Construction of the CMS detector for LHC at CERN

On 5 April 2015, after two years of maintenance and consolidation, the LHC restarted for a second run. The first ramp to the record-breaking energy of 6.5 TeV was performed on 10 April 2015.[30][31] In 2016, the design collision rate was exceeded for the first time.[32] A second two-year period of shutdown is scheduled to begin at the end of 2018.

Decommissioned accelerators

- The original linear accelerator (LINAC 1).
- The 600 MeV Synchrocyclotron (SC) which started operation in 1957 and was shut down in 1991.
- The Intersecting Storage Rings (ISR), an early collider built from 1966 to 1971 and operated until 1984.
- The Large Electron–Positron Collider (LEP), which operated from 1989 to 2000 and was the largest machine of its kind, housed in a 27 km-long circular tunnel which now houses the Large Hadron Collider.
- The Low Energy Antiproton Ring (LEAR), commissioned in 1982, which assembled the first pieces of true antimatter, in 1995, consisting of nine atoms of antihydrogen. It was closed in 1996, and superseded by the Antiproton Decelerator.

Map of the Large Hadron Collider together with the Super Proton Synchrotron at CERN

Possible future accelerators

CERN, in collaboration with groups worldwide, is investigating two main concepts for future accelerators: A linear electron-positron collider with a new acceleration concept to increase the energy (CLIC) and a larger version of the LHC, a project currently named Future Circular Collider.[33]

Sites

The smaller accelerators are on the main Meyrin site (also known as the West Area), which was originally built in Switzerland alongside the French border, but has been extended to span the border since 1965. The French side is under Swiss jurisdiction and there is no obvious border within the site, apart from a line of marker stones.

The SPS and LEP/LHC tunnels are almost entirely outside the main site, and are mostly buried under French farmland and invisible from the surface. However, they have surface sites at various points around them, either as the location of buildings associated with experiments or other facilities needed to operate the colliders such as cryogenic plants and access shafts. The experiments are located at the same underground level as the tunnels at these sites.

Three of these experimental sites are in France, with ATLAS in Switzerland, although some of the ancillary cryogenic and access sites are in Switzerland. The largest of the experimental sites is the Prévessin site, also known as the North Area, which is the target station for non-collider experiments on the SPS accelerator. Other sites are the ones which were used for the UA1, UA2 and the LEP experiments (the latter are used by LHC experiments).

Outside of the LEP and LHC experiments, most are officially named and numbered after the site where they were located. For example, NA32 was an experiment looking at the production of so-called "charmed" particles and located at the Prévessin (North Area) site while WA22 used the Big European Bubble Chamber (BEBC) at the Meyrin (West Area) site to examine neutrino interactions. The UA1 and UA2 experiments were considered to be in the Underground Area, i.e. situated underground at sites on the SPS accelerator.

Most of the roads on the CERN Meyrin and Prévessin sites are named after famous physicists, such as Richard Feynman, Niels Bohr, and Albert Einstein.

Interior of office building 40 at the Meyrin site. Building 40 hosts many offices for scientists from the CMS and ATLAS collaborations.

Participation and funding

Member states and budget

Since its foundation by 12 members in 1954, CERN regularly accepted new members. All new members have remained in the organization continuously since their accession, except Spain and Yugoslavia. Spain first joined CERN in 1961, withdrew in 1969, and rejoined in 1983. Yugoslavia was a founding member of CERN but quit in 1961. Of the 22 members, Israel joined CERN as a full member on 6 January 2014,[34] becoming the first (and currently only) non-European full member.[35]

The budget contributions of member states are computed based on their GDP.[36]