An Electro-Magnetic Mass Spectrometer for High Separation

The interest of using field maps at the final step is that it gives more realistic solution in the modelling of the optical elements (of their magnetic field- we can do the same with electrostatic elements specially for the FField region). Allied with stepwise ray-tracing techniques, it brings greatest accuracy on the behaviour of the Mass spectrometer and its final specifications.

We will lean on Ref. [1] for the details concerning HRS design. The OPERA model of the electromagnetic magnet is shown in [2] Figs.

ELMULT, DIPOLE, FIT AND TOSCA are used in this exercise
The FIT keyword is used to obtain the best value on parameters.

Working Hypotheses:

The Mass Spectrometer has a plan of symmetry at the middle of the MULTIPOL
It is a point to point transportation. (see [1])

Numerical experiment:

1/Using DIPOLE keyword with OBJET 5 keyword (zero and first order construction of the Mass Spectrometer)
Set up this Mass Spectrometer in zgoubi, taking M=132 uma, Ec=60 keV, q=elementary charge, Bro=

Run Zgoubi and check (in zgoubi.res) the value of the FIT procedure (coef of the MATRIX R1)

2/With the same file run zgoubi using OBJET6.1 keyword and find the best solution (point to point) at the image plane by checking the £R1 matrix coefficients

3/Change to MCOBJET with 3 momenta and use zgoubi.fai to observe the beam behaviour at the focal plane.

4/Introducing TOSCA keyword.
Replace the DIPOLE keyword by the TOSCA keyword

5/Use the field map tmag3.map (201-101)
Find the best condition for a point to point transformation (matrix R1 and OBJET 5)
Use MCOBJET with 3 Momenta and compare to the previous result with DIPOLE (zgoubi.fai)

6/ Do the same with tmag4.map