

The q/m-Separator for REX-ISOLDE, D. HABS, O. KESTER, R. RAO, K. RUDOLPH, T. SIEBER, Univ. München - In the planned radioactive beam experiment (REX) at ISOLDE/CERN radioactive singly charged ions are delivered by the online mass separator ISOLDE and are accelerated up to 2.2 MeV/u by a new accelerator concept. The ions coming from ISOLDE are first accumulated, bunched and cooled in a Penning trap. Then, in an electron beam ion source (EBIS) charge multiplication takes place. Finally the highly charged ions are accelerated in a LINAC. As the ions coming out from the EBIS contain impurities coming from residual gas inside the EBIS a q/m selection is necessary before the beam is injected into the LINAC. Calculations show that, extending the range of q/m values up to 1/3 (former values: 1/4.5 - 1/4) a resolving power of 150 is sufficient to ensure that uniquely the radioactive ions pass through the mass slit. In order to reach a high resolving power an achromatic system was chosen [1] consisting on an electrostatic deflector, a magnetic sector field and electrostatic quadrupoles. While the second order aberrations are reduced by appropriate curvatures of the pole faces of the sector magnet, an electrostatic octupole diminishes the third order aberrations. The calculations of the separator beam line up to fourth order are done with the COSY INFINITY code [2]. From the calculations it can be carried out that the resolving power depends strongly on the ion beam emittance coming out from the EBIS. However, the resolving power of 150 can be ensured for emittances up to 40 pi mm mrad (99.99% of the beam) and an energy spread up to 1%. In case of higher EBIS emittances a pure magnetic separator system was designed, which allows emittances 2.5 times higher than the achromatic system. But the energy spread of the ion beam in this case may not exceed 0.2%.

- [1] D. Habs et al, Nucl. Instr. and Meth. B 126 (1997) 218-223.
- [2] M. Berz, Nucl. Instr. and Meth. A 298 (1990) 473.