8. – Isobaric mass separator

8.1. – Introduction

The design of the mass separator for the EXCYT project has been accomplished in collaboration with Prof. Wollnik and his group from the University of Giessen, Germany of [8.1].

The mass separator is planned to consist of two separation stages at two different potentials. This arrangement allows to eliminate ions of undesired mass that pass through the exit slit opportunely positioned. The contaminating ions may have been scattered by residual gas atoms into the exit slit aperture or may have been formed in the acceleration region by charge-exchange processes and for this reason are only accelerated by a portion of the accelerating voltage, thus obtaining the same momentum-to-charge ratio as the desired ions accelerated to the full energy.

The overall system consists of four sections:

the target ion source and a preseparator on the first high voltage platform located inside a heavily radiation shielded area

the beam guidance system that leads the ion beam through a shielding wall to the second high voltage platform and focuses it to the charge-exchange cell, from where it is sent to the first stage located on this second platform

the second stage high resolving mass separator that must analyze the ions after they have been accelerated from the second high voltage platform to ground

the beam guidance system to the Tandem accelerator.

The second platform is located in a room that is not shielded for nuclear radiation but only for X-rays generated by corona-discharge currents on the second platform.

The separator design assumes an ion source that produces ion beams whose ion trajectories have maximal angles of inclination of $a_o = \pm 20$ mrad in the x-direction as well as $b_o = \pm 20$ mrad in the y-direction. The x- and y- extensions of the initial ion beam is only of minor importance as far as transmission is concerned. However this width determines the finally achievable mass resolving power unless there are additional limitations in the width of the ion beam. In any case one can achieve high mass resolving powers by reducing the widths of the entrance slits of the different separator stages and thus also reduce the ion transmission.

The design is reported in the previous report (20th May 1996)

In this section we report only the status of the construction.

8.2. – The sector magnets

The call for tender, for the construction of all the sector magnets of the true separator, of the beam guidance to the Tandem and of the primary beam, started in September 1996, but the contract with the SIGMAPHI company was signed in June 1997.

The definitions of some important details like the chamfers and the external dimensions have added further delay, but now the construction is started again and we foresee to have the magnets following the schedule:

Presepartor	ready
1st stage	September 1998
Primary beam	December 1998
2nd stage	March 1999
Beam guidance to the Tandem	March 1999

8.3. – The electrostatic lens

The electrostatic quadrupole multiplets are designed and the 1st prototype is ready. The call for tender will start soon.

8.4. Power supply

All the power supply for the magnets are ordered to the BRUKER Company and the consignements will come in October 1998.

References

[8.1] G. Ciavola et al. Nucl. Instr.and Meth. B **126**, 17 (1997)