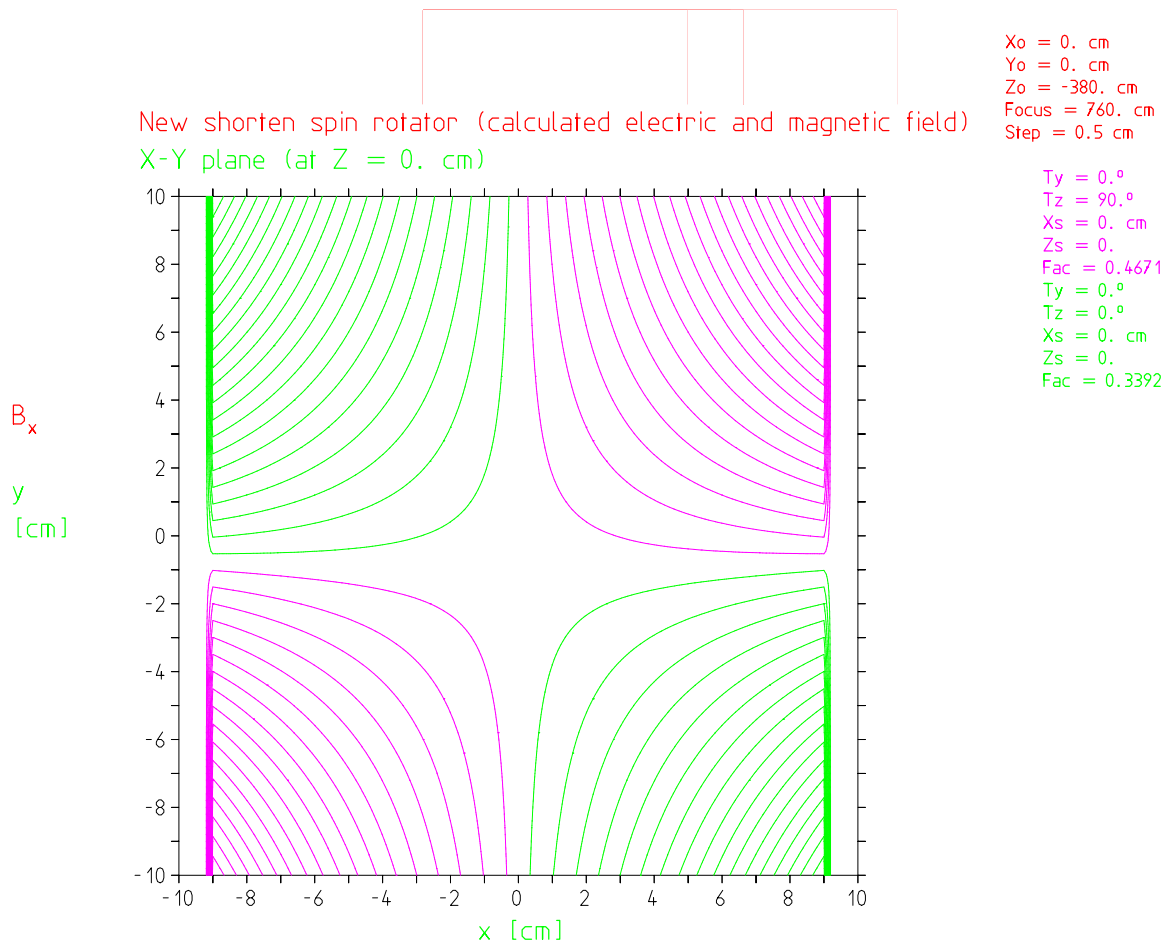


On the new short separator

F Foroughi

PSI May 2002



1 New Short separator

This separator has electric and magnetic field corresponding to the new spinrotator, but shorten in length by a factor 2. The distance between the electrodes is now 18 cm instead of 17 cm !

The main difference is for the rotation of the polarization, which is now 9.0° only (see figure 9).

The chosen value for the fields, are some how arbitrarily chosen, such that for a given setting, the central trajectory for electrons, is stopped in the last triplet. The final values depend on the final setting.

The actual value of 1.55 MV/m (see figure 4) correspond to a potential of

$$V = 1.55 \cdot 10^6 \times 0.18 = 279 \text{ kV}$$

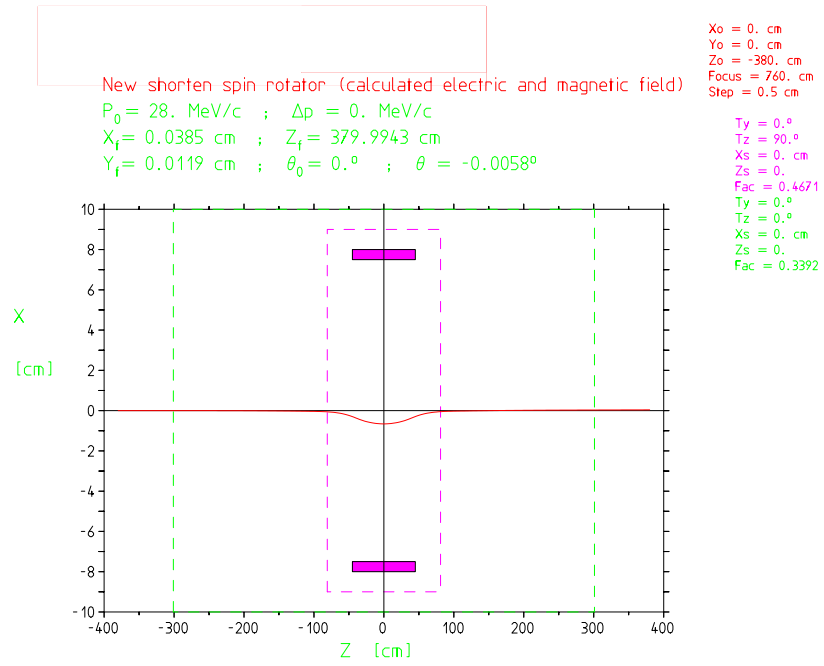


Figure 1:

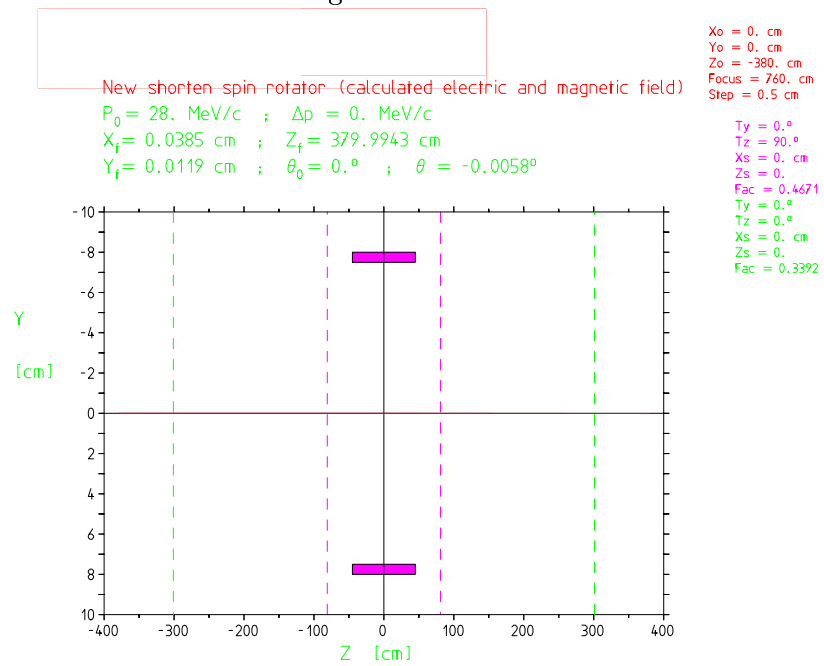


Figure 2:

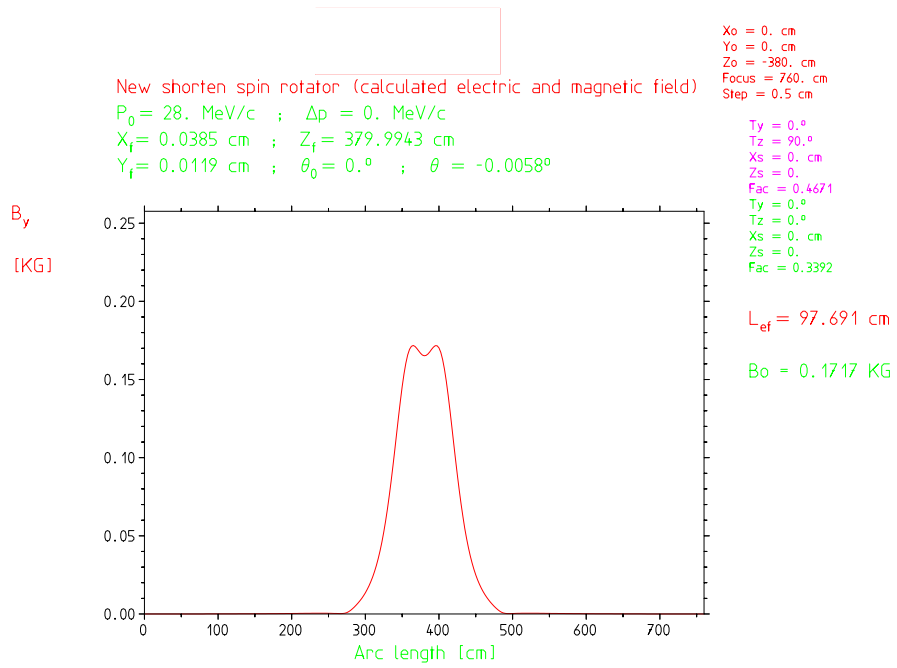


Figure 3:

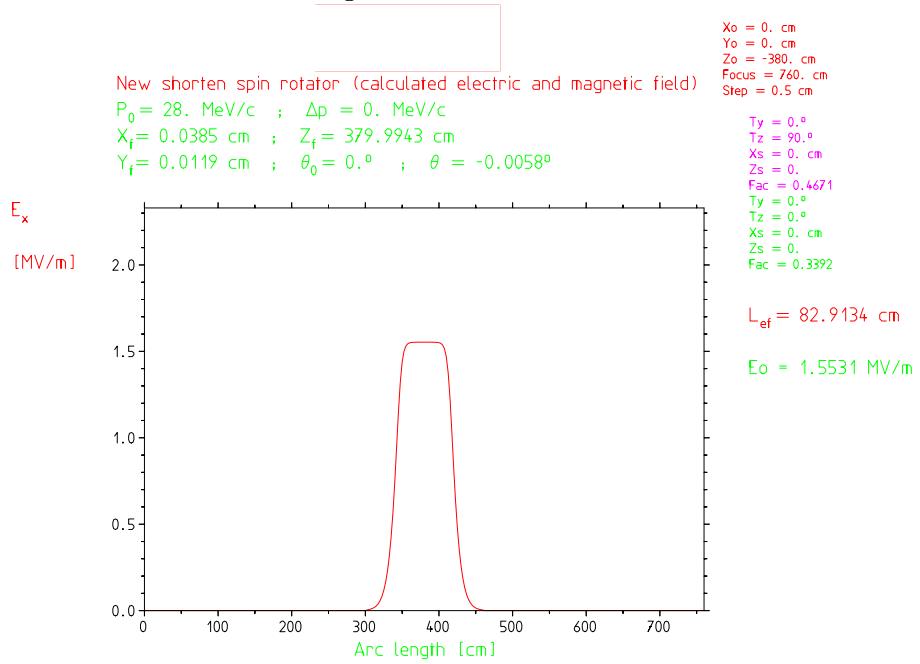


Figure 4:

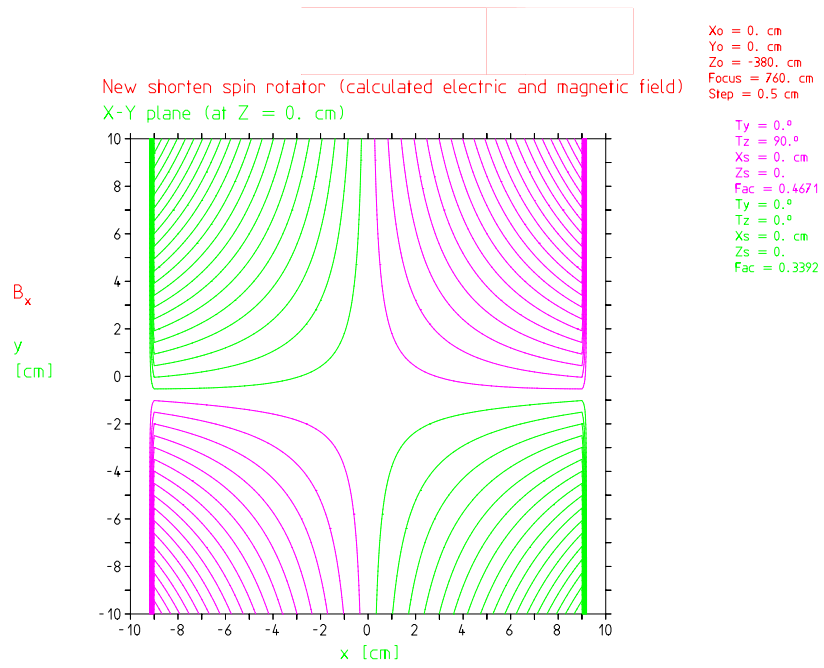


Figure 5:

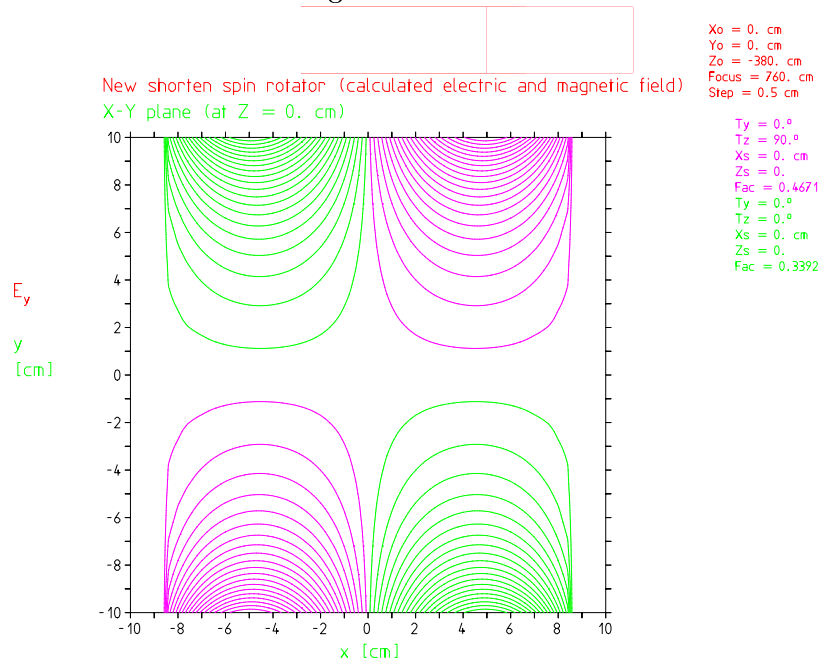


Figure 6:

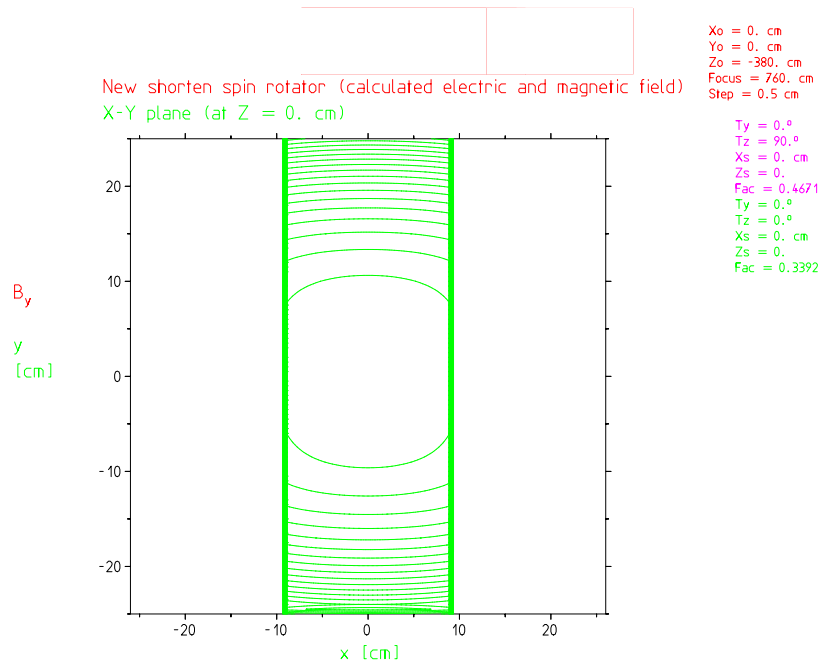


Figure 7:

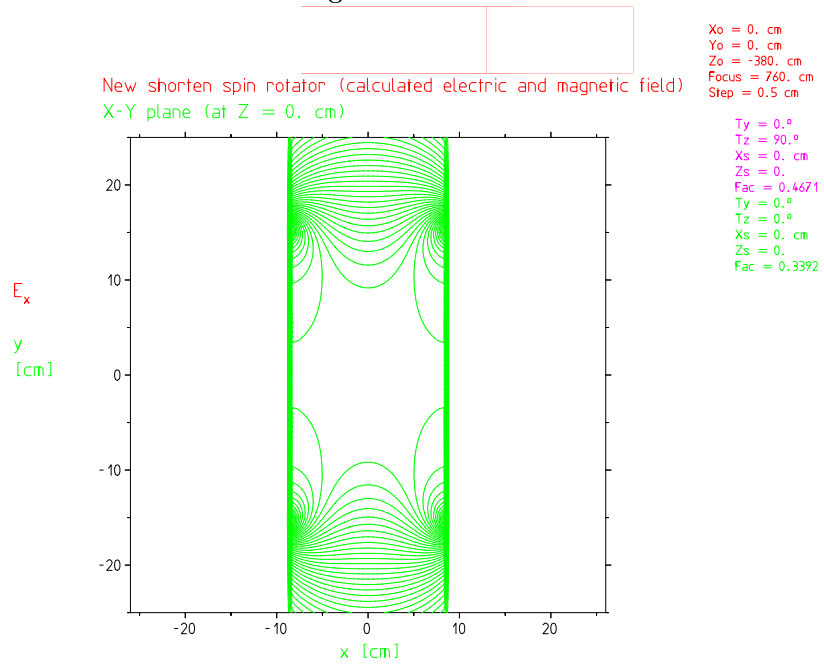


Figure 8:

2 short_v.set file

MAPINPUT

efersep01

mfersep02

ADJUST

1	0.467080	0.0000	0.0000	0.0000	0.0000	90.0000
2	0.339159	0.0000	0.0000	0.0000	0.0000	0.0000

KINE

28.000	0.000	0.000	-380.000	0.000	0.500	0.000	105.658
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STANDARD

5	0.1000E-01	0.1000E-01	3500	0.00	0.00
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FOCUS

760.0000

WINDOW

-400.0000	400.0000	-10.0000	10.0000	-10.0000	10.0000
-400.0000	400.0000	-10.0000	10.0000	10.0000	-10.0000
-400.0000	400.0000	-20.0000	20.0000	-20.0000	20.0000

MATRICE

0.0000	0.0000	0.0000	0.0000	0.0000	0
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INTERPOL

Yes

CAPTION

New shorten spin rotator (calculated electric and magnetic field)

MARGE

YES

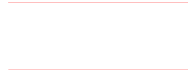
OLD

NO

ZONE

3 Polarization

Here is the result for the polarization of the short separator :



Angle of the helicity of the central trajectory

New shorten spin rotator (calculated electric and magnetic field) : New shor

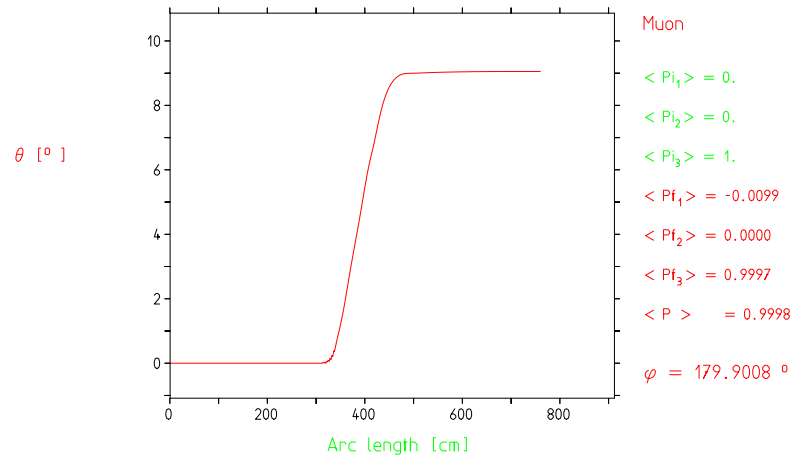


Figure 9:

New short spin rotator (calculated electric and magnetic field)

New short separator

$$\begin{aligned} X_s &= 0. \text{ cm} & X'_s &= 0. \text{ mrad} & Y_s &= 0. \text{ cm} & Y'_s &= 0. \text{ mrad} & dP &= 0. \% \\ X_m &= 3. \text{ cm} & X'_m &= 250. \text{ mrad} & Y_m &= 0.15 \text{ cm} & Y'_m &= 250. \text{ mrad} & dP &= 0.84 \% \end{aligned}$$

$$\text{Muon} \quad : \quad P_o = 28. \text{ MeV}/c$$

$$\text{Deviation angle} \quad : \quad -0.7805^{\circ}$$

$$\text{Angle of the end central helicity} \quad : \quad 9.0515^{\circ}$$

$$\text{Nr} \quad = \quad 10000$$

$$\langle \text{Pi}_1 \rangle \quad = \quad 0.$$

$$\langle \text{Pi}_2 \rangle \quad = \quad 0.$$

$$\langle \text{Pi}_3 \rangle \quad = \quad 1.$$

$$\langle u \rangle \quad = \quad +1.0000 \quad ; \quad \sigma \quad = \quad \pm 0.0000$$

$$\langle \text{Pf}_1 \rangle \quad = \quad -0.0099 \quad ; \quad \sigma_1 \quad = \quad \pm 0.0243$$

$$\langle \text{Pf}_2 \rangle \quad = \quad +0.0000 \quad ; \quad \sigma_2 \quad = \quad \pm 0.0006$$

$$\langle \text{Pf}_3 \rangle \quad = \quad +0.9997 \quad ; \quad \sigma_3 \quad = \quad \pm 0.0019$$

$$\langle P \rangle \quad = \quad +0.9998 \quad ; \quad \sigma \quad = \quad \pm 0.0244$$

$$\theta_{u-Pf} \quad = \quad +8.9869^{\circ} \quad ; \quad \theta_{\text{Pi}-Pf} \quad = \quad +0.5648^{\circ}$$

$$\phi \quad = \quad +179.9008^{\circ}$$

$$A_o \quad = \quad -.2602 \quad ; \quad B_o \quad = \quad -.7410 \quad ; \quad C_o/c \quad = \quad -.420710^{-2} \text{ s/m}$$

$$1/\rho \quad = \quad 0.1092 \text{ cm}$$

$$\text{Step-size} \quad = \quad 0.5000 \text{ cm}$$

4 Electron cleaning

The central trajectory for electron is in red. The corresponding deviation angle is 7.36°

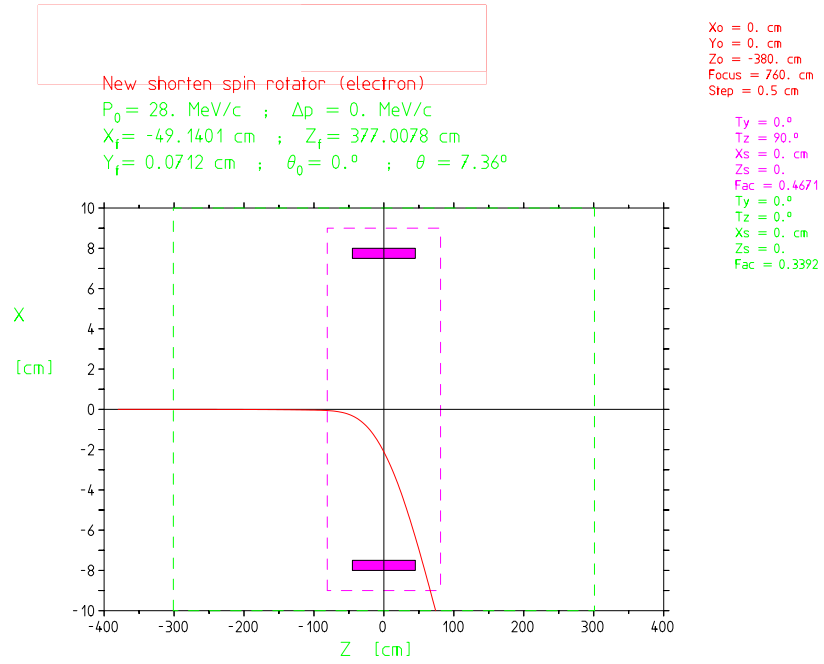


Figure 10:

However when embraced between two triplets, the electrons (in blue) are not all deviated back into the beam axis !!! The distance between the center of short separator and first two embracing quadrupoles is 149.5 cm.

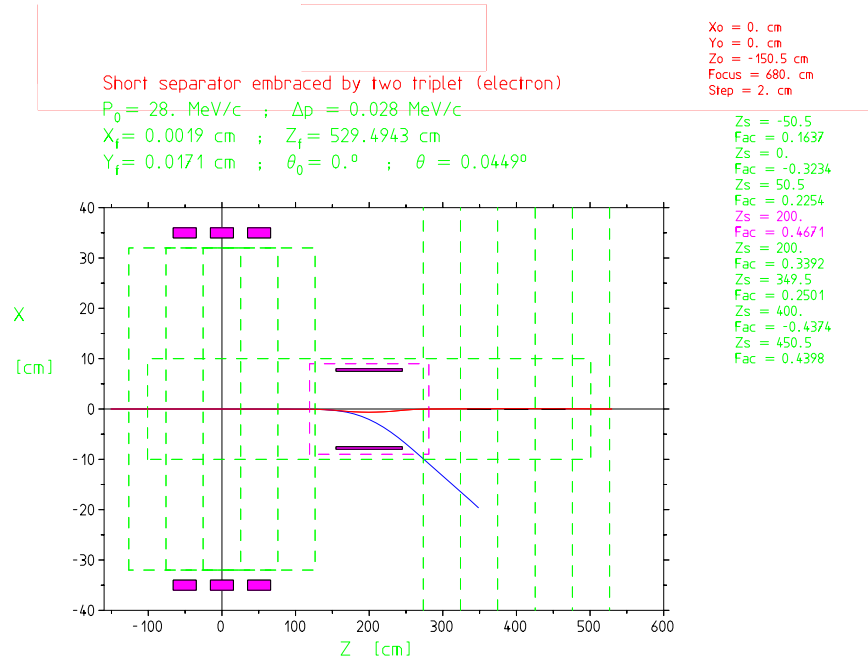


Figure 11:

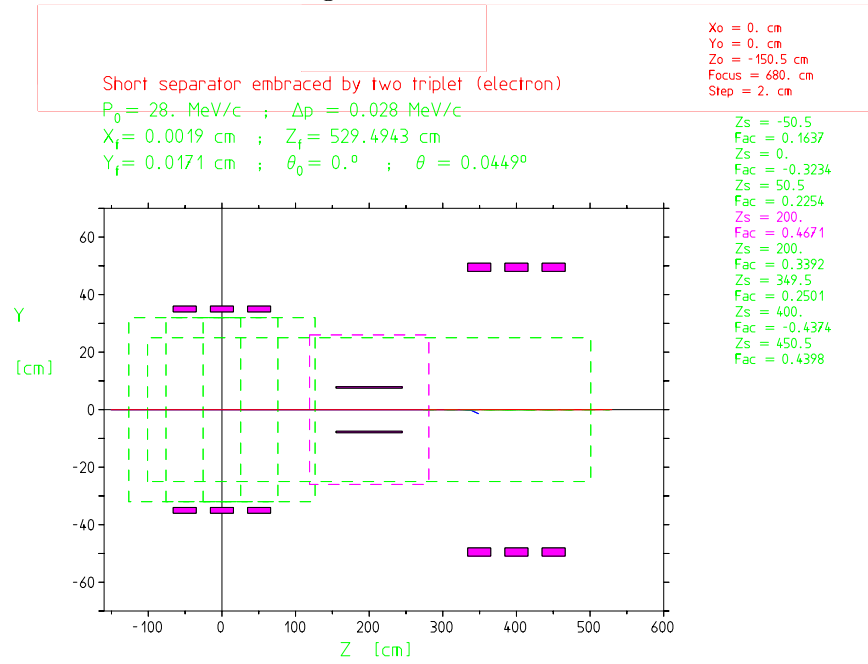


Figure 12:

MAPINPUT
qsm01a
efersep01
mfersep02

ADJUST

1	0.163665	0.0000	0.0000	-50.5000	0.0000	0.0000
1	-0.323393	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.225447	0.0000	0.0000	50.5000	0.0000	0.0000
2	0.467080	0.0000	0.0000	200.0000	0.0000	90.0000
3	0.339159	0.0000	0.0000	200.0000	0.0000	0.0000
1	0.250136	0.0000	0.0000	349.5000	0.0000	45.0000
1	-0.437363	0.0000	0.0000	400.0000	0.0000	45.0000
1	0.439837	0.0000	0.0000	450.5000	0.0000	45.0000

KINE

28.000	0.000	0.000	-150.500	0.000	2.000	0.028	105.658
--------	-------	-------	----------	-------	-------	-------	---------

STANDARD

5	0.1000E-02	0.1000E-01	3500	80.00	40.00
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FOCUS

680.0000

WINDOW

-160.0000	600.0000	-40.0000	40.0000	-70.0000	70.0000
-160.0000	600.0000	-40.0000	40.0000	-70.0000	70.0000
-150.0000	160.0000	-100.0000	100.0000	-60.0000	60.0000

MATRICE

0.5000	10.0000	0.5000	10.0000	1.0000	1
--------	---------	--------	---------	--------	---

INTERPOL

Yes

CAPTION

Short separator embraced by two triplet (electron)

ZONE

Contents

1	New Short separator	2
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