Beam induced backgrounds with latest ring layout

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Beam line optics

MAD8 beam line file from Yuri&Co. Various outputs(OPTICS,TWISS) for interfacing with MARS(through MMBLB) and also for consistency checks (MAD tracking utilities). Current "OPTICS" file looks like

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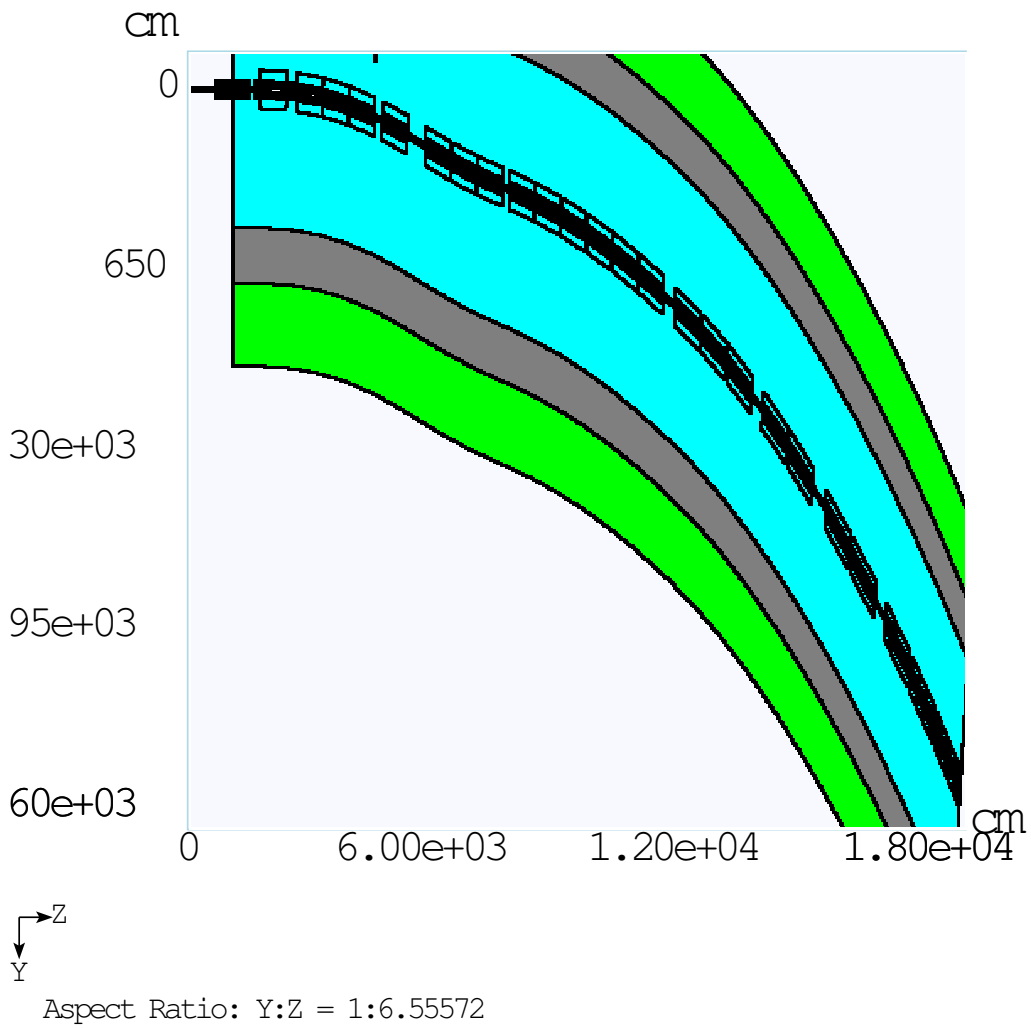
 KEYWORD      TYPE        NAME    S(m)  L(m)    KOL        K1L  ...
-----------------------------------------------------------------

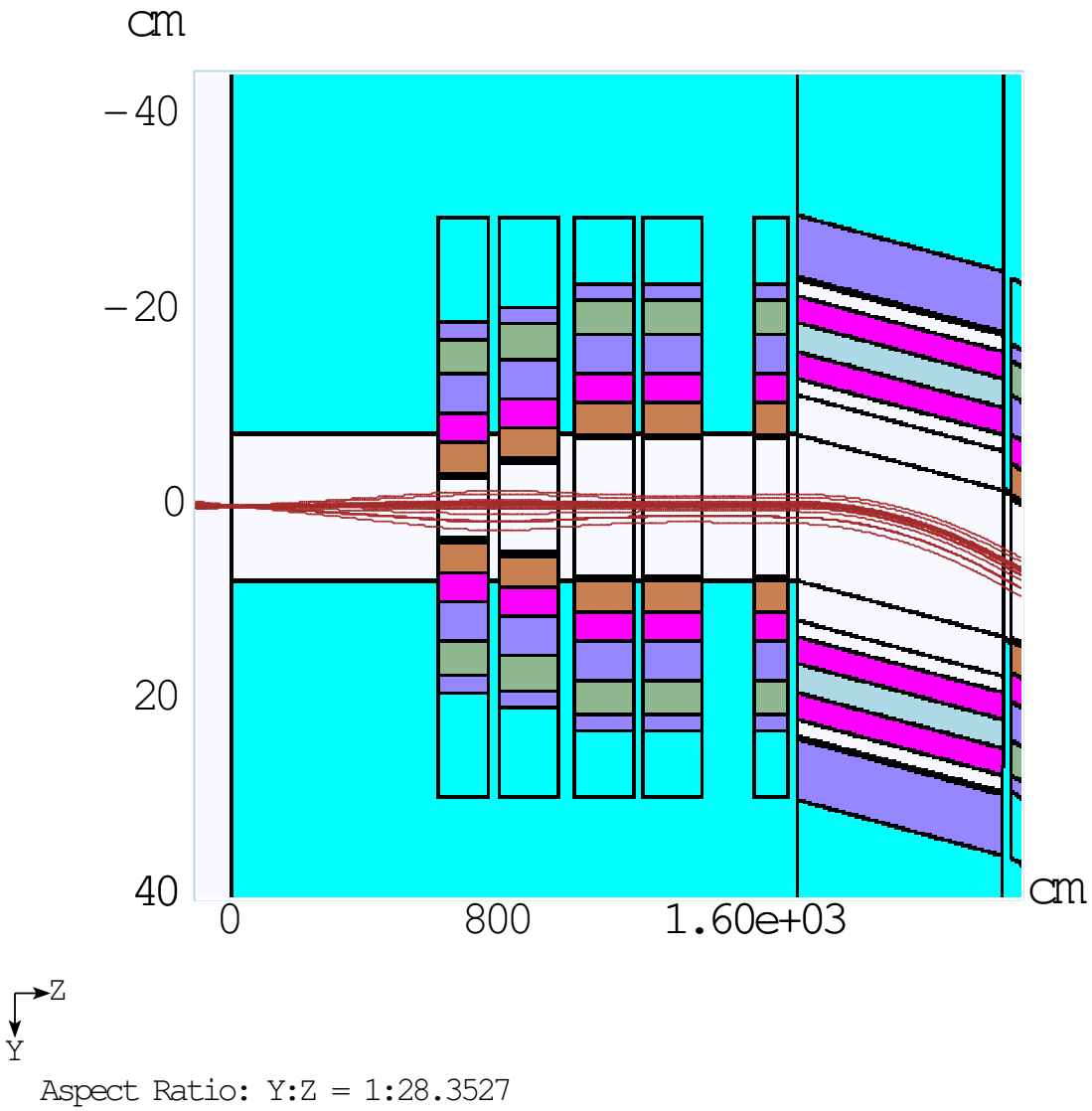
"MARKER"      "~"         "IP"    0.000  0.00   0.00000      0.00000
"DRIFT"       "DRIFT"     "DR1"   6.000  6.00   0.00000      0.00000
"QUADRUPOLE"  "QNB3_7"    "QLB1"  7.500  1.50   0.00000      0.150000
"DRIFT"       "DRIFT"     "DRSH"  7.800  0.30   0.00000      0.00000
"QUADRUPOLE"  "QNB3_10"   "QLB2"  9.500  1.70   0.00000      0.130557
"DRIFT"       "DRIFT"     "DR2"   10.00  0.50   0.00000      0.00000
"QUADRUPOLE"  "QNB3_15"   "QLB3"  11.70  1.70   0.00000    -0.885071E-01
"DRIFT"       "DRIFT"     "DRSH"  12.00  0.30   0.00000      0.00000
"QUADRUPOLE"  "QNB3_15"   "QLB4"  13.70  1.70   0.00000    -0.885071E-01
"DRIFT"       "DRIFT"     "DR3"   15.20  1.50   0.00000      0.00000
"QUADRUPOLE"  "QNB3_15"   "QLB5"  16.20  1.00   0.00000    -0.378024E-01
"DRIFT"       "DRIFT"     "DRT2"  16.45  0.25   0.00000      0.00000
"RBEND"       "OMD_15"    "BE1"   22.45  6.00   0.192000E-01 0.00000
```

Here "QNB3_7" is specific type of quadrupole with 7cm diameter aperture, "OMD_15" is for open midplane dipole with 15cm aperture, etc. Drits are currently generic ones.

MMBLB and MARS beam line model



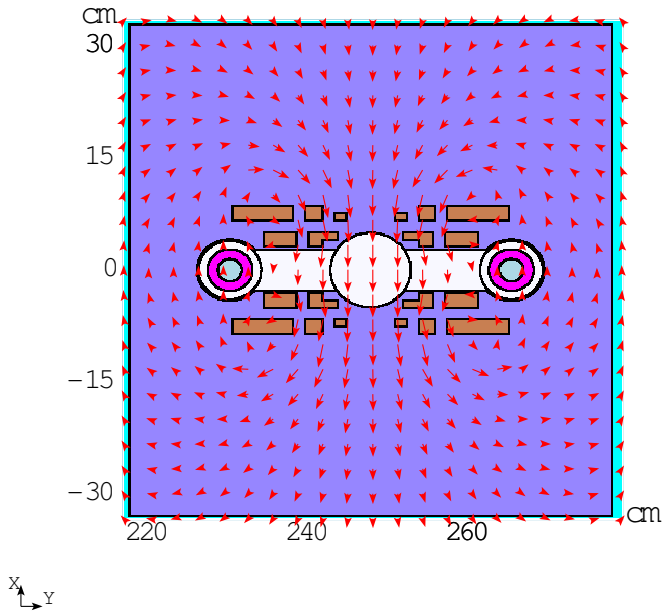
Closer look at IP region (up to 30m away)



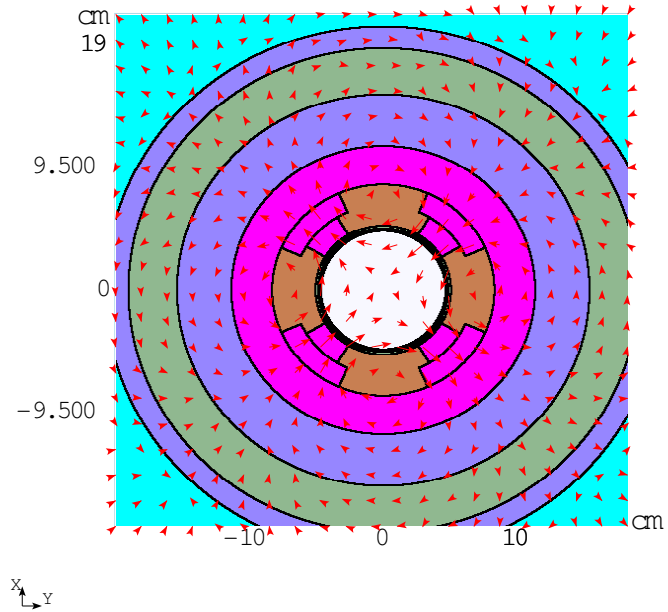
Magnets

Quadrupoles with COS-THETA design, similar to what is proposed for ILC, LHC upgrade, etc. Dipoles with open midplane design (LHC upgr). Generic sextupoles.

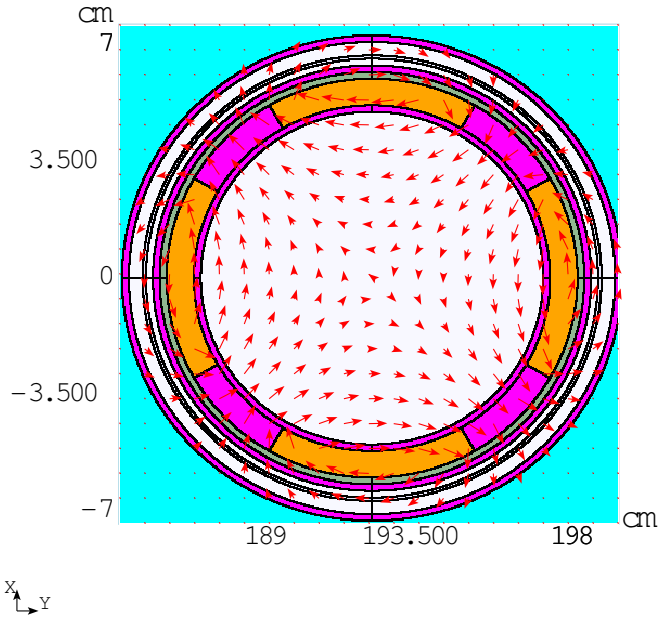
For consistency with MAD central fields are always ideal, and outside of aperture field map or parametrisation is used. Currently sextupoles have no field outside of aperture.



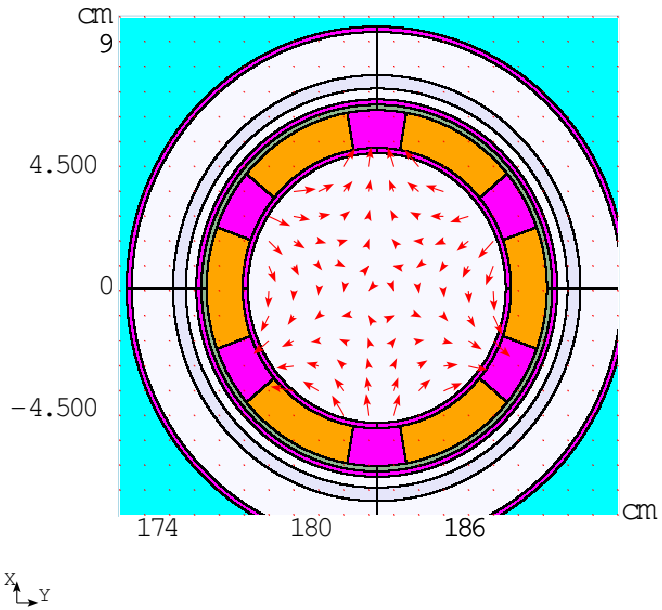
Aspect Ratio: X:Y = 1:0.93385



Aspect Ratio: X:Y = 1:0.95109

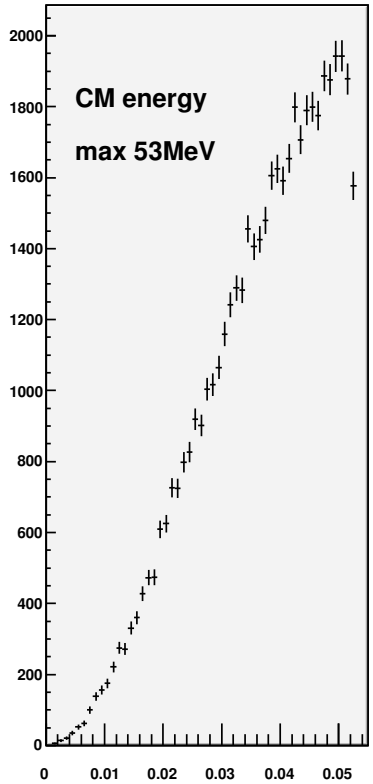


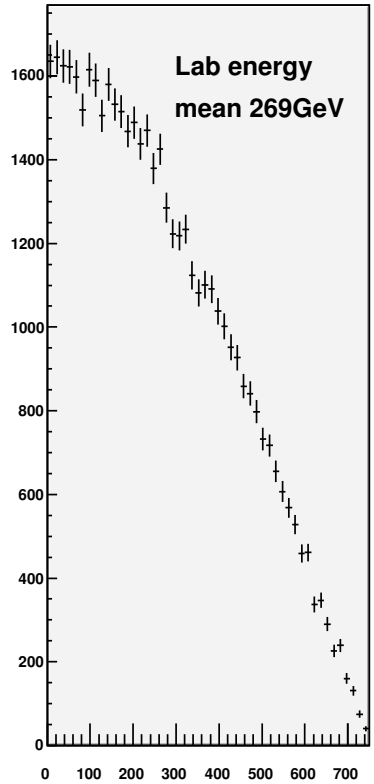
Aspect Ratio: X:Y = 1:0.97704

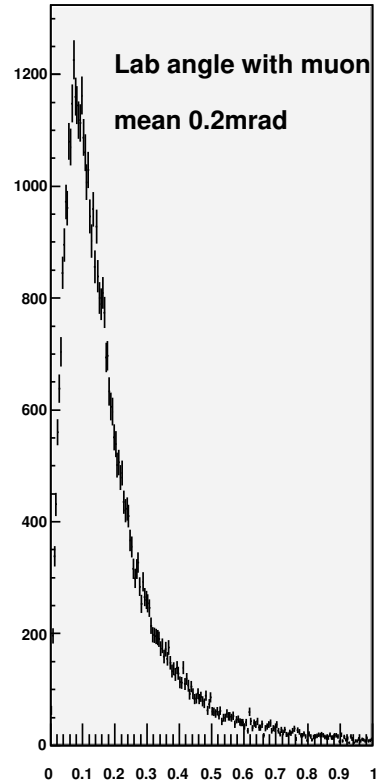


Aspect Ratio: X:Y = 1:1.05195

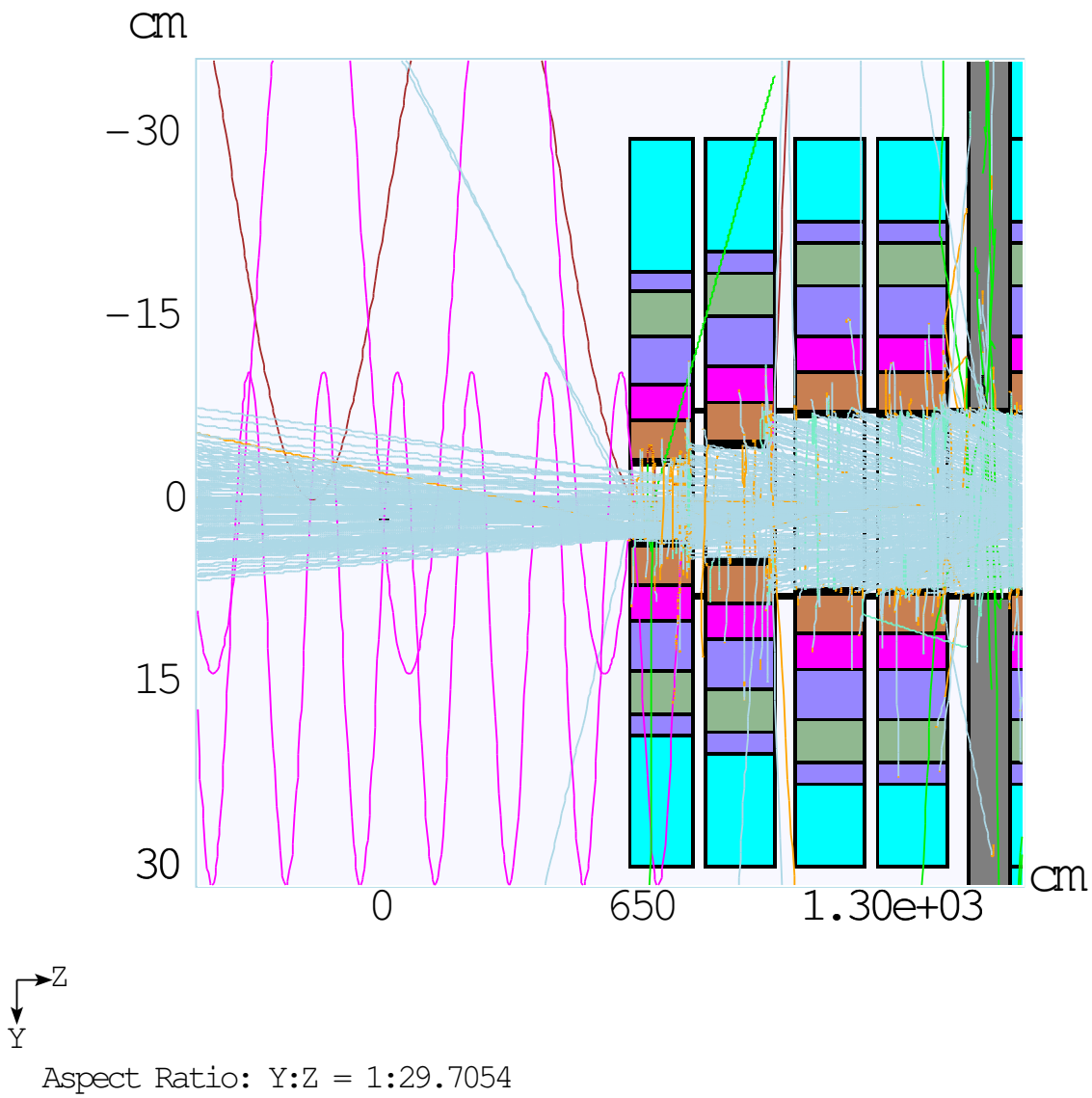
Decay electron parameters



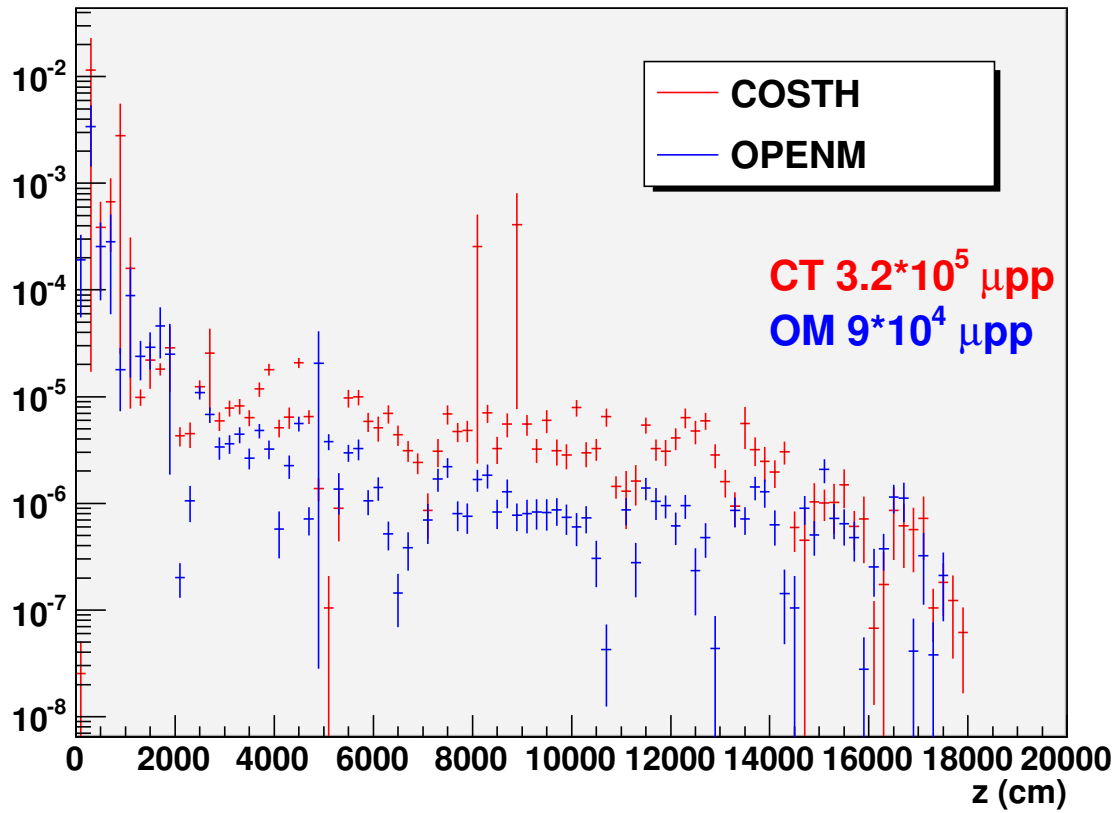




Sample events



Muons for openmidplane and costheta dipoles



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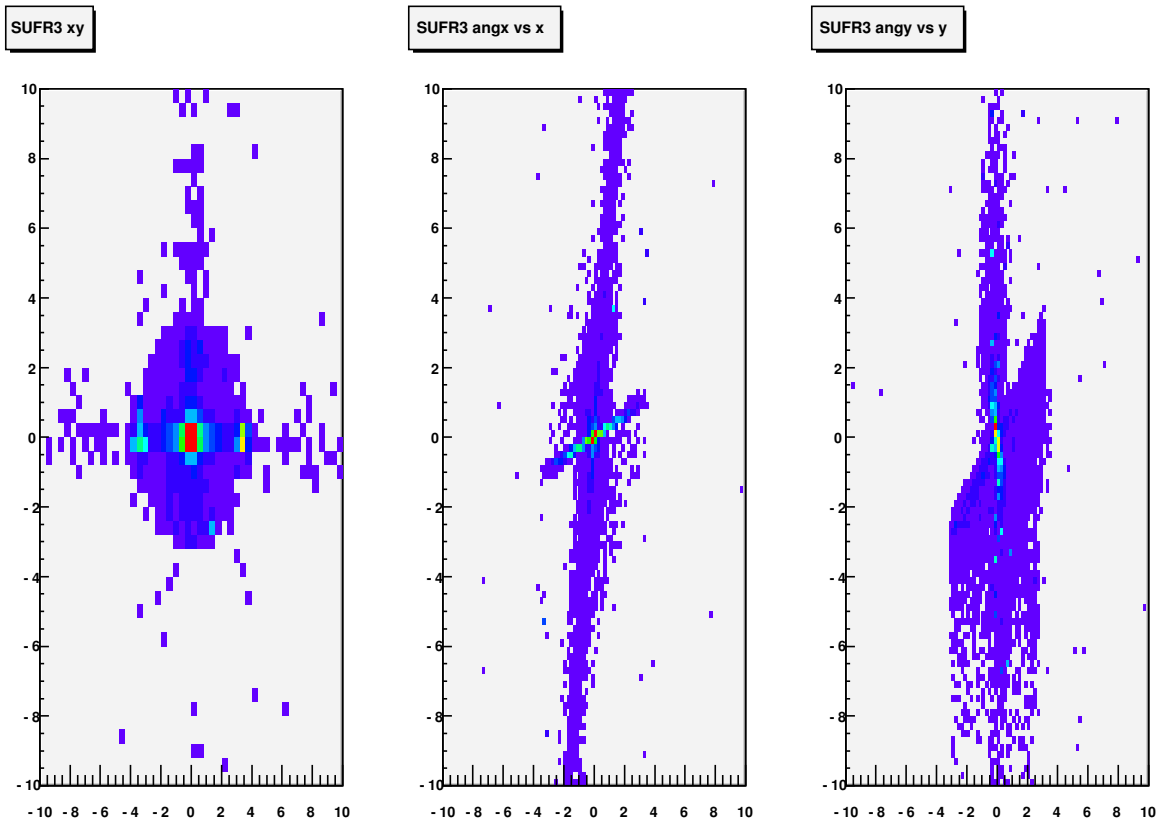
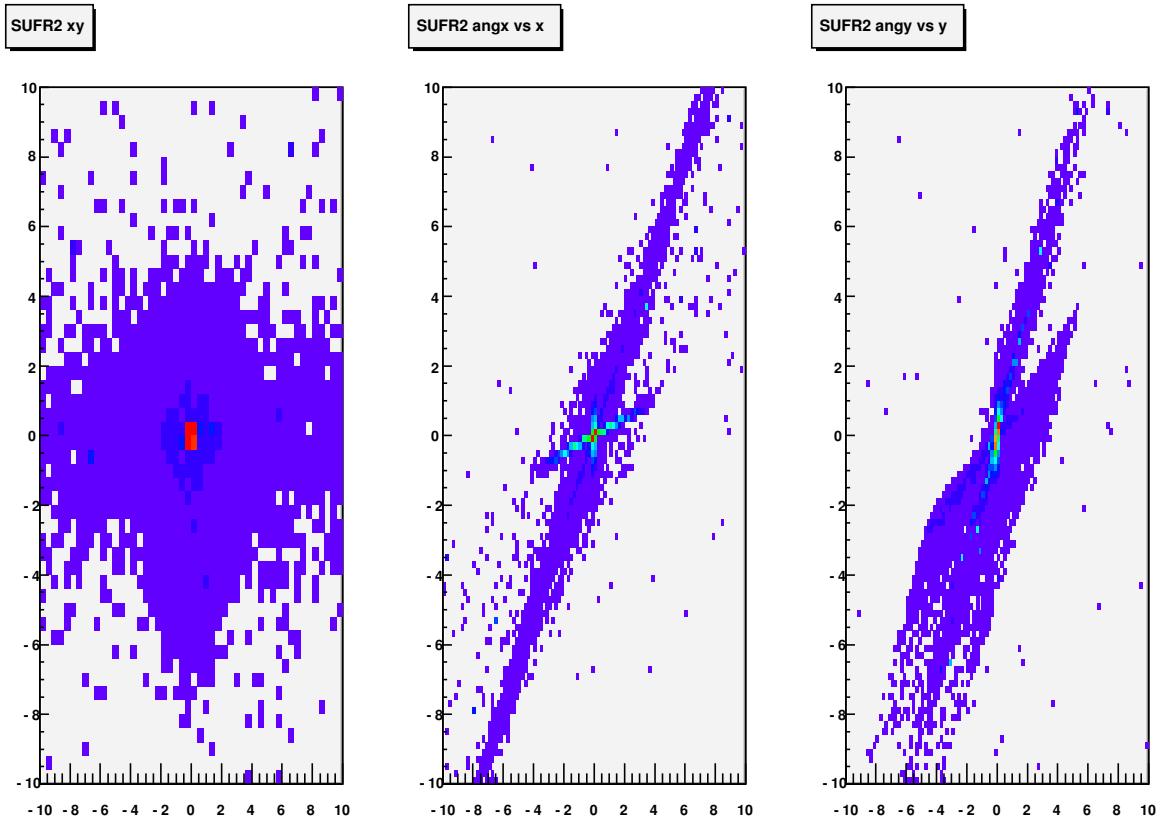
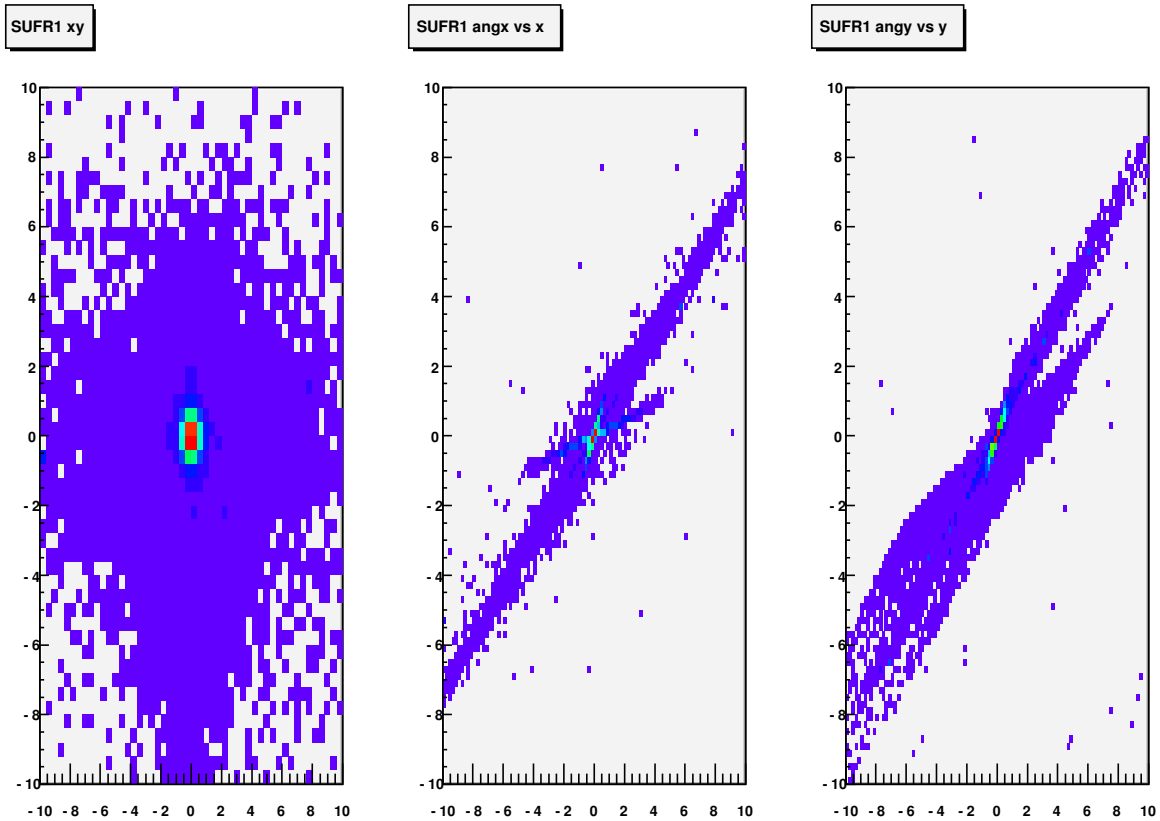
Some properties of the background Z=600cm



$Z = 0cm$

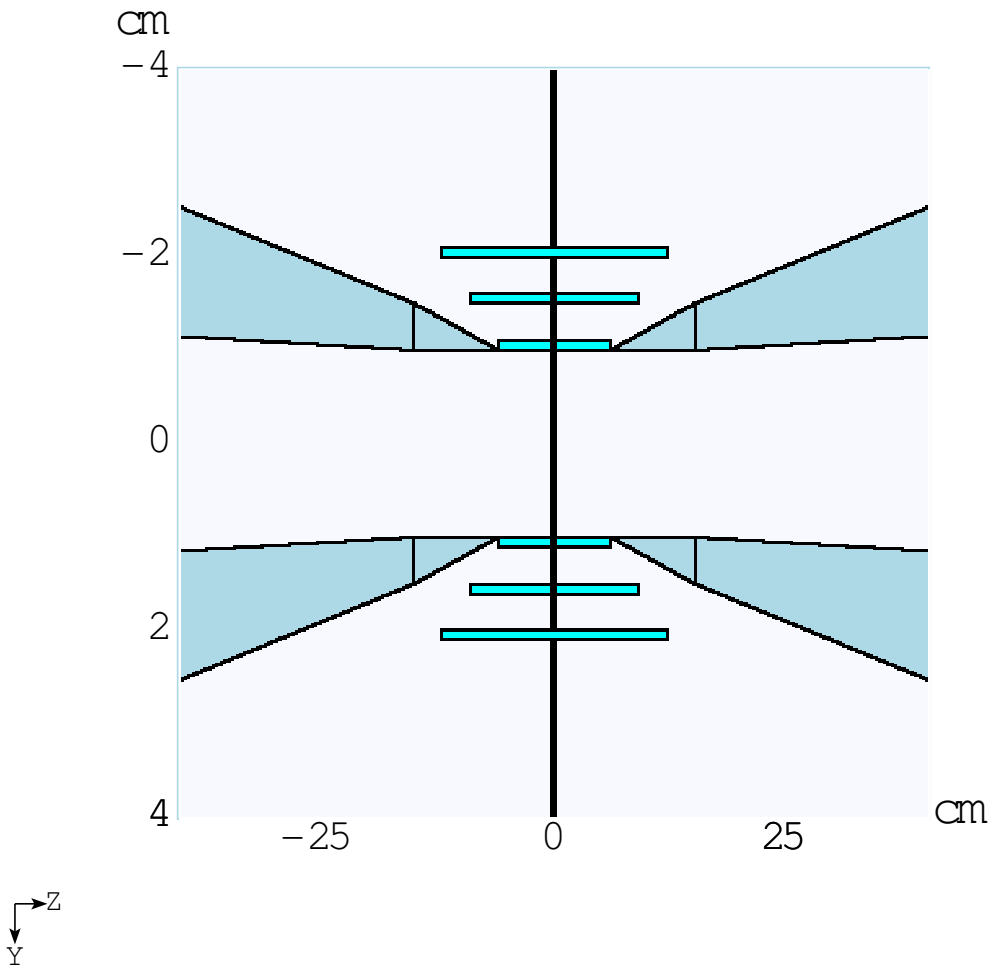

SUFR2 xy
SUFR2 angx vs x
SUFR2 angy vs y
10
8
6
4
2
0
-2
-4
-6
-8
-10
-10 -8 -6 -4 -2 0 2 4 6 8 10

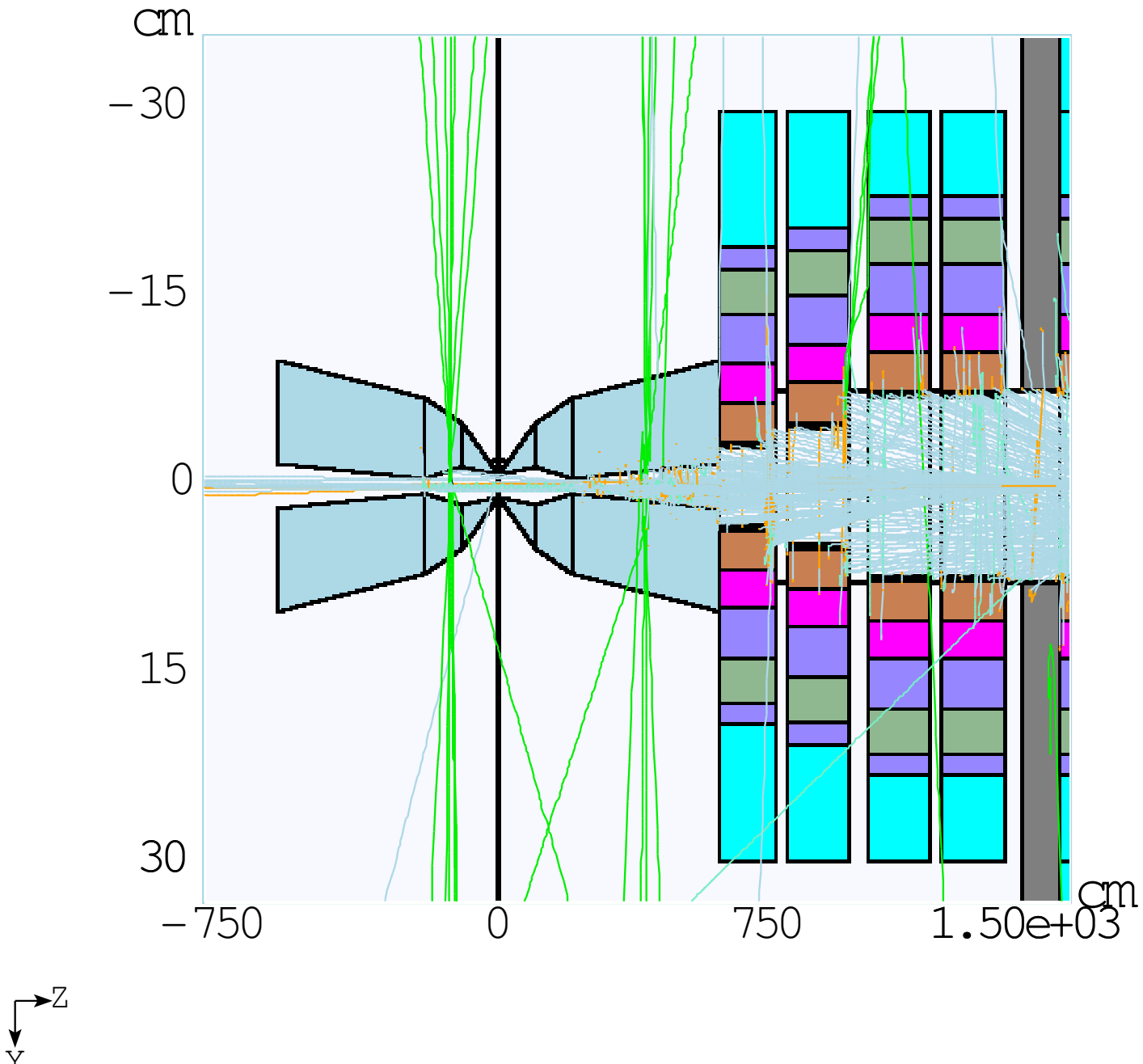
$Z = -600cm$


SUFR1 xy
SUFR1 angx vs x
SUFR1 angy vs y
10
8
6
4
2
0
-2
-4
-6
-8
-10
-10 -8 -6 -4 -2 0 2 4 6 8 10

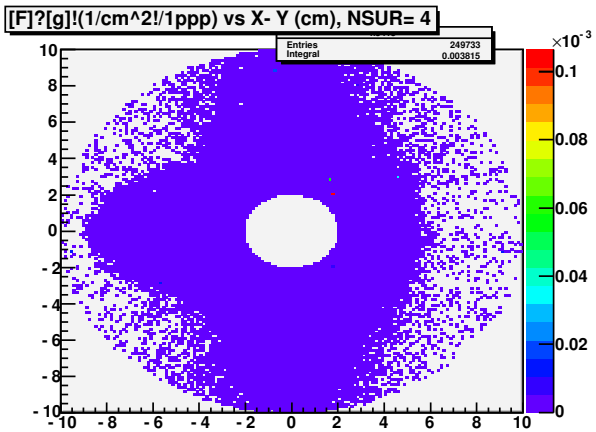
Noses and detector surfaces

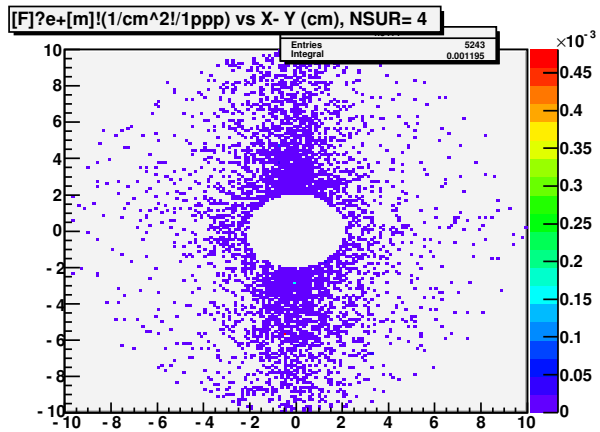
Solenoidal field -3.5T (R < 330cm) 1.5T (330cm< R < 600cm) abs(Z)< 750cm

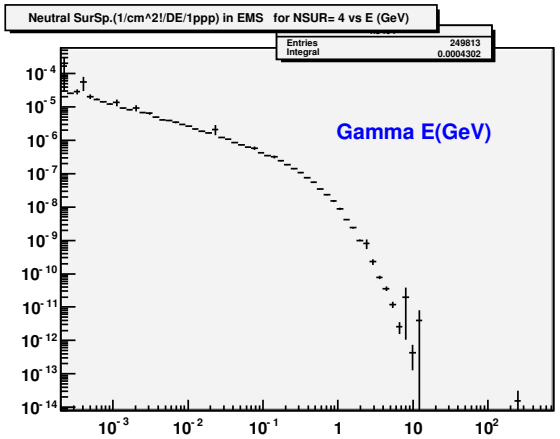


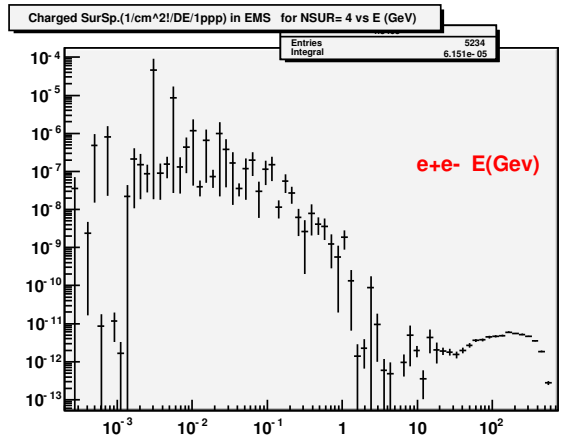

cm
−30
−15
0
15
30
−750
0
750
1.50e+03
cm
Z
Y

Surface detector at Z=0 R 2-10cm, no nose

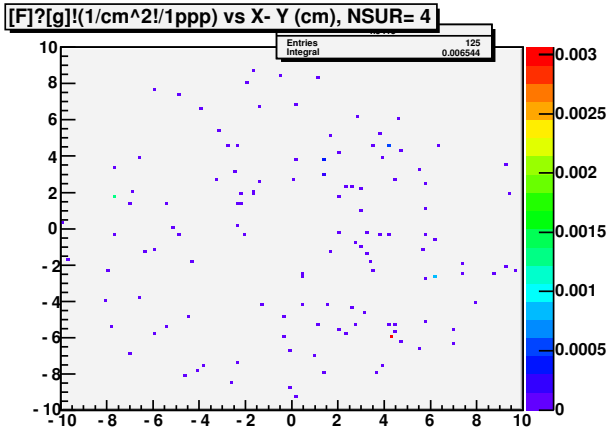


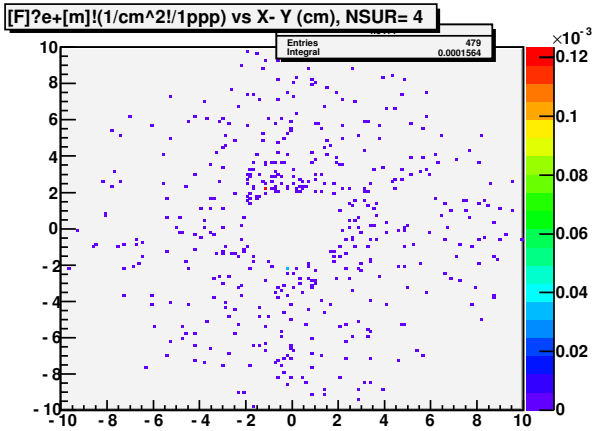


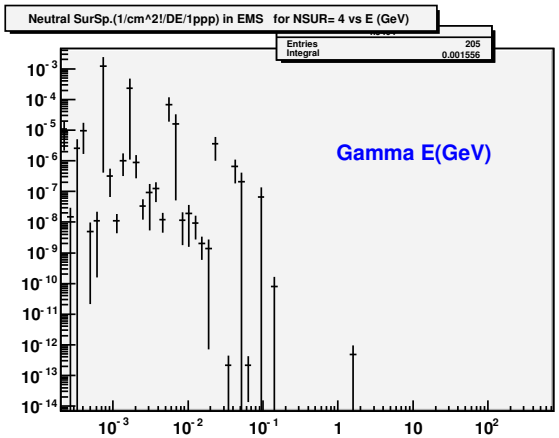


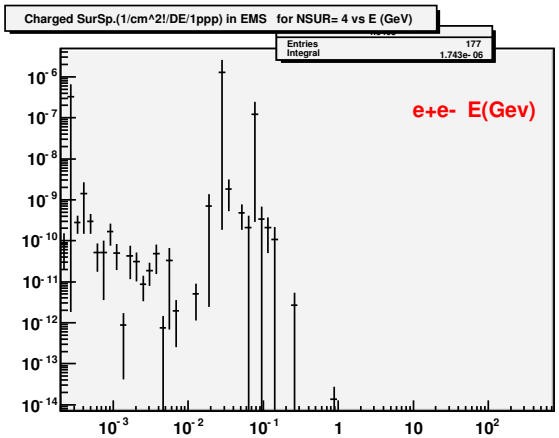


The same with W noses









Conclusion

- No results yet, however certain progress is achieved
- Magnet design can be important, need to compare options
- Detector model should come next ("4th concept" like?)