre-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.

Other french laboratories involved

Irfu (CEA Saclay)

14kt
detector weight

4 288
collaborators

30
years of operation

51
participating countries

229
research institutions

€ 340M
construction cost

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.

1993 Approval of the CMS project

2010 First data collection after 15 years of design, R&D and construction

2012 First 8TeV collisions at the LHC

2012 Discovery of the Higgs boson, in conjunction with the ATLAS experiment

2013 Nobel Prize in Physics awarded for the discovery of the Higgs boson

2015 First 13TeV collisions at the LHC

2029 High-luminosity LHC should begin

2038 Expected end of operations

* Since 2018