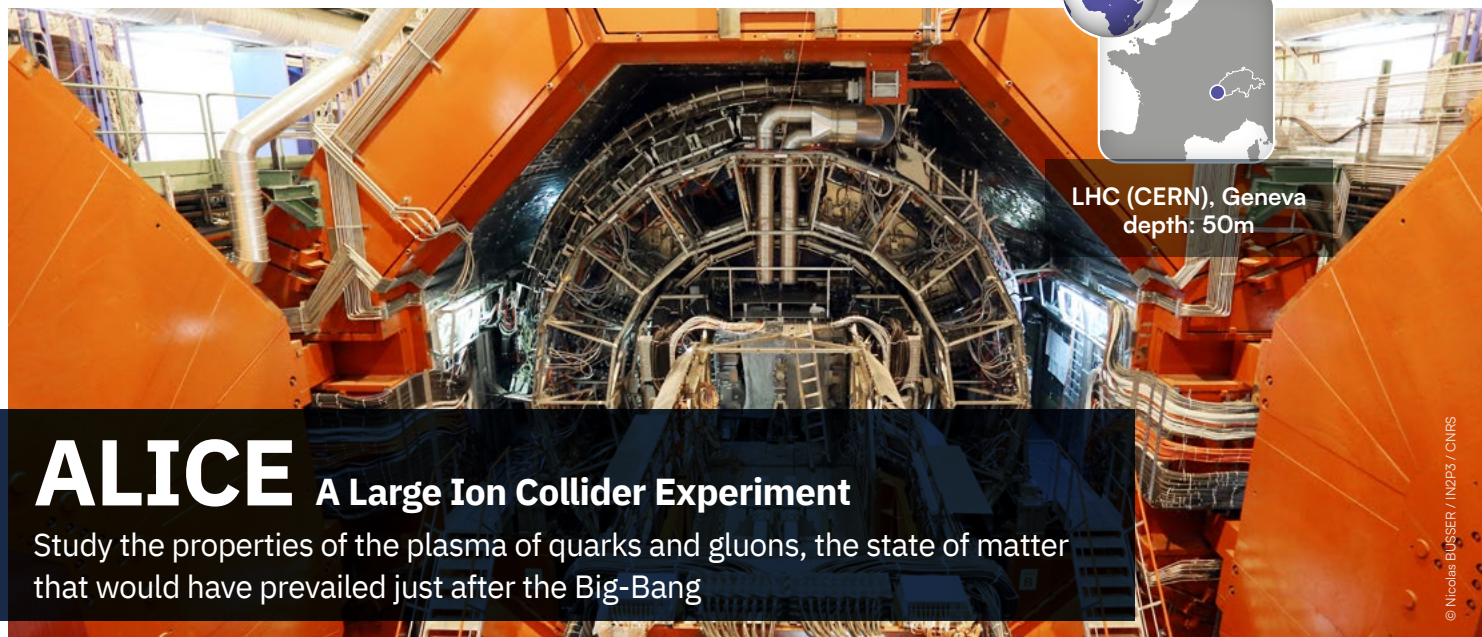


Study of the properties of the plasma of quarks and gluons



LHC (CERN), Geneva depth: 50m



ALICE A Large Ion Collider Experiment

Study the properties of the plasma of quarks and gluons, the state of matter that would have prevailed just after the Big-Bang

Scientific leader: Antonio Uras (IP2I) *

Laboratories involved: CC-IN2P3 (Lyon), IJCLab (Orsay), IPHC (Strasbourg), IP2I (Lyon), LPCA (Clermont-Ferrand), LPSC (Grenoble), Subatech (Nantes)

Nature: research infrastructure

Status: international project in operation based at the CERN. The ALICE experiment is installed in the French part of the LHC in Serger.

Website: <http://alice-collaboration.web.cern.ch>

Scientific objectives

The ALICE experiment studies a particular phase of matter: the plasma of quarks and gluons. Scientists are creating this plasma using collisions of heavy ions and are seeking to recreate and characterise this state of matter that would have prevailed for a few microseconds just after the Big Bang. The properties of this phase are key points in the theory of the strong interaction that describes, among other things, the confinement of quarks, i.e. the way in which they have lost their freedom to combine into more complex particles called "hadrons".

Resources deployed

- The world's largest time projection chamber: diameter 5m and length 5 metres, for a total volume of about 90m³.
- The highly transparent internal trajectometer with about 10% radiation length, with improved and extended acceptance in the front region for "Run 3".
- A muon spectrometer to study the full spectrum of quarkonia J/Ψ, Ψ', Y, Y', Y'' in the pseudorapidity interval 2.5 ≤ η ≤ 4.

10kt weight of the detector	20 years of design
1 935 scientists	€ 132M construction cost
20 years of operation	39 participating countries

IN2P3 CONTRIBUTIONS

- Participation in the design and construction of the trigger detectors, electromagnetic calorimetry, internal trajectometer and muon spectrometer.
- First measurements of strange hadrons from the test collisions (in 2009) during the commissioning of the LHC, and then of the production of multi-strange hadrons.
- Characterisation of quarkonia outflow and discovery of J/psi regeneration.
- Characterisation of QGP hard probe production (jets, gamma, W and Z).
- First measurements of the elliptical Y flow at the LHC
- Participation in the design and construction of the new ITS and the Muon Forward Tracker (MFT).

Other french laboratories involved

Irfu (CEA Saclay)

1993

Declaration of intent for the ALICE project

2010

First "Run 1" data taken

2015

The LHC ramps up to 13TeV for proton-proton collisions and 5TeV for lead-lead collisions

2018

Construction of the MFT, which extends the acceptance of the inner trajectometer in front of the muon spectrometer

2019-2021

Upgrades of ALICE detectors and electronics. Installation of the MFT.

2022

Start of LHC "Run 3"

2030

Expected end of "Run 4" and ALICE operations

* Since 2022