IDS120h POWER DEPOSITION AND Hg POOL STUDIES

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Power deposition for IDS120h for different cases of Hg pool:

mars1510/MCNP

>10^{-11} MeV NEUTRON ENERGY CUTOFF

>SHIELDING: 60%WC+40%H_2O

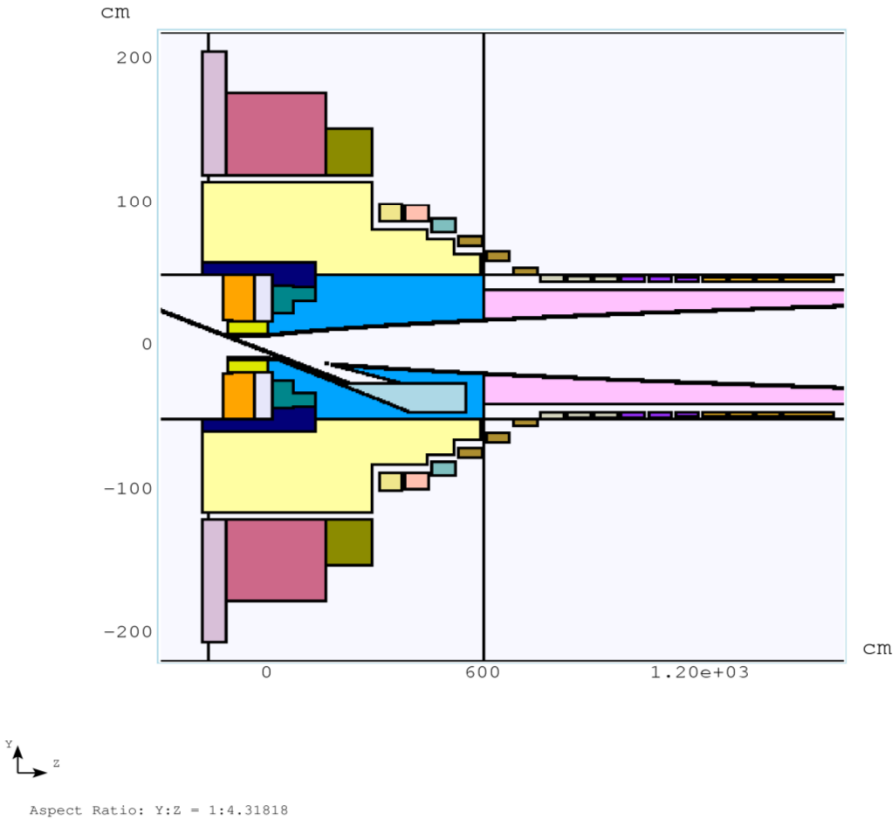
>4 MW proton beam, Np=100,000

>PROTONS ENERGY E=8 GeV.

>GAUSSIAN PROFILE: $\sigma_x=\sigma_y=0.12$ cm.

IDS120g and IDS120h geometries.

IDS120g with water cooling rings around RS coils



IDS120h

SC#1 NOW THE BIGGEST COIL EXTENDED FURTER UPSTREAM

RS FURTER AWAY FROM Hg POOL GAP, JET AND PROTON BEAM

ENERGY DEPOSITED IN SC SOLENOIDS (SC#), SHIELDING (SH#).
P12 OPTIMIZED POINT, POOL WALL CASES x=+/-6,30, 40 cm

NiSn/NiTi	P12(6)	P12(30)	P12(40)
SC#1	0.555	0.460	0.516
SC#2	0.050	0.029	0.041
SC#3	0.012	0.028	0.027
SC#4	0.010	0.005	0.043
SC#5	0.003	0.012	0.017
SC#6	0.001	0.012	0.004
SC#1-6	0.631	0.591	0.684
SC#7-9	0.050	0.045	0.051
SC#10-12	0.049	0.036	0.046
SC#13-15	0.025	0.041	0.032
SC#16-19	0.066	0.061	0.048
SC#1-19	0.821	0.774	0.825

NiSn/NiTi	P12(6)	P12(30)	P12(40)	60/40	P12(6)	P12(30)	P12(40)
SC#1-6	0.631	0.591	0.684	SH#1	920.0	918.0	918.5
SC#7-9	0.050	0.045	0.051	SH#2	1292.5	1091.5	1089.5
SC#10-12	0.049	0.036	0.046	SH#3	33.68	34.42	34.2
SC#13-15	0.025	0.041	0.032	SH#4	43.36	50.4	50.4
SC#16-19	0.066	0.061	0.048	–	–	–	–
SC#1-19	0.821	0.774	0.825	SH#1-5	2289.54	2094.32	2092.6

SC~ SAME DP
SH#2 ~ 200 kW DECREASE IN DP (BLUE AREA)
SH#4~ SMALL INCREASE IN DP (YELLOW AREA)

ENERGY DEPOSITED IN RESISTIVE COILS (RS#), BEAM PIPE (BP#).

Cu	P12(6)	P12(30)	P12(40)	(STST)	P12(6)	P12(30)	P12(40)
RS#1+2	116.70	116.9	115.8	BP#1	205.15	205.55	203.0
RS#3	43.41	43.23	43.82	BP#2	176.25	176.15	175.75
RS#4+5	53.45	53.35	53.55	BP#3	6.20	6.70	6.96
RS#1-5	213.56	213.48	213.17	BP#1-3	387.60	388.40	385.71

RS, BP~ SAME DP

IDS120h:ENERGY DEPOSITED IN OTHER PARTS AND TOTALS.

TOTALS	P12(6)	P12(30)	P12(40)
SC#1-19	0.821	0.774	0.825
SH#1-4	2289.54	2094.32	2092.6
RS#1-5	213.56	213.48	213.17
BP#1-3	387.60	388.40	385.71
RSC	7.24	7.35	7.36
Hg TARG.	407.9	409.35	409.5
Hg POOL	31.24	219.65	228.85
HgP.WALLS		0.953	0.42
Be WIND.	0.861	0.879	0.86
TOTAL	3338.76	3335.17	3353.58

Power Deposited: **SC#1: 0.46 kW,**

SC#2-SC#6: <0.029 kW

SC#1-19: 0.774 kW

Hg POOL~200 kW DP INCRERASE

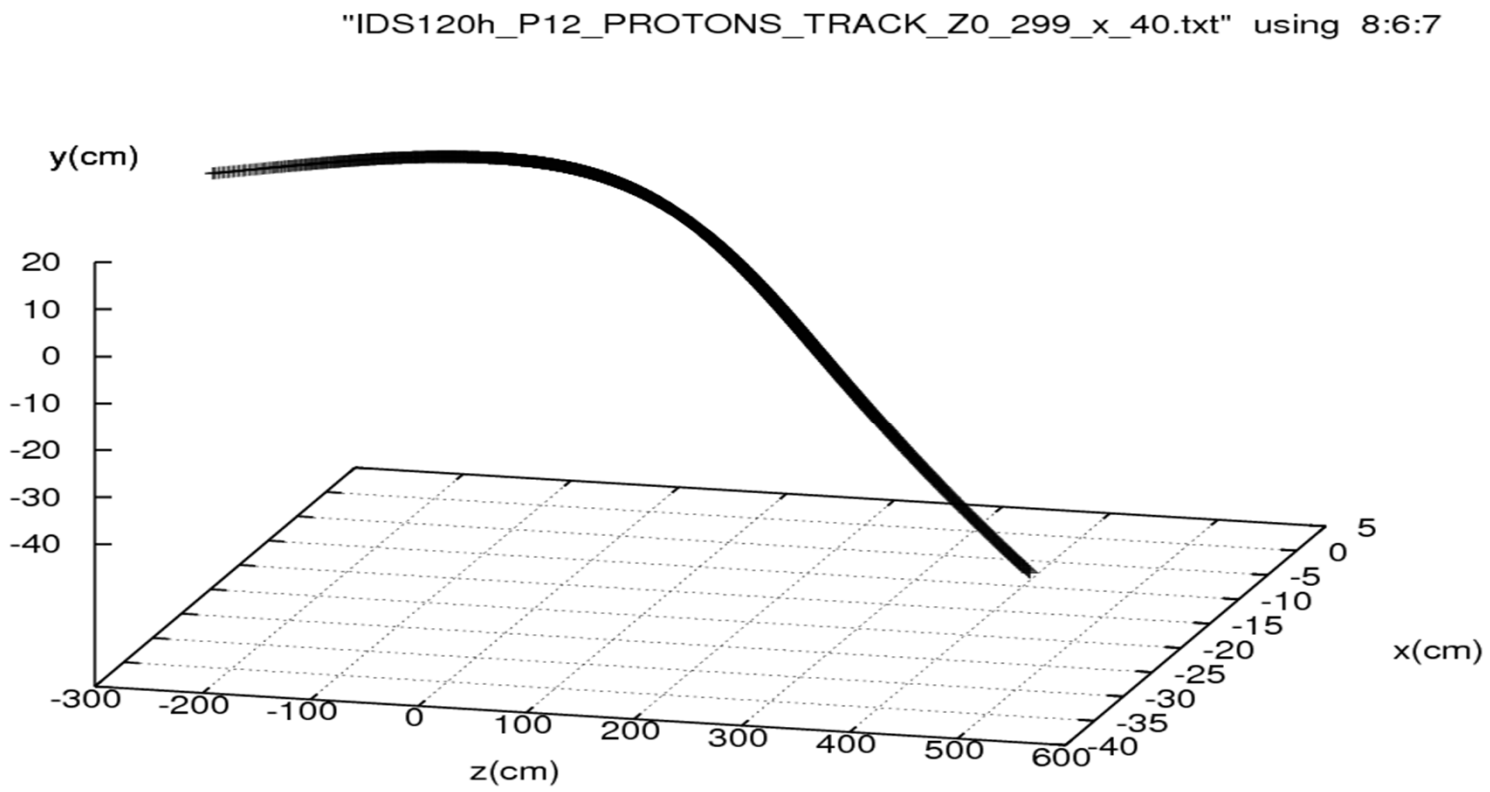
POSSIBLE DECREASE OF IR FOR SC#3-7:

IR SC#3-7:(120,110,100,90,80)---->(90,80,70,60,50)

IDS120h:PROTONS 3D TRAJECTORY FROM Z=-300 cm

USING P12 OPTIMIZED INITIAL POINT WITH POOL WALLS AT x=+/-40 cm,
POOL GAP WALLS AT x=+/-6 cm FOR -15<y<0 cm AND AT x=+/-30 cm FOR -25<y<-15 cm

INITIAL (x,y,z,cx,cy,cz)=(-19.7072, 17.9395, -300.0, 0.087459, -0.0446628, 0.995166)
FINAL (x,y,z,cx,cy,cz)=(-36.8303, -37.4611, 550.0, -0.077835, -0.028829, 0.996549)

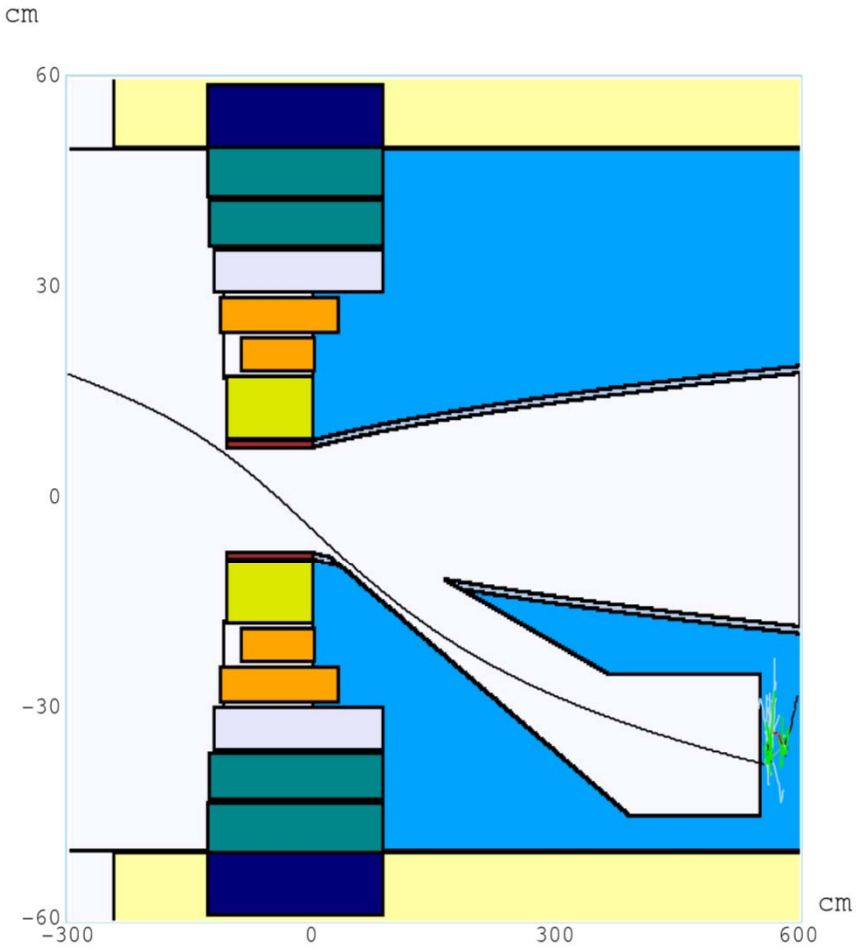


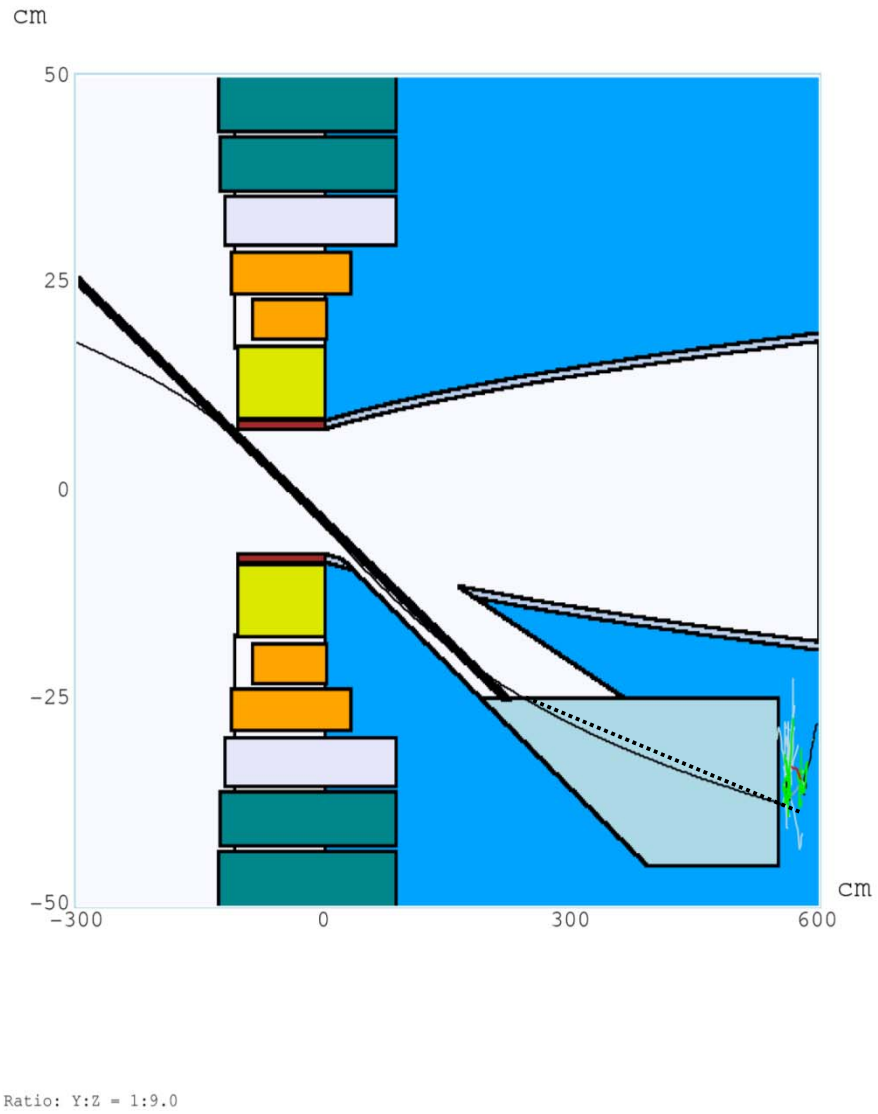
FOR POOL WALLS AT x=+/- 40 cm PROTONS STOPPED BY THE z=550 cm POOL WALL

FOR POOL WALLS AT x=+/- 30 cm PROTONS STOPPED BY THE x=-30 cm POOL WALL

IDS120h:PROTONS TRAJECTORY FROM Z=-300 cm YZ PROJECTION

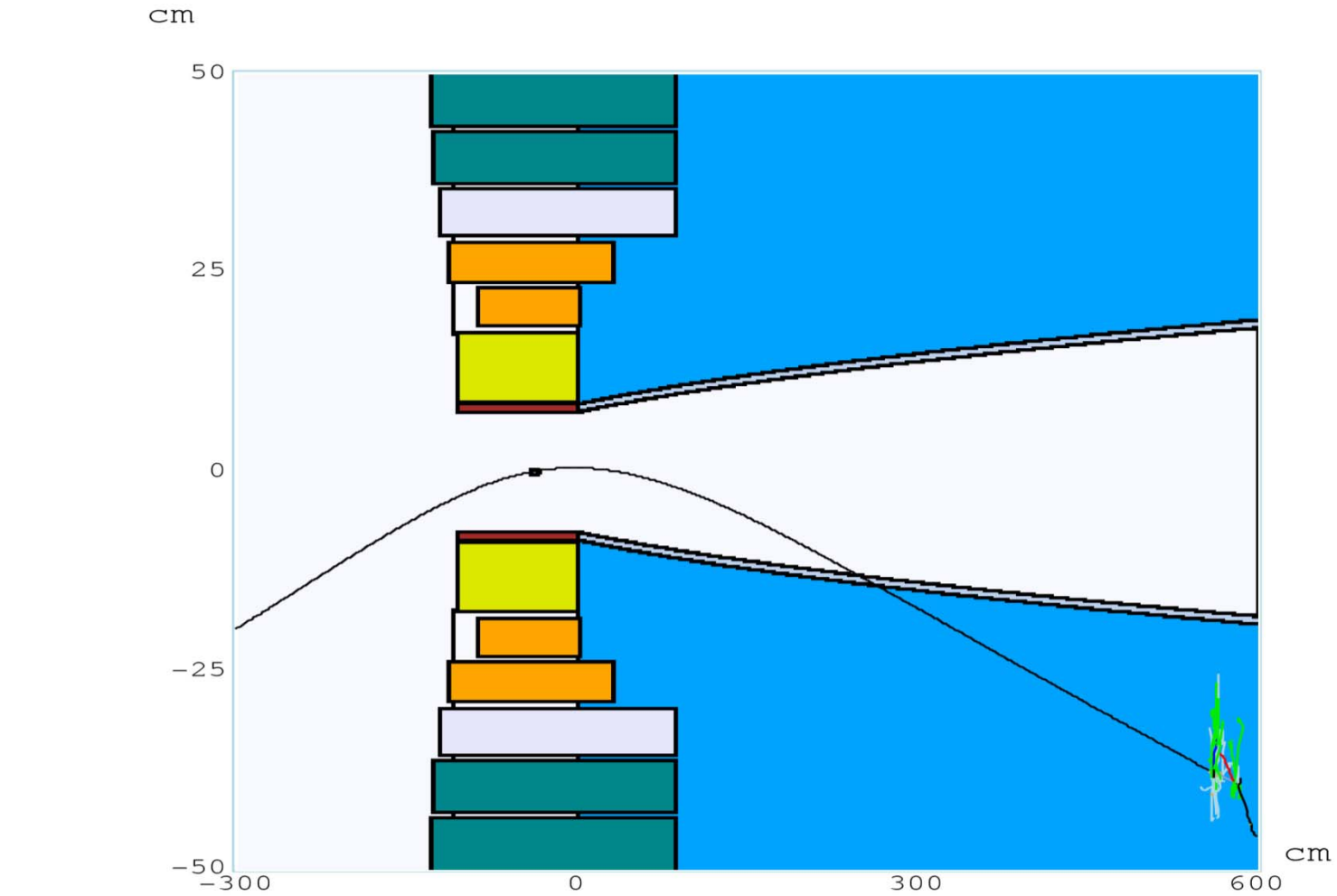
FREE Hg POOL SURFACE y=-25 cm



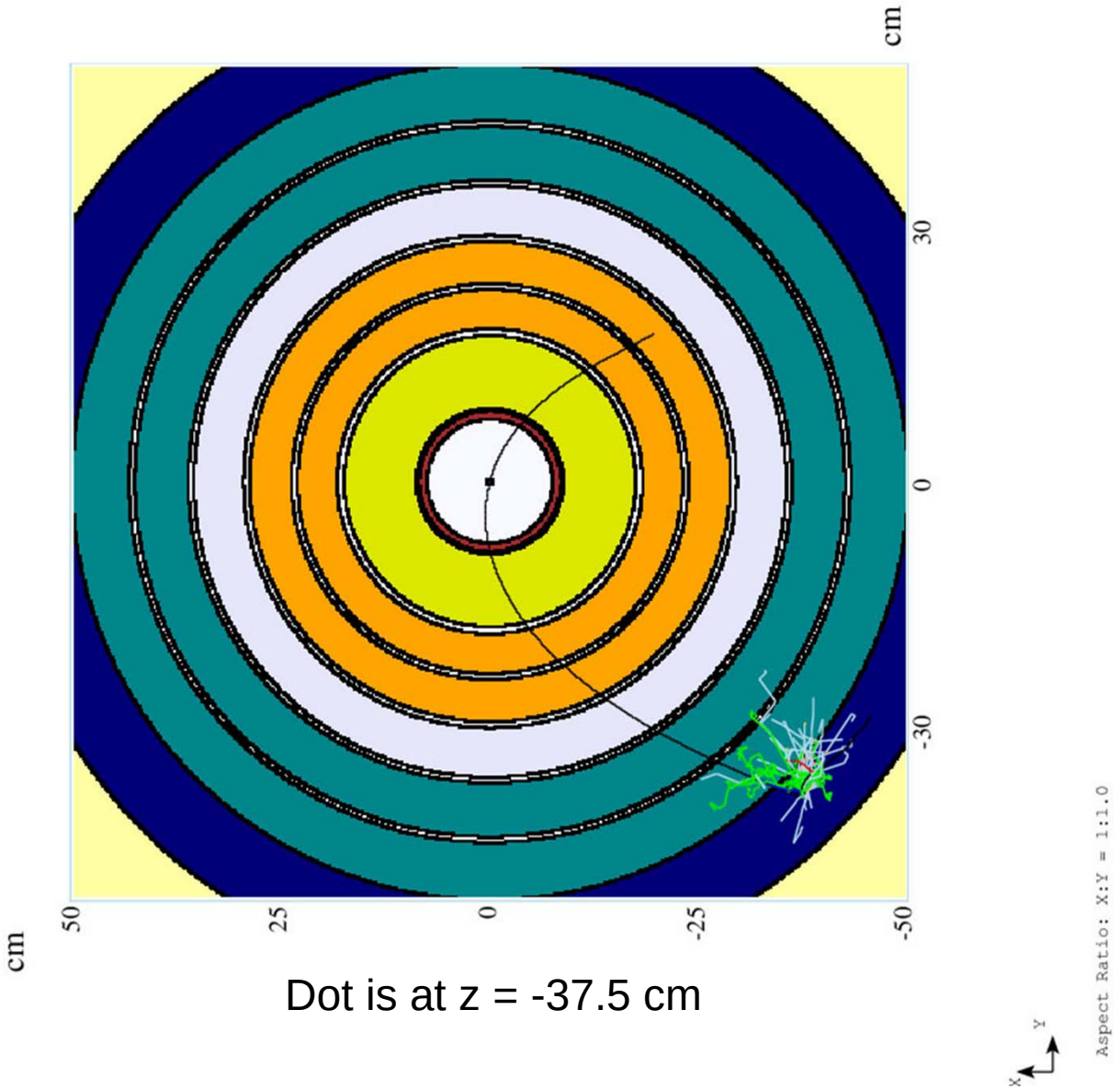


LENGTH OF STRAIGHT LINE: FOR x=+/-30 cm~ 280 cm~19 IL
FOR x=+/-40 cm~ 350 cm~23 IL

IDS120h:PROTONS TRAJECTORY FROM Z=-300 cm XZ PROJECTION



IDS120h:PROTONS TRAJECTORY FROM Z=-300 cm XY PROJECTION



Dot is at z = -37.5 cm

FOR x=+/-40 cm POOL WALLS

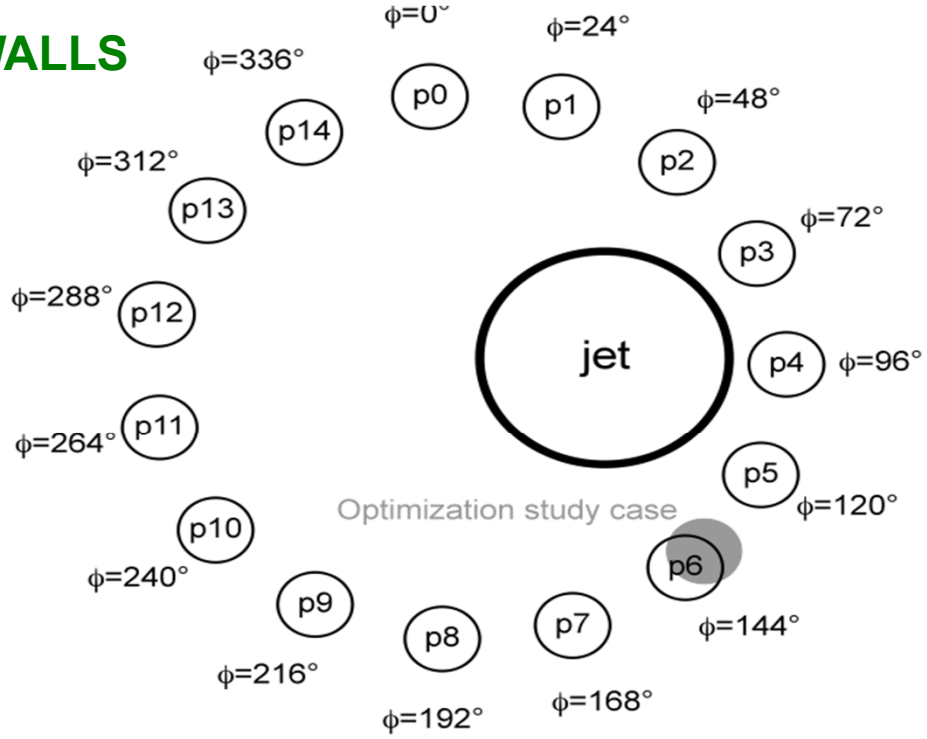


Figure 3: The layout of multiple proton beam entry directions relative to mercury jet at z=-75 cm.

POINTS P0, P13,P14 ARE STOPPED BY THE x=-40 cm WALL.
POINTS P10,P11,P12 ARE STOPPED BY THE z=550 cm WALL.
POINTS P1-P9 HIT THE z2 WALL WITH: z2=-10-15y, -45<y<-25, THIS IS THE INCLINED WALL TO THE RIGHT OF THE Hg POOL.

LEAST FAVORABLE POINTS P6,P7
MOST FAVORABLE POINTS P12, P13
FOR POINT P12:

FOR FREE POOL SURFACE AT y=-20 cm AND x=+/-25 cm #IL>15
x=+/-35 cm #IL>24

FOR FREE POOL SURFACE AT y=-25 cm AND x=+/-30 cm #IL>19
x=+/-40 cm #IL>23