STATUS OF THE ALBA PROJECT

D. Einfeld, on behalf of the ALBA team, CELLS-ALBA, Cerdanyola del Valles, Spain

Abstract

ALBA-CELLS is a new .medium energy light source under construction near Barcelona, Spain, consisting of a 100 MeV Linac, a full energy Booster and a 3 GeV, 268.8 m long Storage Ring.. The LINAC, is already commissioned, and the installation of Booster and Storage ring is under way. The building housing the accelerators is finish and the auxiliary services are also under commissioning. The commissioning of the booster is planned for late 2009 and the one of the storage ring for spring 2010. In this paper, the status of the different components is reviewed.

BUILDING STATUS

The building housing the accelerator complex and the offices, and the one for the conventional facilities are finished and occupied. The building is ready for the full installation of the accelerators, and the services (water, electricity, cooling) are being commissioned and should be available for commissioning of the booster in late 2009.

LINAC

The LINAC was commissioned by THALES with the help of ALBA in the summer of 2008. All the specified parameters were reached, with a very good emittance (normalized values around 20 mm-mrad in all the modes) and energy spread (under 0.5%) [1, 2].

BOOSTER

Status of the Components

All the components of the Booster are already delivered at CELLS, with exception of the pulsed magnets and of some power supplies. The measurement of the magnets and of the power supplies is already done or under way at present, with all the components fulfilling the specifications.The only difficulty was missing edge focusing in the main bending magnets, but the optics could be recover [3].

Installation

The booster mechanical installation started in January 2009 and was completed in three months. The vacuum chamber had been previously pre-assembled and bake-out in the Lab. The remaining part of the installation (cabling, auxiliary piping, etc) will proceed in parallel with the installation of the storage ring and should be finish at the end of September 2009.

STORAGE RING

Most of the components of the storage ring are already delivered and ready for installation. All the power supplies have been delivered to CELLS and are undergoing Site Acceptance Tests. For the corrector power supplies, the power part has been tested and fulfils our specs, while the control part is being modified to fulfil the requirements of the fast orbit feedback system.

All the magnets have been delivered to CELLS and the magnetic measurement analyzed. In particular, all the combined function bending magnets have been measured in-house, and the effect of each one in the lattice analyzed (edge focusing, gradient, etc). A sorting procedure has been defined, and together with the extra coils available in each bending, the beta beating introduced by gradient imperfections in the bendings can be completely compensated [4, 5].

RF

The testing and measuring of the new HOM-damped RF cavities (DAMPY) is under way. After identifying two problems with the preseries cavity (reduced damping of the E011 mode and localized overheating), modifications on the design were introduced (see xx), improving the damping of the mode, and to reduce the heating to values well within the safety limits. The cavity with the modifications has been tested up to 80 kW, well above the 55 kW required for operation [6].

Almost all the equipment of the RF system has been delivered to ALBA. Missing equipment are two circulators from the company Ferrite Inc. that have been sent back to repair. Also, five out of six SR Dampy cavities have to be sent back to ACCEL to perform the mechanical corrections for its proper operation. In the RF lab, the whole system, including the Digital LLRF, has been tested and the first series cavity conditioned up to 80 kW.

Insertion Devices

ALBA is planned to start operation in 2010 with several different insertion devices installed in the storage ring either from ”day one” or within the first year of operation. The production of all the insertion devices is almost finish, with the factory acceptance test taking place in the period between May and August 2009, and the Site Acceptance Test in the one between June and November 2009. The first insertion devices to be deliver to ALBA are the multipole wiggler and one of the Apple-II [7], both expected before the end of May 2009.

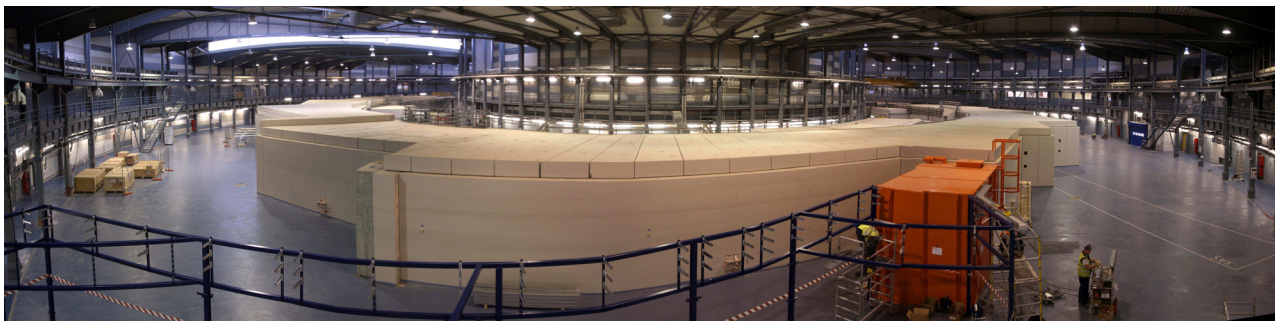

Figure 1: View from the experimental hall of ALBA.

Figure 2: View from the tunnel, with the booster already installed.

Pulsed Elements

Five kicker magnets and 2 septa (one spare element of each kind) are under production. The fist unit measured of the septum magnet presents some problems that are under evaluation. The kicker magnets are waiting for the titanium coating before being delivered to ALBA.

Vacuum System

All the standard vacuum components and the vacuum chambers of the storage ring are at ALBA since February 2009. Sample vacuum chambers have been tested and the resting results were within the specifications. For the crotch absorbers, the manufacturer could not fulfil the tolerances concerning perpendicularity, however careful analysis of the effect on the beam is going on and to figure out what absorbers can be accepted [8].

The 6 NEG coated vacuum chambers were deliver in February 2009 and tested, reaching an ultimate vacuum pressure in the gauge of 6×10^{-10} mbar. The installation of the vacuum chambers in the tunnel started in April 2009.

Installation

The installation of the Storage Ring has just started. Two girders, forming one sector out of a total of 16 sectors, are equipped with quadrupoles and sextupoles in the Experimental Hall. Then they are installed in the tunnel with the help of the 12 T crane. The combined magnets are the final magnetic elements to be installed. The complete vacuum chamber for one sector, with a total length around 16 m is assembled and baked in the Experimental Hall. Later the vacuum chamber is installed in the tunnel and connected to provisional vacuum pumps which will keep the vacuum in the low 10-10mbar range. It is expected to complete one sector per week and then proceed with the straight sections. Cabling and secondary piping will proceed in parallel to the mechanical installation.

Figure 3: Preseries Dampy cavity.

A large effort has been made in house in order to simplify the cabling during the installation. Standard procedures for the pulling and testing of cabling are developed, and a shared database between all the components is being used. The mechanical installation should be finished at the end of fall 2009, and the commissioning of the subsystems

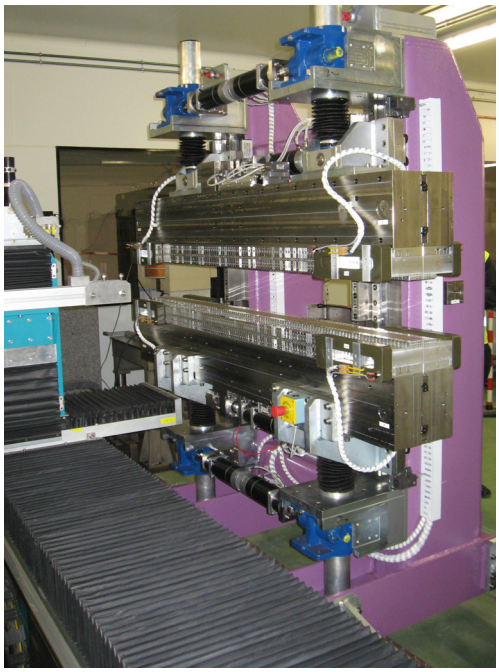

Figure 4: The first Apple-II undulator in the ALBA ID lab.

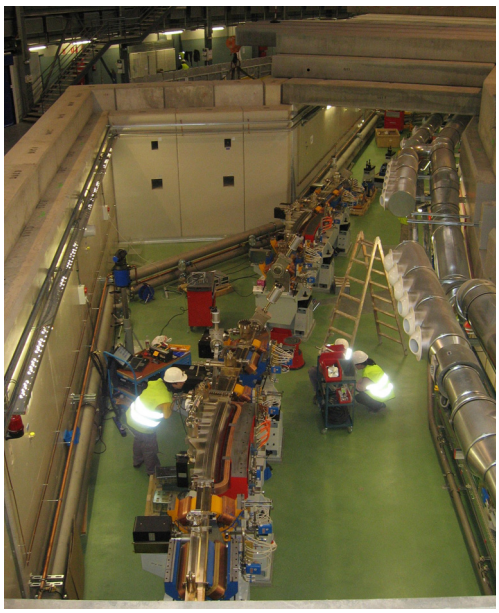

Figure 5: View from the tunnel, with the booster already installed.

(magnets/power supplies, RF system, etc) started.

Figure 6: Moving the first girder into the tunnel.

COMMISSIONING PLANS

The commissioning plans for the booster and the storage ring are already drafted. The booster commissioning would take place in two steps: A short first one of two weeks, were the main mission is to detect problems with the components and control system, and accelerate the beam up to 400 MeV, taking place in December 2009 , and a second one, were the target is to provide beam (3GeV, some mA) for storage ring commissioning.

The storage ring commissioning is also divided in two phases. In the first phase, no insertion devices would be used, and dummy chambers with large aperture will be installed in the ID sections. Once the physics of the bare machine is understood, the insertion devices will be used.

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