Internatinal workshop on

Nuclear and Particle Physics at 50 GeV PS

2001/12/11

(Conceptual design of) Primary Proton Beamline, Target Station and Decay Volume

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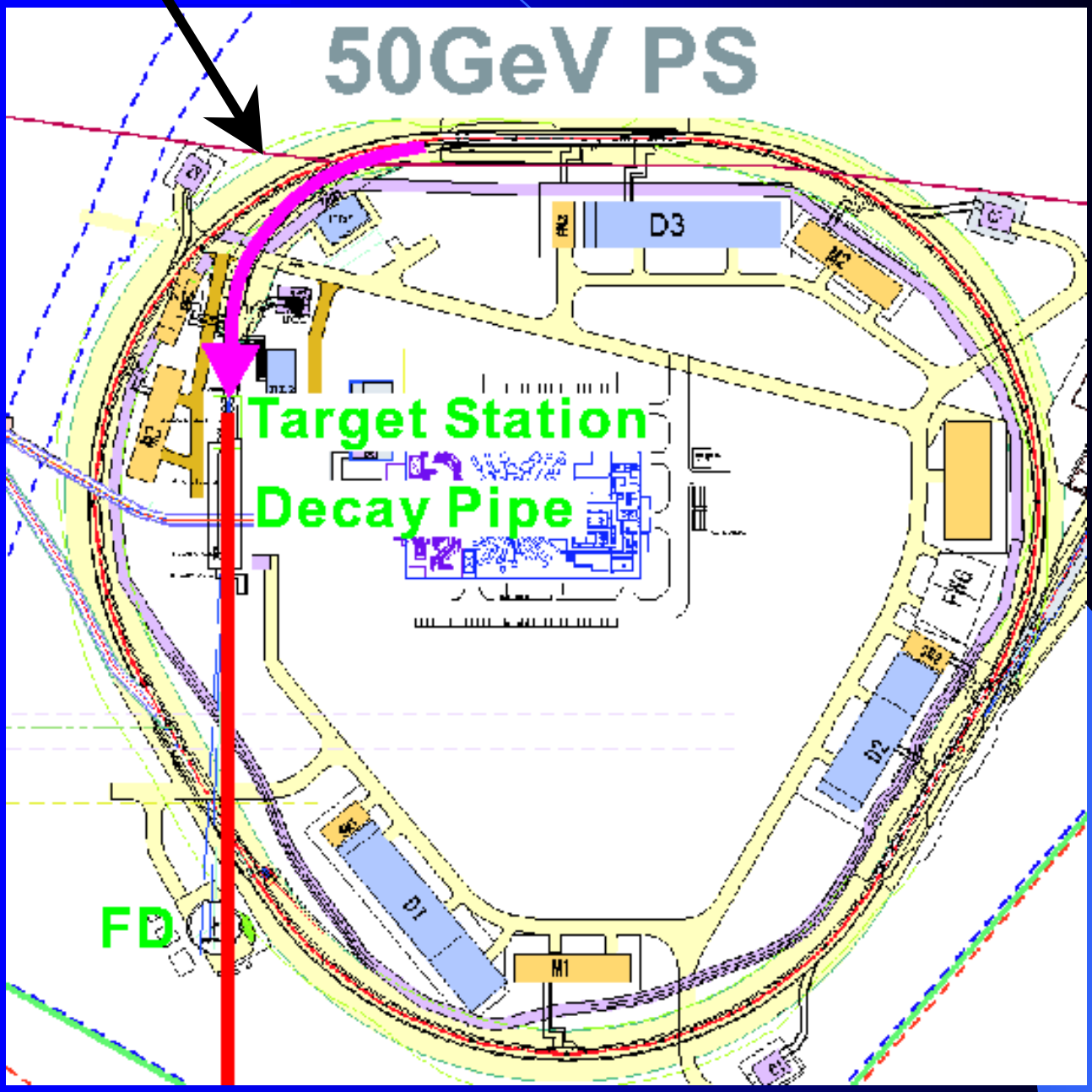
Overview

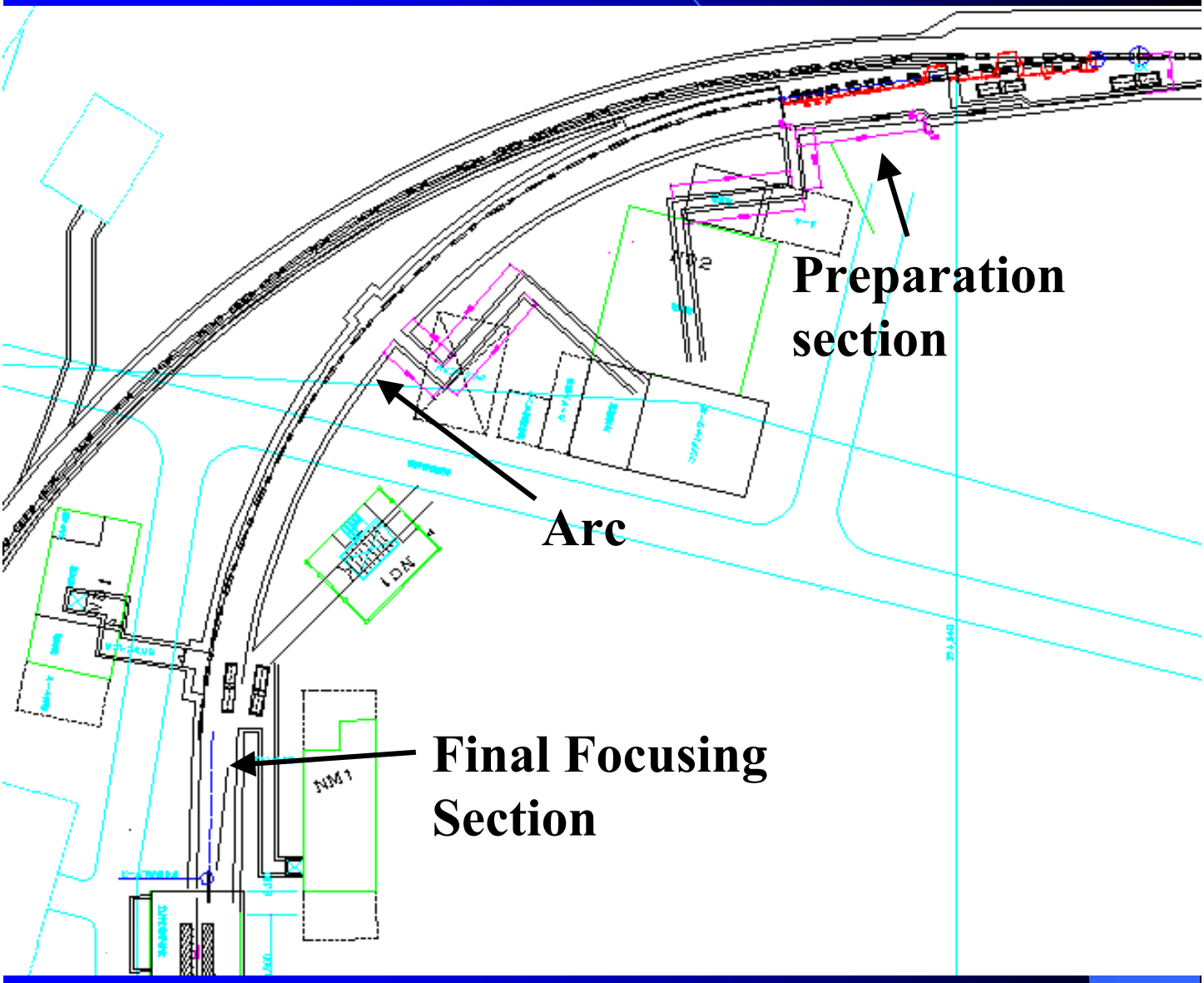


Fast extraction

$\varepsilon = 6\pi$ mm.mr

Beam power = ~ 0.75 MW.

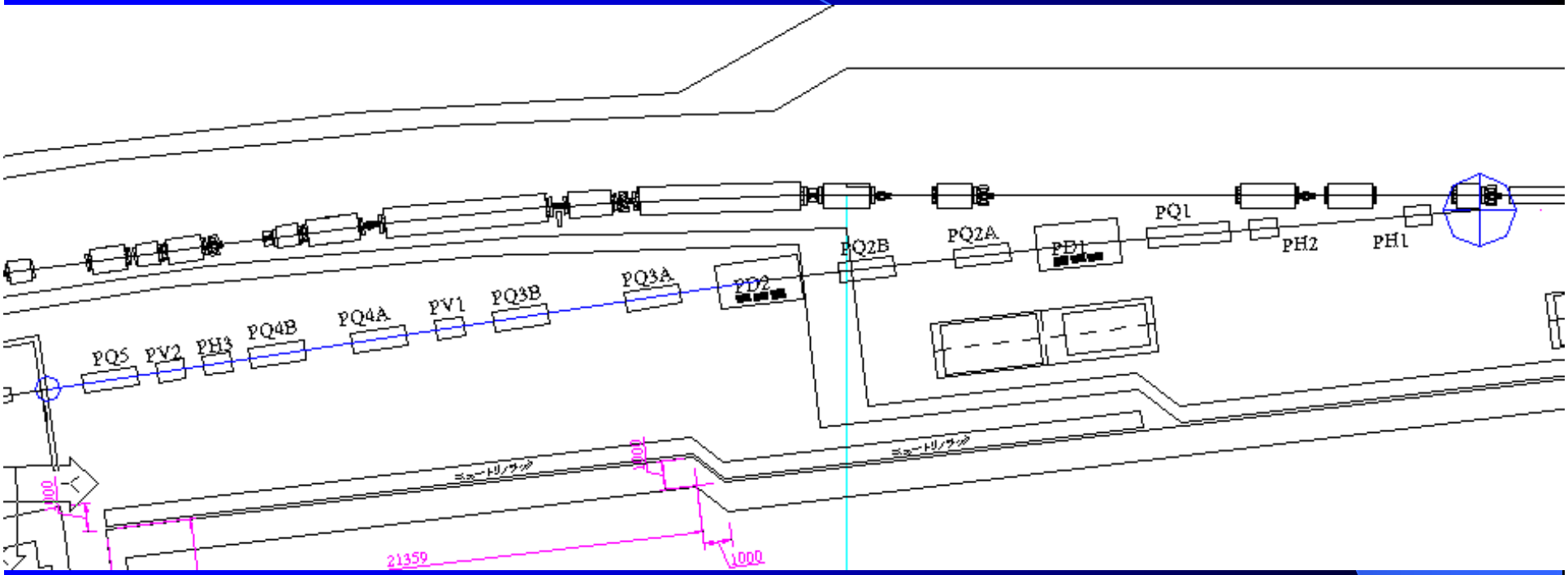
Overview
Primary proton beamline



The design was done in strong cooperation with J. Doornboss of TRIUMF

Preparation section

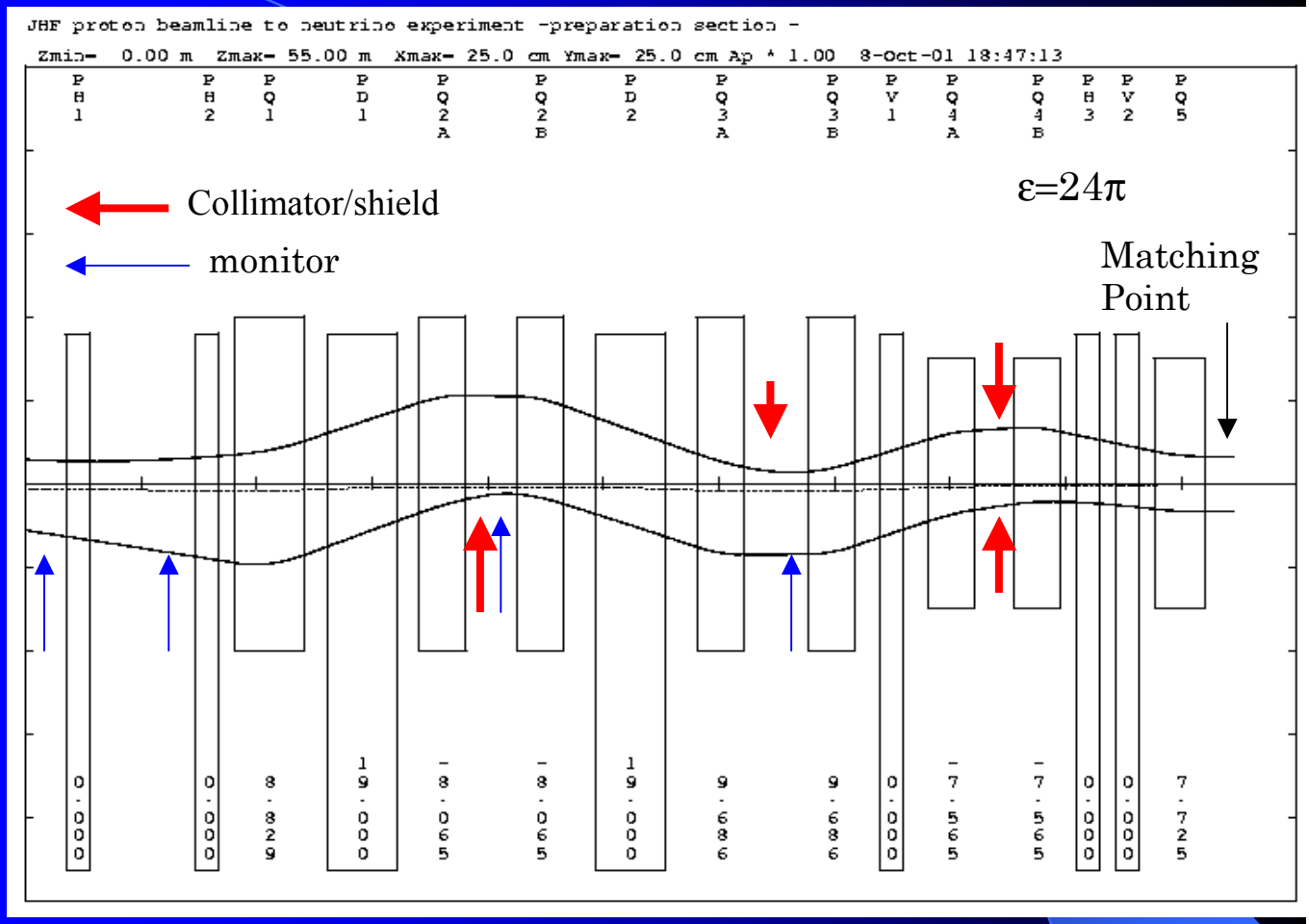
Make the matching with the Arc.



Consists of normal conducting magnets

Total Length : 52.3m → Tight spacing

3.84 degrees bending



Acceptance : **60π** mm･mrad

Space is (too) tight to put beam plug

Need study for collimators

& beam abort

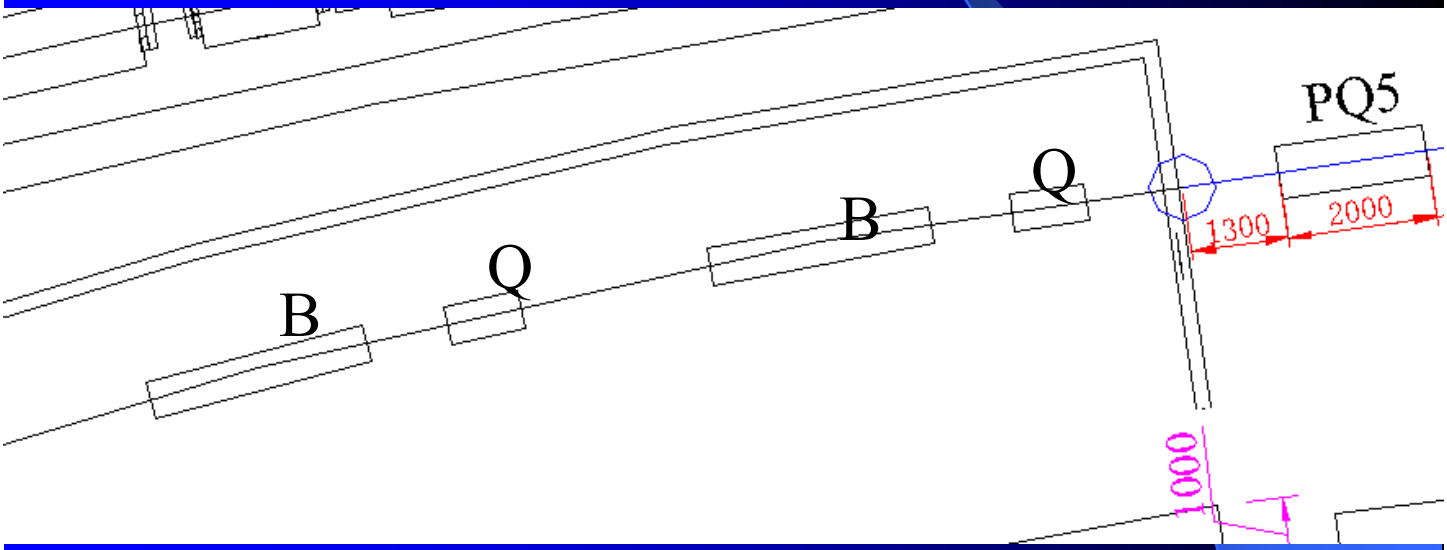
Arc

Bends by **3m long 4 Tesla superconducting magnet**.

1m long Quad-superconducting magnet.

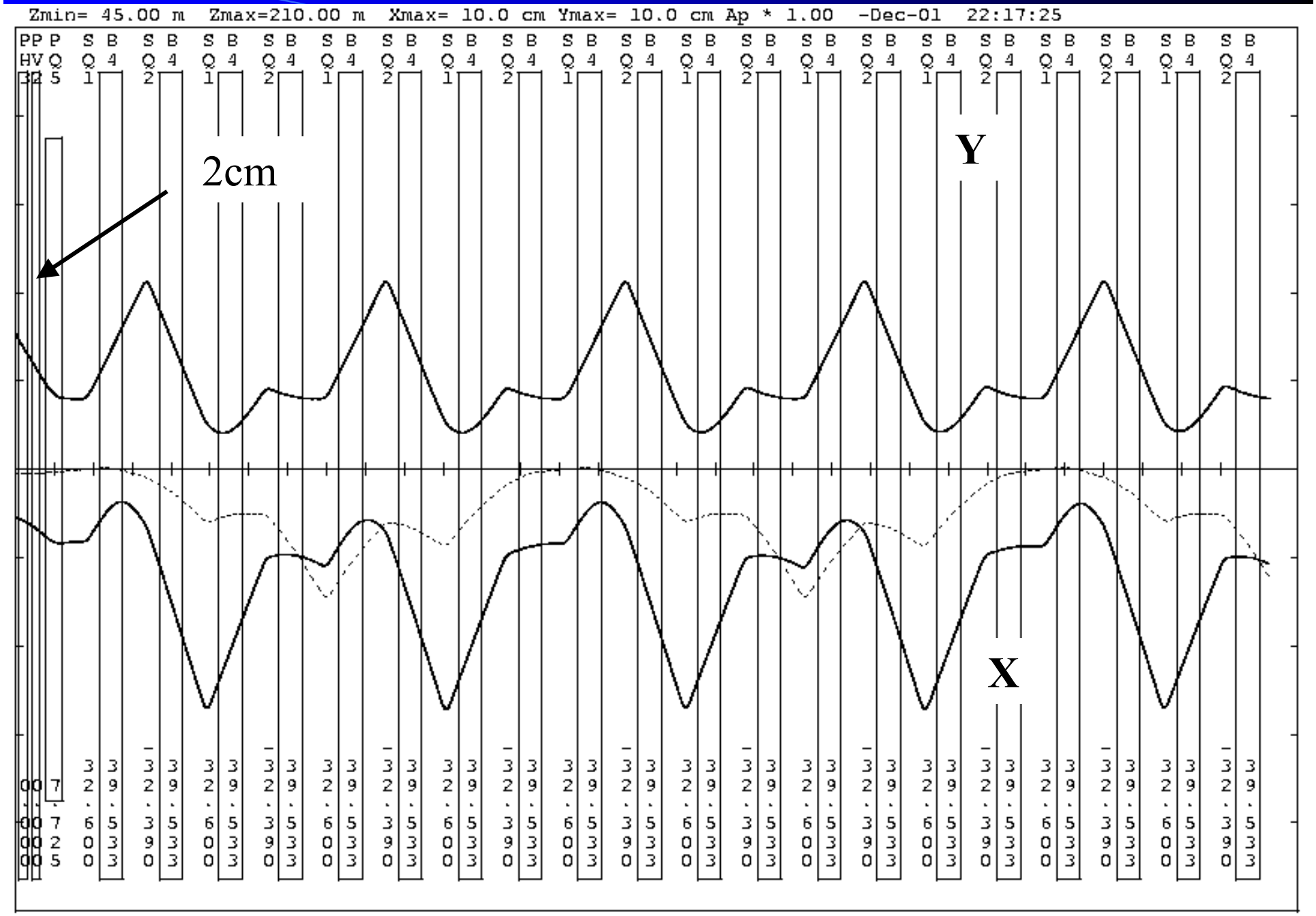
FODO lattice. × 10

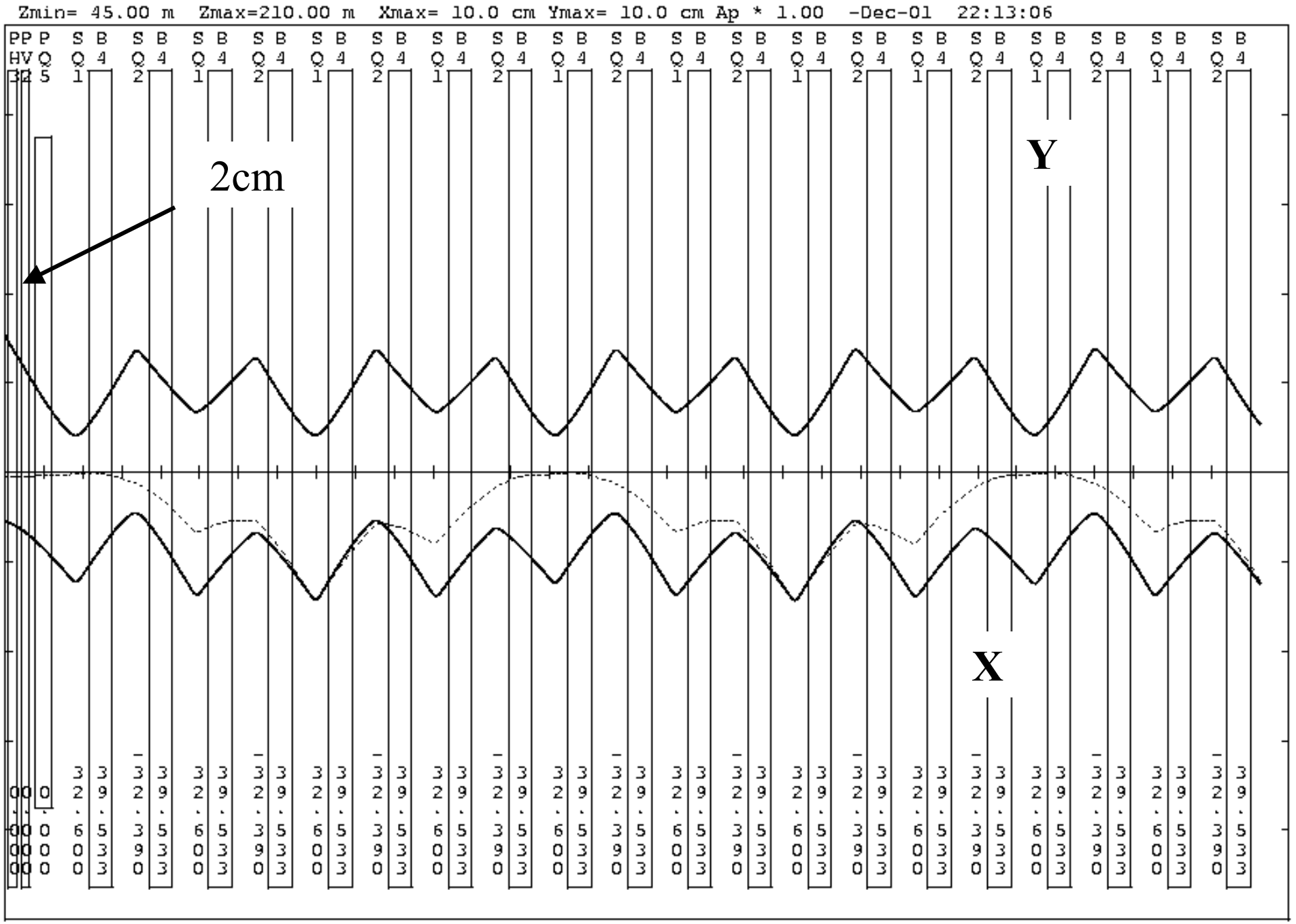
～80 degrees bending



To prevent the quenching,

the beam size and halo should be small.


Zmin= 45.00 m Zmax=210.00 m Xmax= 10.0 cm Ymax= 10.0 cm Ap * 1.00 -Dec-01 22:17:25
2cm
Y
X


Zmin= 45.00 m Zmax=210.00 m Xmax= 10.0 cm Ymax= 10.0 cm Ap * 1.00 -Dec-01 22:13:06
2cm
Y
X

Beam Monitor

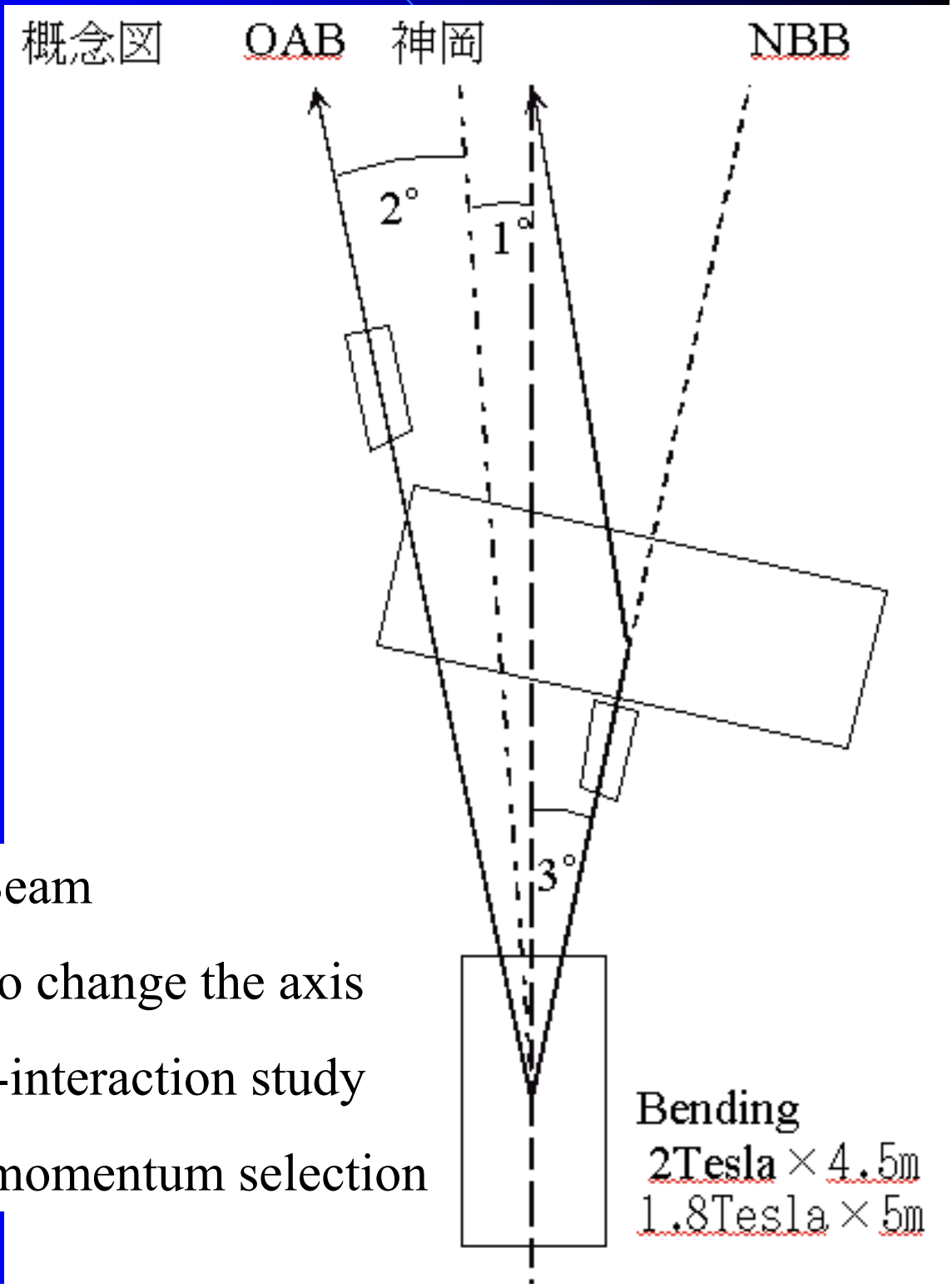
Three types

1. Inductive pick-ups
   - R. E. Shafer *et al.*, IEEE,NS-28,2290,1981
     Beam center w/ 30υm precession.
     Operative in 4 Kelvin.
     No loss
2. SEED
   (Secondary Emission Electron Detector)
   R. Drucker *et al.* FERMILAB-Conf-98/062
   A.R.Berdoz *et al.* TRI-PP-91-6
   J. Krider *et al.*, FERMILAB-PUB-85/176
   Strip(～t=8μm) sandwiched
   w/ anode foil(～8μm)

3. Luminescent Plate

Remotely control the position of
SEED and Luminescent Plate

Focusing Section & Target Station

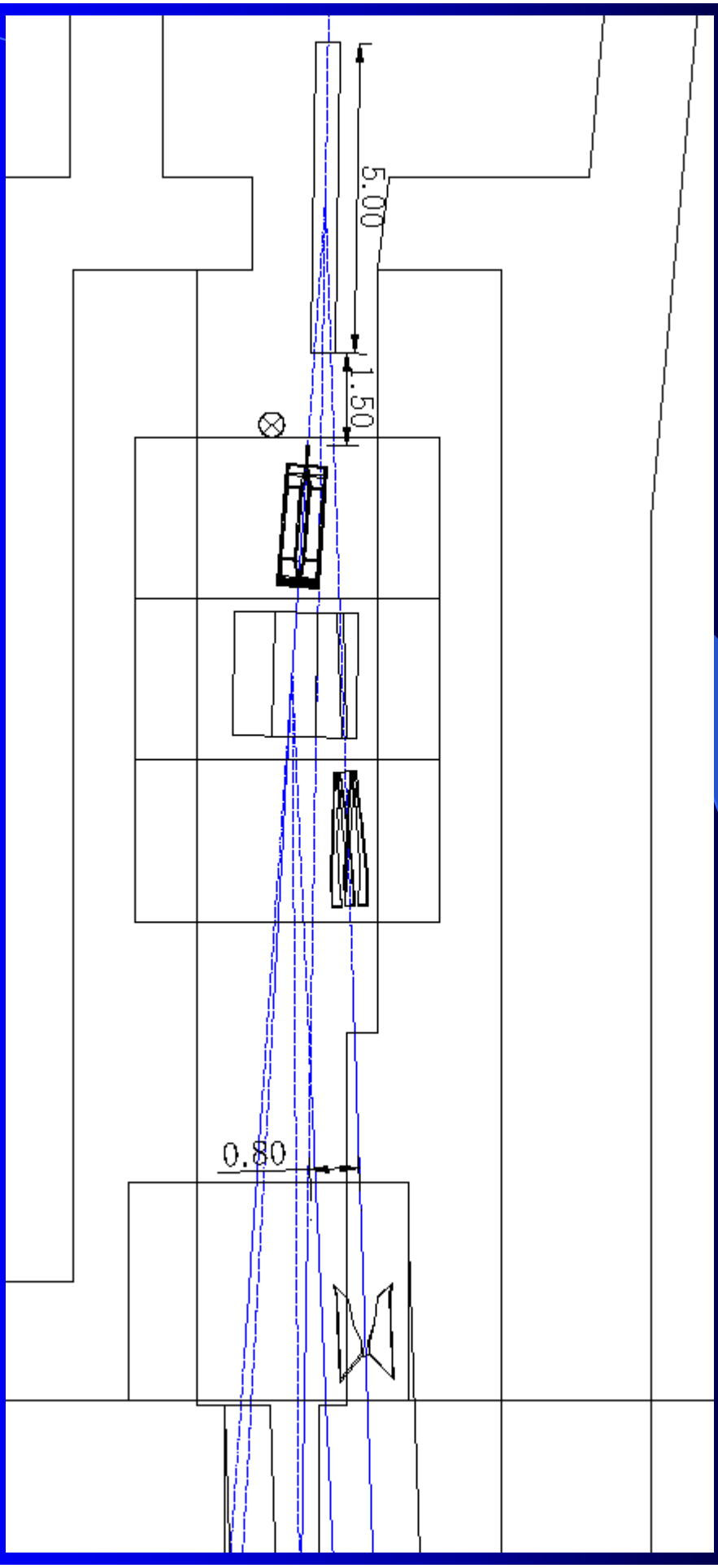


Off Axis Beam

Plan to change the axis

NBB for n-interaction study

6 degrees momentum selection

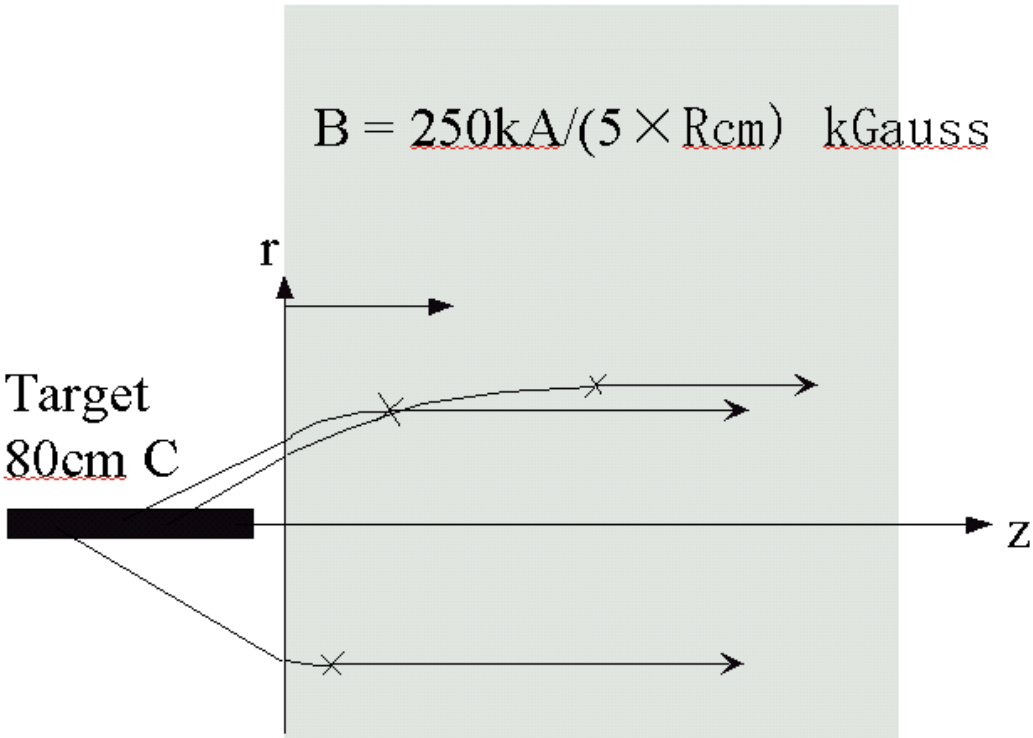

5.00
1.50
0.80

HORN

Study for the optimization is just started.

This time,

target should be separated from the horn.

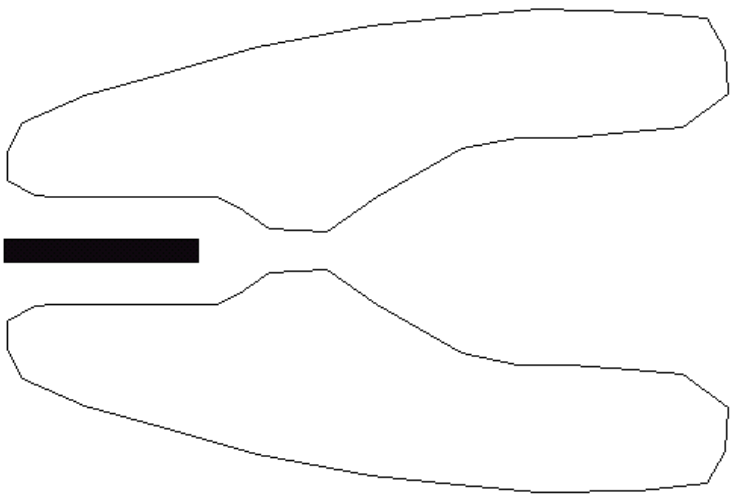


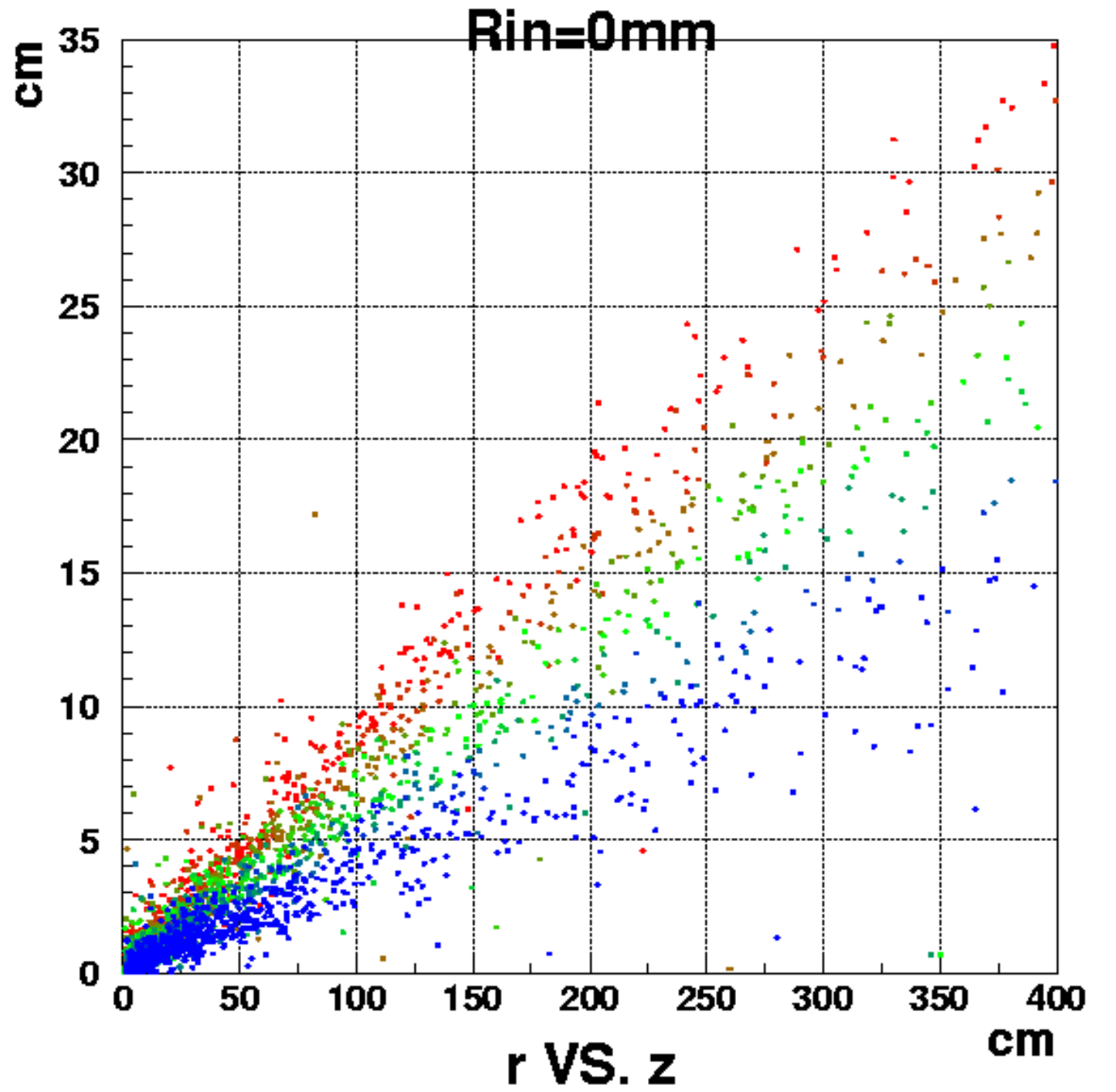
Geant-
FLUKA

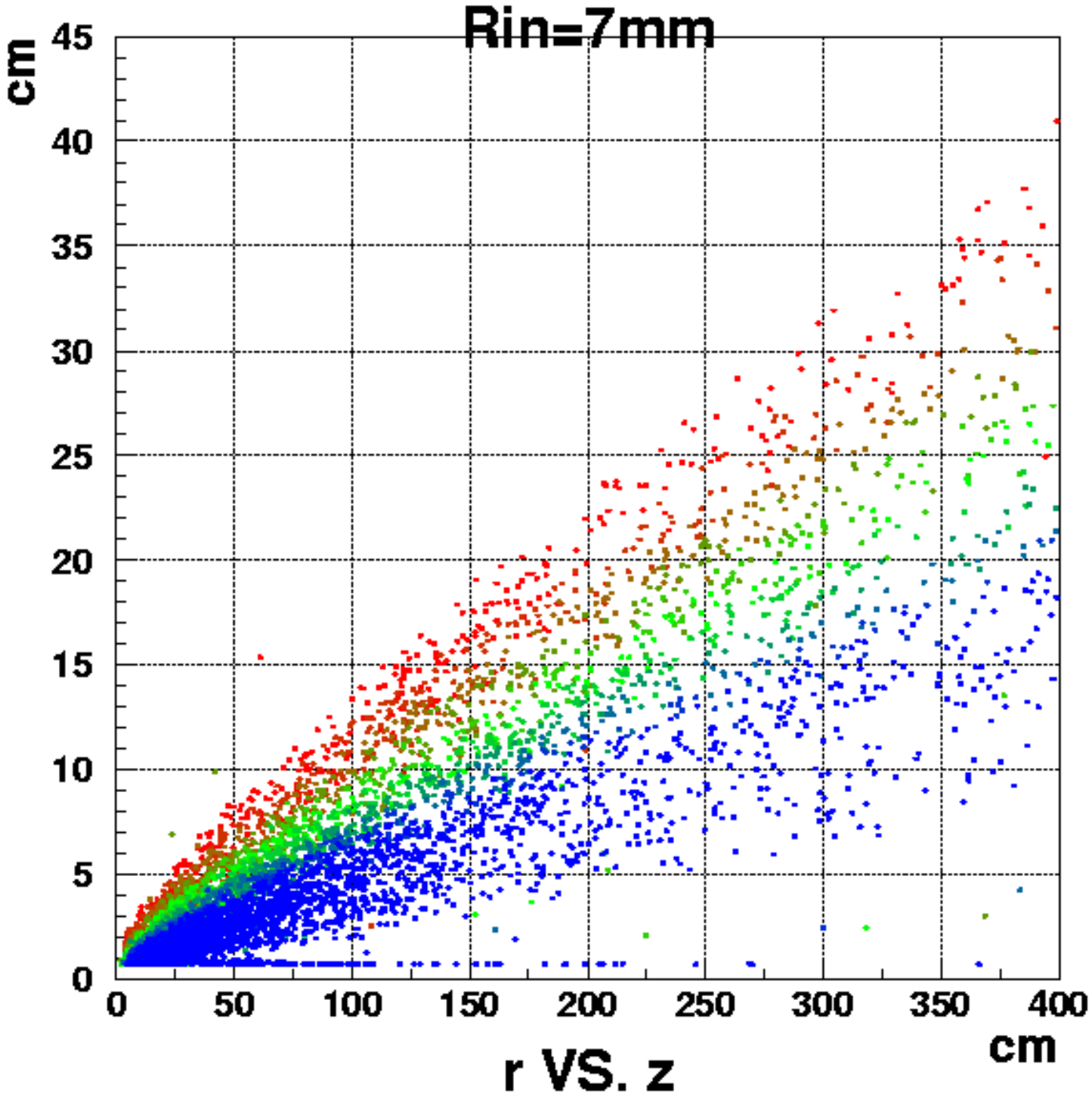
However,

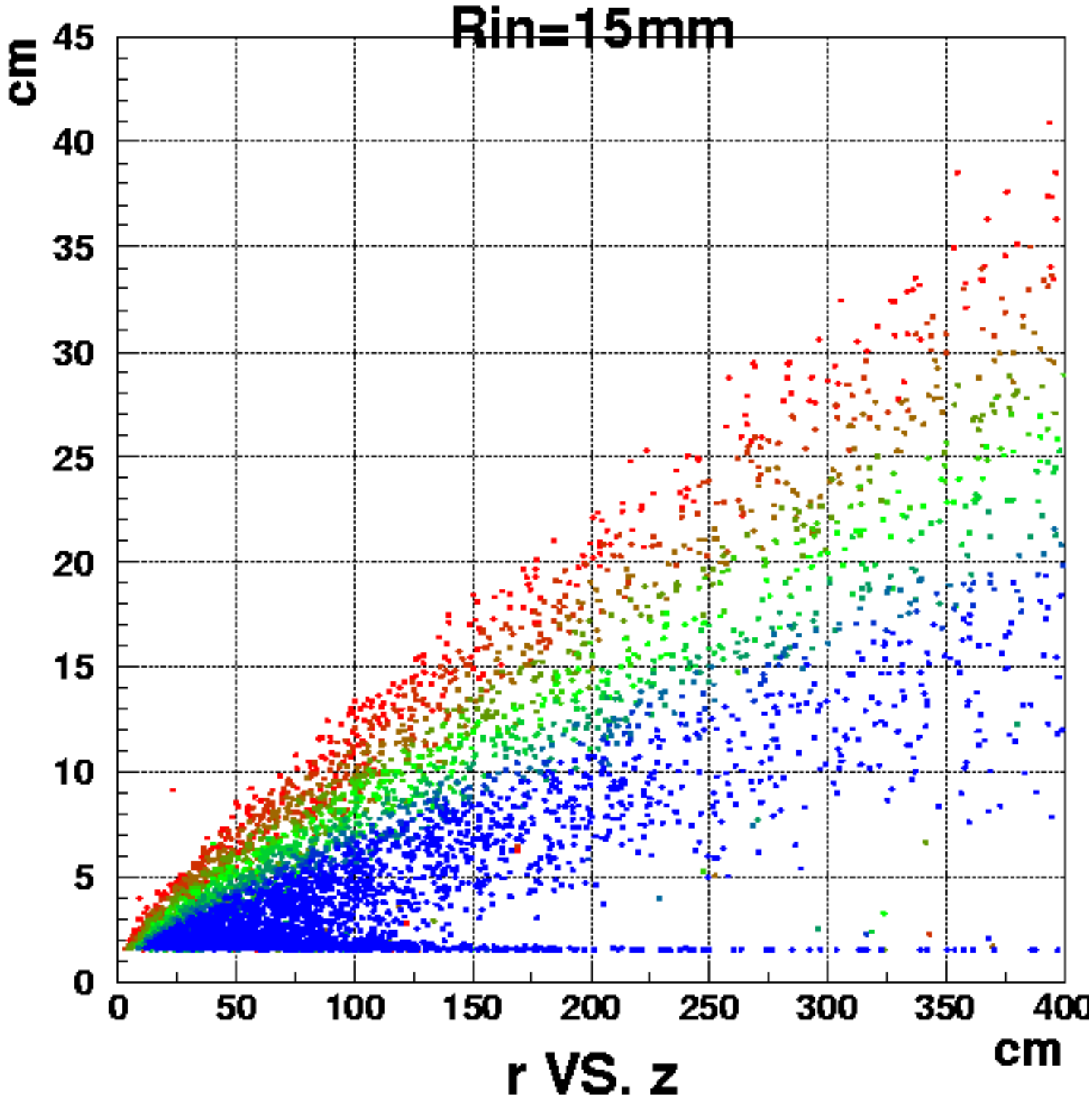
broad flux w/ target

installed upstream



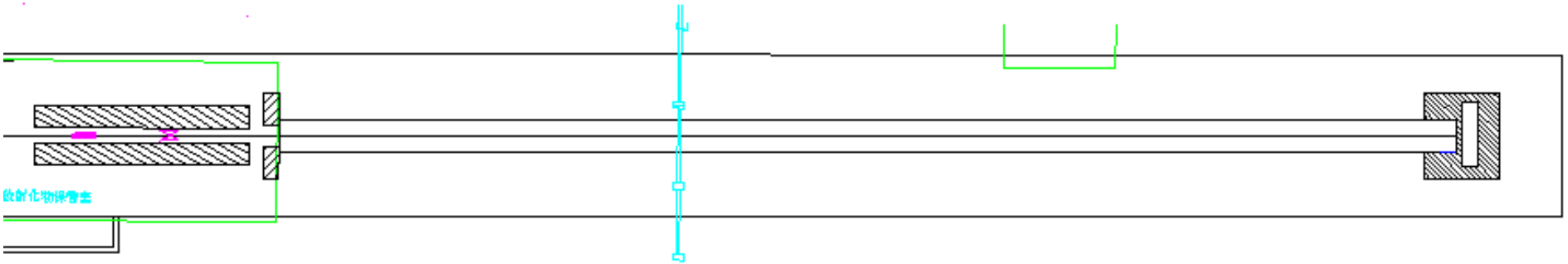

Rin=0mm
cm
35
30
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
cm
r VS. z


Rin=7mm
cm
45
40
35
30
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
cm
r VS. z

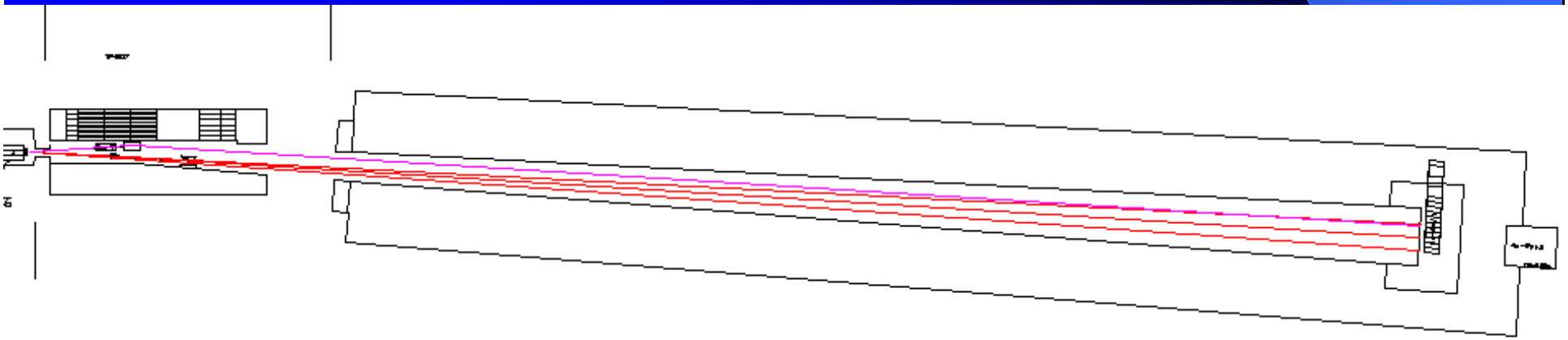

Rin=15mm
cm
45
40
35
30
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
cm
r VS. z

Decay Volume

Top View



Side View



Trapezoidal shape

Summary

Preparation & Arc : 1st ver. of realistic optics

→ Beam plug, halo scraping…

Focusing section & Target station

: concept

(Changeable OAB & Limited NBB)

→ realistic design

Horn & Decay volume : optimization start

→ realistic design

Need study to handle ～1MW beam