

Status Report of the projects at CERN

INTRODUCTION

Besides the Long Shut-Down 1, other projects are still progressing at CERN. The LINAC4, which will be the essential part of the injector chain in the future, is in the installation phase and will be connected to the existing accelerators in 2018. AWAKE, a project to verify the approach of using protons to drive a strong wakefield in a plasma which can then be harnessed to accelerate a witness bunch of electrons, will be using the proton beam of the CERN Neutrino to Gran Sasso, plus an electron and a laser beam. This facility will be installed in the CNGS target vicinity, as the experimentation with neutrino has been stopped at the end of 2012. ELENA, a small compact ring for cooling and further deceleration of 5.3 MeV antiprotons delivered by the CERN Antiproton Decelerator, is in the study phase. In the HIE-ISOLDE project, the preliminary survey works have started and the installation is going to take place in 2015.

The CLIC study is still on going and the achievements realised on the Two Beam Test Module are presented. Moreover, since the beginning of the year, CERN has launched a study of the feasibility of a circular collider of about 100 km circumference, the FCC, hosting either hadrons or leptons.

FCC

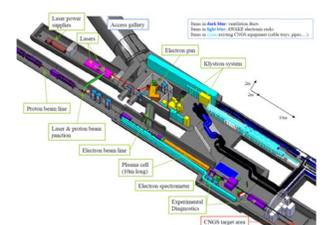
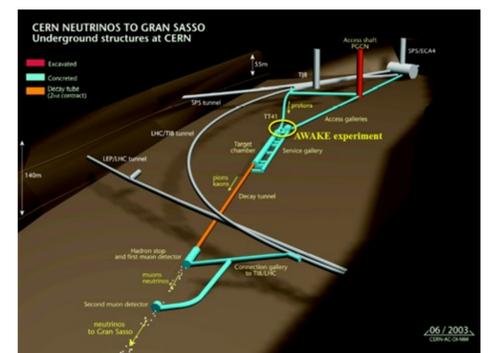
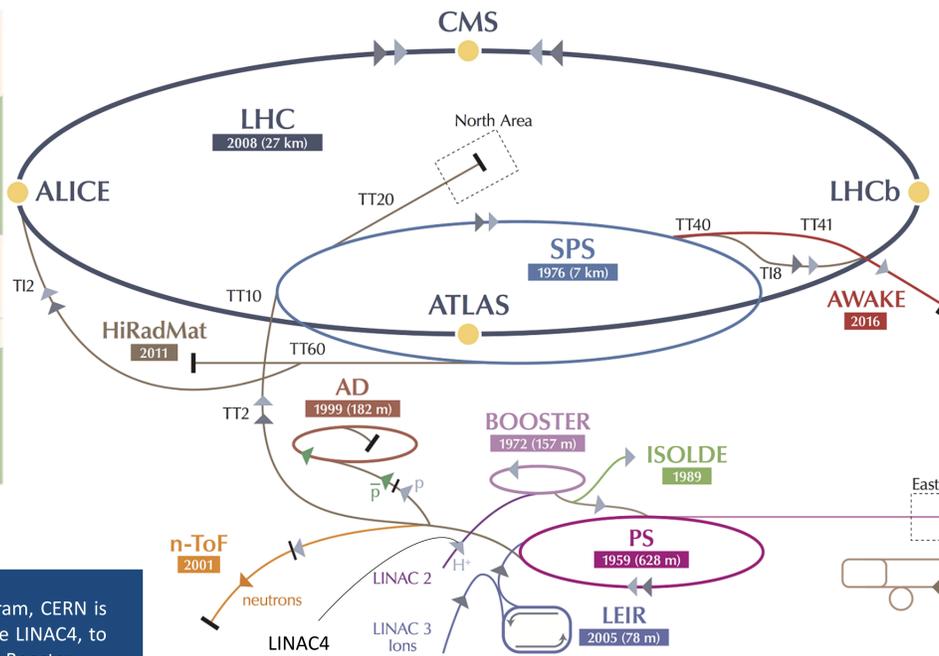
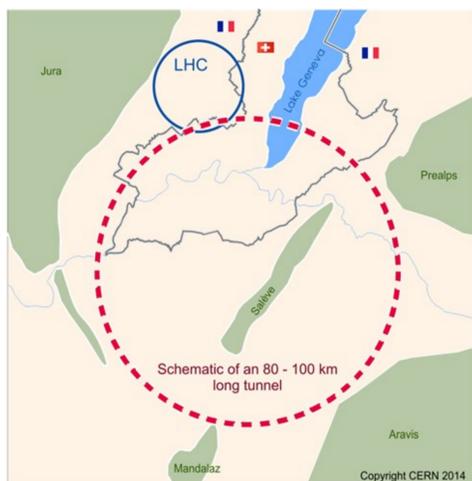
The Future Circular Collider is a study for post-LHC particle accelerator that has been launched at CERN following the European Physics strategy. The main emphasis of the conceptual design study is a hadron collider with a centre-of-mass energy of the order of 100 TeV in a new 80-100 km circumference tunnel. It will also include the study of a lepton collider. The work will involve an assessment of: the current reference systems and surfaces used at CERN for the accelerator alignment; the suitability of these reference systems for a project of this scale; and the integration with the reference systems used by the host states (France and Switzerland).

ELENA

ELENA is a compact ring for cooling and further deceleration of 5.3 MeV antiprotons delivered by the CERN Antiproton Decelerator (AD). The ultimate physics goal is to perform spectroscopy on anti-hydrogen atoms. It will consist of a ring and transfer lines to the existing and new experimental areas such as BASE, ASACUSA, ALPHA, ATRAP, and GBAR. The survey work has consisted in the preparation works for network and design of fiducials and alignment systems. The installation is going to start in 2015, the measurements will be mostly done with the AT401 as the configuration of the ring fits quite well with the use of this new technology.

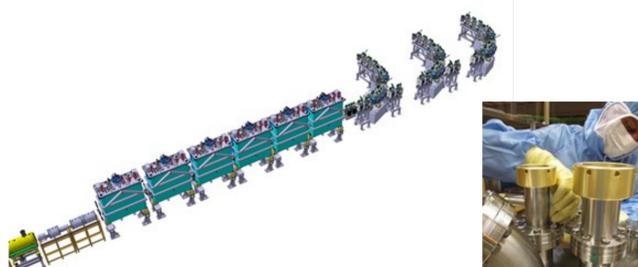
AWAKE

AWAKE will use proton beams from the Super Proton Synchrotron in the CERN Neutrinos to Gran Sasso facility, which has been stopped at the end of 2012. These protons will be injected into a 10-metre plasma cell to initiate strong wakefields. A second beam – the “witness” electron beam would then be accelerated by the wakefields. In 2014, the works consisted in the transfer of the position of the proton beam magnets to a new network (direct levelling, AT401 measurements, ecartometry), and for civil engineering purposes, to mark the axis of the new electron tunnel and the laser bore hole and a laser scan of the area after excavation. The installation of the components will take place in 2015.



LINAC 4

As first step of the LHC luminosity upgrade program, CERN is building a new 160 MeV H^- linear accelerator, the LINAC4, to replace the 50 MeV Linac2 as an injector to the PS Booster. In 2012, a new geodetic network has been defined using the AT401 laser tracker and gyro-theodolite measurements. With respect to this network, marking of the components on the floor was done and the supporting jacks pre-aligned. The components of the 1st portion of the linac, the 3 MeV, and one DTL have been installed, aligned and commissioned, a particle beam has been successfully tested at 12 MeV. The metrology during assembly is also progressing well, the remaining components will be aligned in 2015.



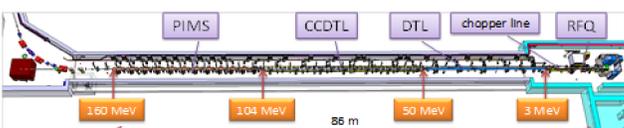
CLIC/CLEX/CTF3

The Two Beam Test Module is a key assembly of the CLIC project, integrating different types of components: RF components, quadrupoles, BPM. The components will need to be aligned along two parallel beams: the Drive Beam (DB) and the Main Beam. One module has been installed in a test area where the assembly and alignment strategy were validated. Tests under different environmental conditions were also done thanks to an air conditioning system and a ventilation. The micrometric accuracy of sensors coupled with AT401 measurements has permitted a better knowledge of the impact of such constraints on the alignment of components.



HIE-ISOLDE

The HIE-ISOLDE project is a major upgrade of the ISOLDE REX facility. A linac, composed of 6 cryo-modules, and 3 transfer lines will be installed in several steps. Most of the geodetic network is installed in the hall and measured. The linac and HEBT transfer line supports are being aligned. Delivery of the first magnets started and the fiducialisation work will begin soon after acceptance tests. The first Cryo-module assembly started in a class 100 clean room. Survey procedures have been adapted to the constraints of the clean environment. Special tooling has been designed to allow the adjustment and the geometrical follow up of the assembly.



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