**INTRODUCTION**

To extend customer choice in the high energy range, IBA has developed the Cyclone® 30 High Current (1.2 mA H- called HC) and the Cyclone® 30 Multi-particle (H-D-He++ called XP). Those 2 cyclotrons are based on the well known Cyclone® 30 with the same yoke dimensions and main functionalities.

**C30HC : from 800µA to 1.2mA**

The well known IBA C30 cyclotron have been upgraded to a new high current version (C30HC). For this purpose a new ion source, a new injection line and a new central region have been designed and tested. A new final amplifier will provide 100 kW of RF power for beam acceleration.

On the top of the accelerator, the ion source is mounted on top of the vacuum box containing an Einzell lens, a buncher and a Faraday cup. The axial bore of the cyclotron contains a X-Y steerer, a solenoid and two small quadrupoles (whose position can be adjusted in rotation to match the emittance from source to central region).

The injection system is based on the design of the Cyclone® 70 installed in Nantes. This ion source bench is composed on one side of a H-/D- ion source and on the other side by a He++ ion source (Supermanogan® from Pantechnik). At ion source exit, beams are first focused glazer lenses, then bent by a central magnet and focused by a quadrupole triplet. Like in the C30HC version, the injection line also contains a buncher, einzel lenz and faraday cup installed in a vacuum box located just underneath the cyclotron yoke.

The vacuum system has been improved by using two turbomolecular pumps. This improvement will reduce vacuum stripping in the injection line during beam handling from source to central region.

The fully assembled cyclotron passed the factory tests in 2010. In order to avoid machine activation, beam test went no further than the ion source system and central region. The results were good and demonstrated beam currents up to 2 mA on pop up probe (at 1 MeV in the machine).

The installation took place in 2011 in Turkey (Taek - Ankara).

During the last months, the high current version successfully completed all site acceptance tests, and especially those regarding the upgrade, namely 1.2 mA accelerated on one extraction port and a dual beam production at 2*500µA. Furthermore, the machine has shown good behavior up to 1.5 mA extracted current. The cyclotron shows an exemplary stability during commissioning and acceptance tests, such that the handover by the customer has been done early in March.

**C30XP : He++ beam at 30MeV**

The IBA C30xp cyclotron is an upgrade of the famous IBA C30 cyclotron that will accelerate two families of ions:

- q/m = 1/2 : α accelerated to 30 MeV and D-ions in the 7.5-15 MeV range.
- q/m = 1/1 : H- ions in the 15-30 MeV range.

The adjustment of the magnetic field is achieved by altering the q/m=1/2 magnetic field using movable magnetic inserts in two opposite valleys.

The injection system is based on the design of the Cyclone® 70 installed in Nantes. This ion source bench is composed on one side of a H-/D- ion source and on the other side by a He++ ion source (Supermanogan® from Pantechnik). At ion source exit, beams are first focused glazer lenses, then bent by a central magnet and focused by a quadrupole triplet. Like in the C30HC version, the injection line also contains a buncher, einzel lenz and faraday cup installed in a vacuum box located just underneath the cyclotron yoke.

The axial bore of the cyclotron houses the last elements of the injection line a XY-steerer. A focusing solenoid and two small quadrupoles (position adjustable in rotation to match the emittance from source to central region) and an accelerator will provide 100 kW of RF power for beam acceleration.

The well known IBA C30xp cyclotron have been upgraded to a new high current version (C30HC). For this purpose a new ion source, a new injection line and a new central region have been designed and tested. A new final amplifier will provide 100 kW of RF power for beam acceleration.

**REFERENCES**

[1] ECPM 2009- IBA C30 Cyclotron Beam Intensity Upgrade
W. Kleeven, S. Zaremba, M. Abs and B. Nactergal


Il faut mettre plus de détails sur ces références =>
conférence ECPM,
conférence cyclo etc...
Eric Forton, 5/3/2012