INTRODUCTION

The construction of the building complex for the CNAO project [1] has started in 2005. At the end of the 2007 the complex is almost complete with several apparatus already installed. By the middle of 2008 the first operation with beam is scheduled and the LNL will participate with some staff and equipment.

STATUS OF THE FACILITY

The concrete casting for the synchrotron platform began in the late summer of 2005. Then the synchrotron building (high technology part) grew very fast in parallel to the clinical part and the conventional plants. At the end of the 2007, the building were almost complete (see FIG. 1), and will be delivered in the spring of 2008.

In the clinical part some rooms are already equipped with the general plants and they are ready for the final installation of the medical equipment.

The main conventional plants such as the electrical power plants and the fluid plants are completely built and the commissioning operations are already started.

FIG. 1 Aerial photo of the CNAO building complex in December 2007, when the site was visited by the Italian Ministry of Health.

In the synchrotron hall some devices are already positioned and connected to the ancillary systems, as shown in FIG. 2. In the power supply room (see FIG. 3) a lot of work was done since all the devices were positioned and connected to the electrical and water distribution in less than one year. The high current cables from the power supply to the magnets are laid and connected. The water cooling circuit started in December 2007 and the first device could be cooled within the spring of next year.

FIG. 2 View of the synchrotron hall. Some elements of the accelerator system are already positioned as the magnets of the LEBT and the vacuum tanks.

FIG. 3 View of the Room for the Power Supply. All the power supply are already positioned.

The sources are cabled and ready for the commissioning with beam. They have also been operated for the first time in the March 2007.

Some components of the CNAO control system are already built and tested, such as the Timing Control system and they are ready for the final integration. Regarding the LINAC control system, the Factory Acceptance Tests were carried out in April 2007 and its delivery is scheduled for March 2008. In addition the Power Supplies for the LINAC magnets have been positioned in 2007 and connected to the subsystems. For these devices the commissioning is planned on March 2008.
**ACTIVITIES OF LNL**

The LNL is in charge for the installation and commissioning of the 7 MeV/u LINAC section [2] in collaboration with some staff of GSI. Many LINAC components previously assembled at this laboratory were delivered to Pavia during this year. On the other hand the LNL staff worked together with CNAO staff to integrate the auxiliary systems with the rest of the accelerator. Some modification to the water connections with the LINAC magnets, the organization of the interlock signals, and the remotization of some RF signals in control room turned out to be absolutely necessary. In facts, the LINAC is designed for the HICAT project and it is thought with a different philosophy in the organization of the accelerator.

**FIG. 4** Front view of the RF system for the IH-DTL during the Factory Acceptance tests.

Other LNL activities covered the Factory Acceptance Test of the RF system. The RF system is composed by a single RF generator at 216.817 MHz and the power amplifier (see FIG. 4) which feed respectively the RFQ with 200 kWp, the IH-DTL with 1400 kWp and the debuncher tank with 4 kWp. Each amplifier can be controlled individually, and the amplitude and the phase can be set better than 0.2%. During these tests some experience has been matured about the typical problems of these systems. After the tests the amplifiers has been delivered to Pavia and the mechanical installation started as well as the positioning of the coaxial waveguide up to the dummy load.

The spare parts for the Magnets Power Supplies have been revised and the order of buying has been placed. Moreover the necessary electronic equipment for testing these systems has been bought, such as High Voltage and Current Probe, HV Power Supply, RF cables and connectors.

In December 2007 some CNAO and LNL staff has been trained for one week in RF aspects inherent to cavities, transmission lines and RF measurements. In this period the final preparation of the IH-DTL has been done. The final position of the coupler loop was set and also the as well as the pick-up probe (see FIG. 5). The unloaded Q factor was measured and determined to be 14850. The influence of the position of the two tuners on the resonant frequency has been investigated in a broad range (see FIG. 6) and the setting for the correct frequency was found and will be checked again after the transportation.

**FIG. 5** The ID-DTL tank at GSI during the operation of preparation before the shipping to Pavia.

**FIG. 6** Influence on the position of the tuner position on the resonant frequency. The nominal value is 216.817 MHz.

**CONCLUSIONS**

In the next year the commissioning phase of the LINAC will start. The assembling and commissioning time is estimated to be around 40 working days for RFQ and 50 for IH-DTL.
