20to2T5m WITH RESISTIVE MAGNETS: C TARGET
C TARGET STATION + C MODULE STUDIES

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20to2T5m WITH RESISTIVE MAGNETS: WITH 10 cm GAPS BETWEEN CRYOSTATS

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C TARGET STATION + BP#1 AZIMUTHAL TDPD SIMULATIONS
[ICEM = 1 MODE SIMULATIONS].

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➡ SIMULATIONS CODE: mars15 (10/14) [USING MCNPDATA x-SECTION LIBRARIES FOR NEUTRON INTERACTIONS WITH KE < 14 MeV]

➡ NEUTRON ENERGY CUTOFF: 10^{-12} GeV

➡ SHIELDING: 60% W + 40% He [WITH STST VESSELS]

➡ B_z (r = 0, z) : 20 T [z = 0.0 cm] ---→ 2.0 T [z ~ 500.0 cm]

➡ C ROD RADIUS / ANGLE: 0.58 cm / 59 mrads (~ 3.38 degrees) [-37.5 < z < 37.5 cm]
C density = 2.26

➡ PROTON BEAM POWER: 4.0 MW

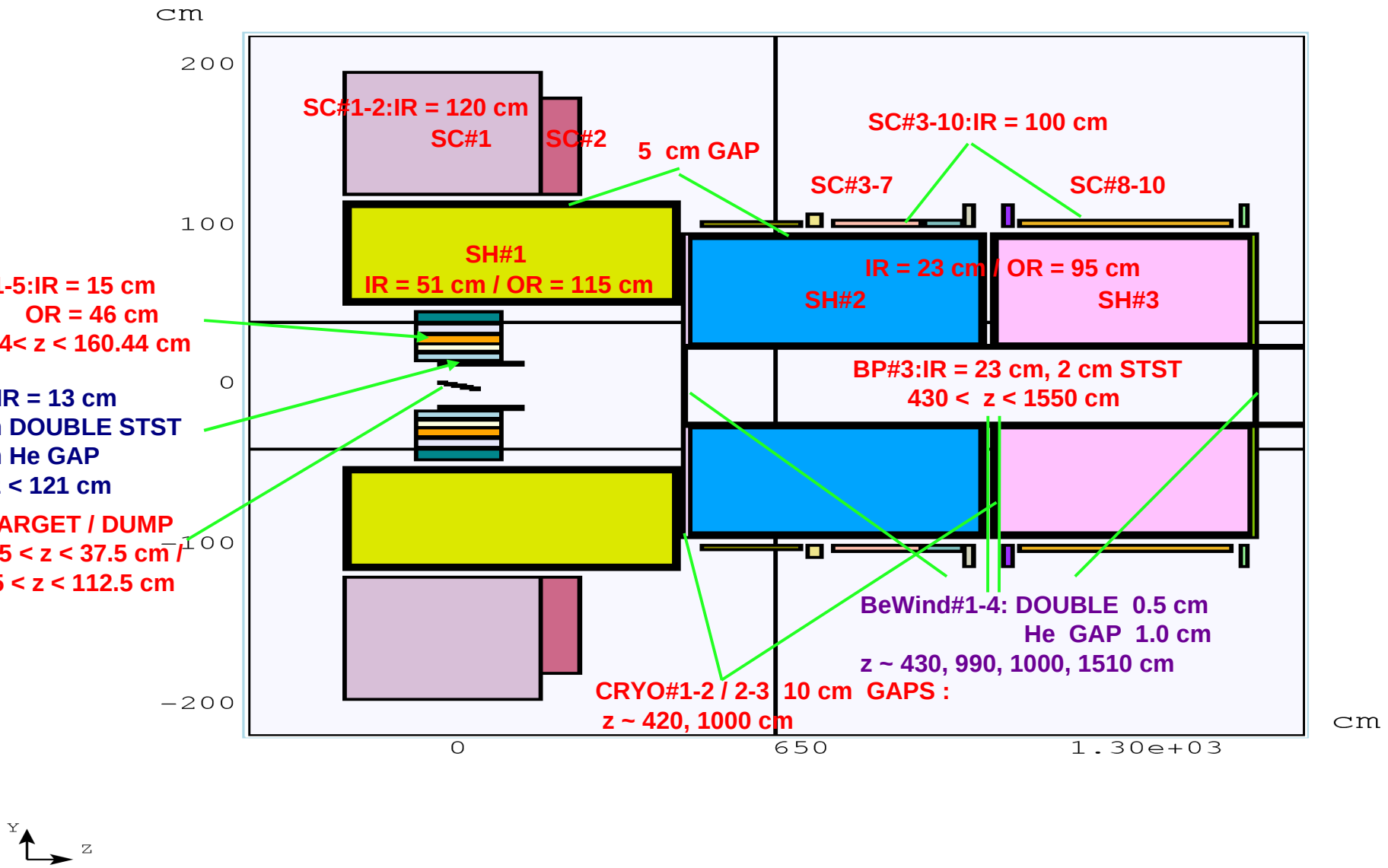
➡ PROTON ENERGY: E = 6.75 GeV (Kinetic energy)

➡ PROTON BEAM PROFILE : GAUSSIAN, $\sigma_x = \sigma_y$ = 0.2588 cm [5 micron emmitance]

➡ PROTON BEAM LAUNCH : (xo, yo, zo) = (-2.02835, 5.44336, -100.0) cm
(dcxo, dcyo, dczo) = (0.035168, -0.045786, -0.998332)

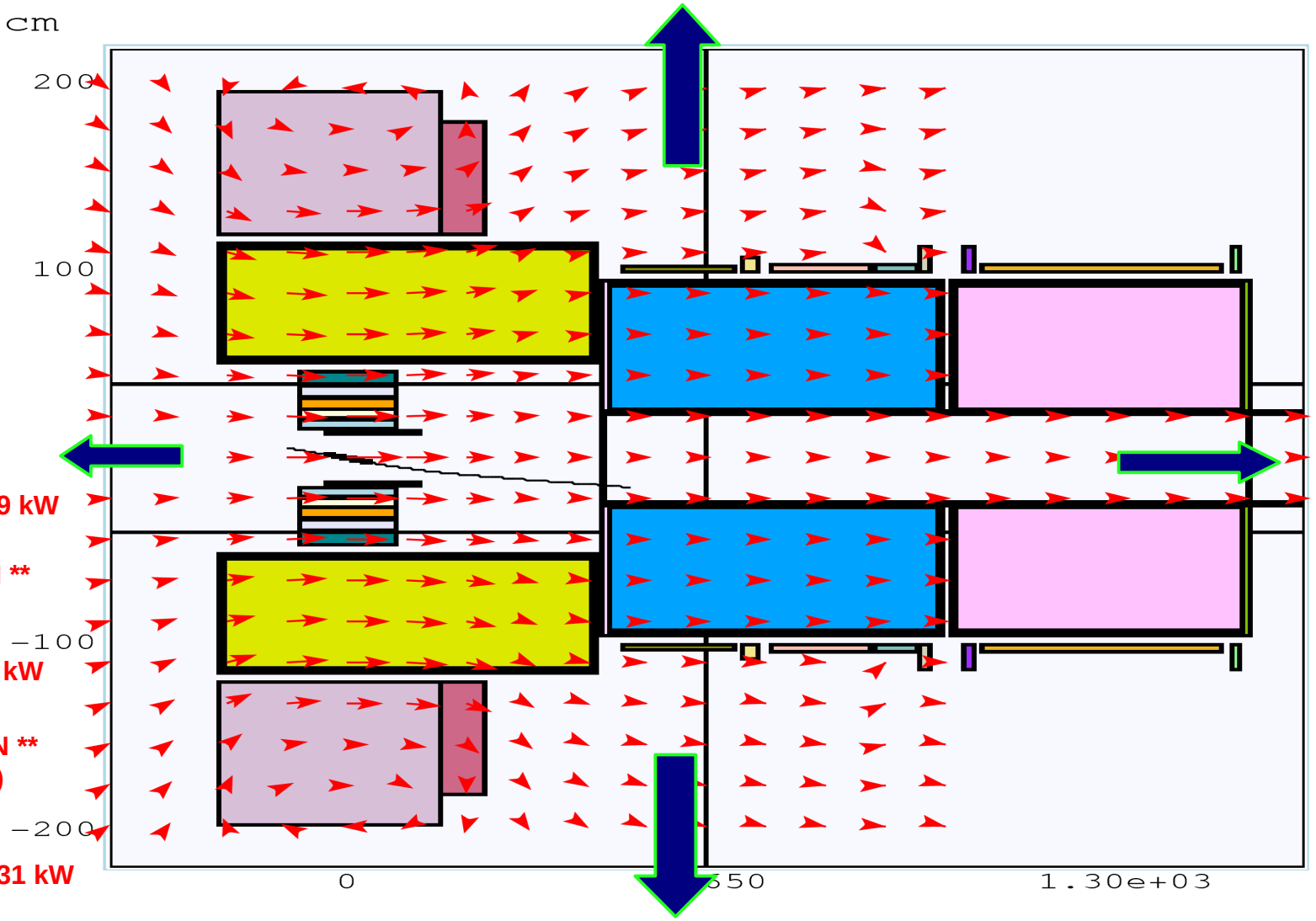
➡ EVENTS IN SIMULATIONS : N_p = 2E5 / 3E5 (STEP:10^-2 / 10^-3 / 10^-4)

20to2T5m: yz CROSS SECTION (x = 0.0 cm) WITH GEOMETRY DIMENSIONS / PARAMETERS.



20to2T5m : yz CROSS SECTION (x = 0.0 cm) WITH B FIELD MAP AND CENTROID TRAJECTORY WITHOUT C TARGET / DUMP PRESENT . THE BEAM WILL REACH THE CRYO#1 UPSTREAM Be WINDOW (AT z ~ 430 cm) NEAR THE BOTTOM AREA. POWER LEAK FLOW mars1510/mars1514.

[z = - 200.0 , 1500.0 cm, R = 210.0 cm SURFACE DETECTORS].



z = - 200.0 cm
TOT ~ 155 kW
p:21 kW / n:109 kW

** PRINCETON **
z = - 200.0 cm
TOT ~ 130 kW
p:26 kW / n:88 kW

** PRINCETON **
(NO MASS)
z = - 200.0 cm
TOT ~ 8.53 kW
p:1.7 kW / n:0.31 kW

z = 1500 cm
TOT ~ 380 kW
p:166 kW / n:37 kW

** PRINCETON **
z = 1500.0 cm
TOT ~ 338 kW
p:152 kW / n:32 kW

** PRINCETON **
(NO MASS)
z = 1500.0 cm
TOT ~ 221 kW
p:85 kW / n:8 kW

R = 210.0 cm
TOT ~ 260 kW
p:1 kW / n:187 kW

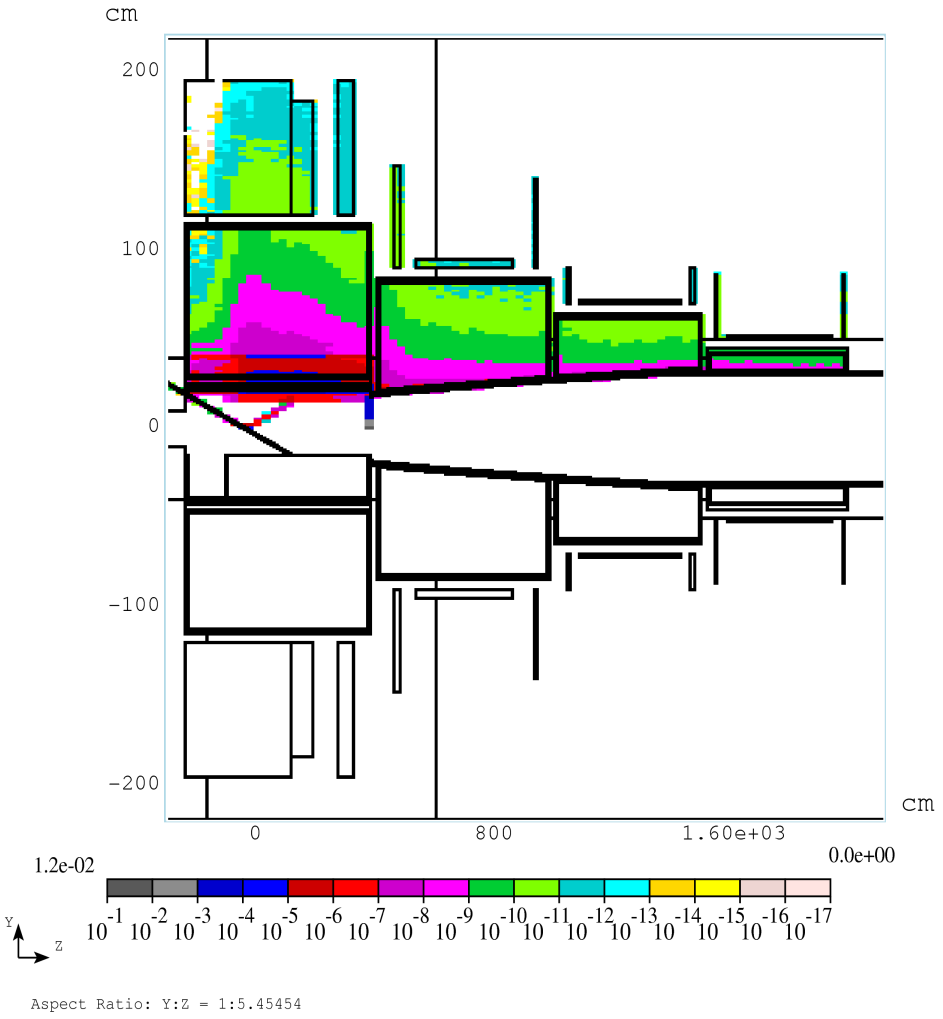
** PRINCETON **
R = 210.0 cm
TOT ~ 263 kW
p:2 kW / n:203 kW

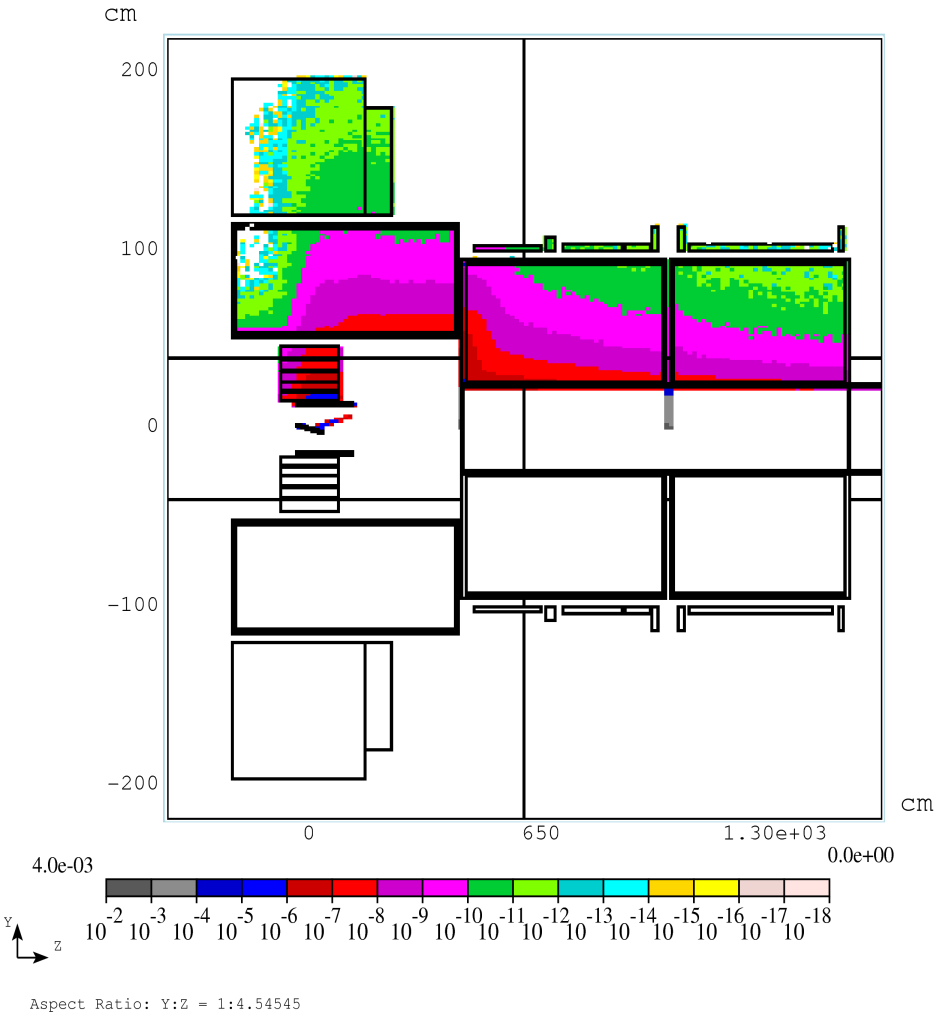
** PRINCETON **
(NO MASS)
R = 210.0 cm
TOT ~ 66 kW
p:0.3 kW / n:8 kW

Y
Z

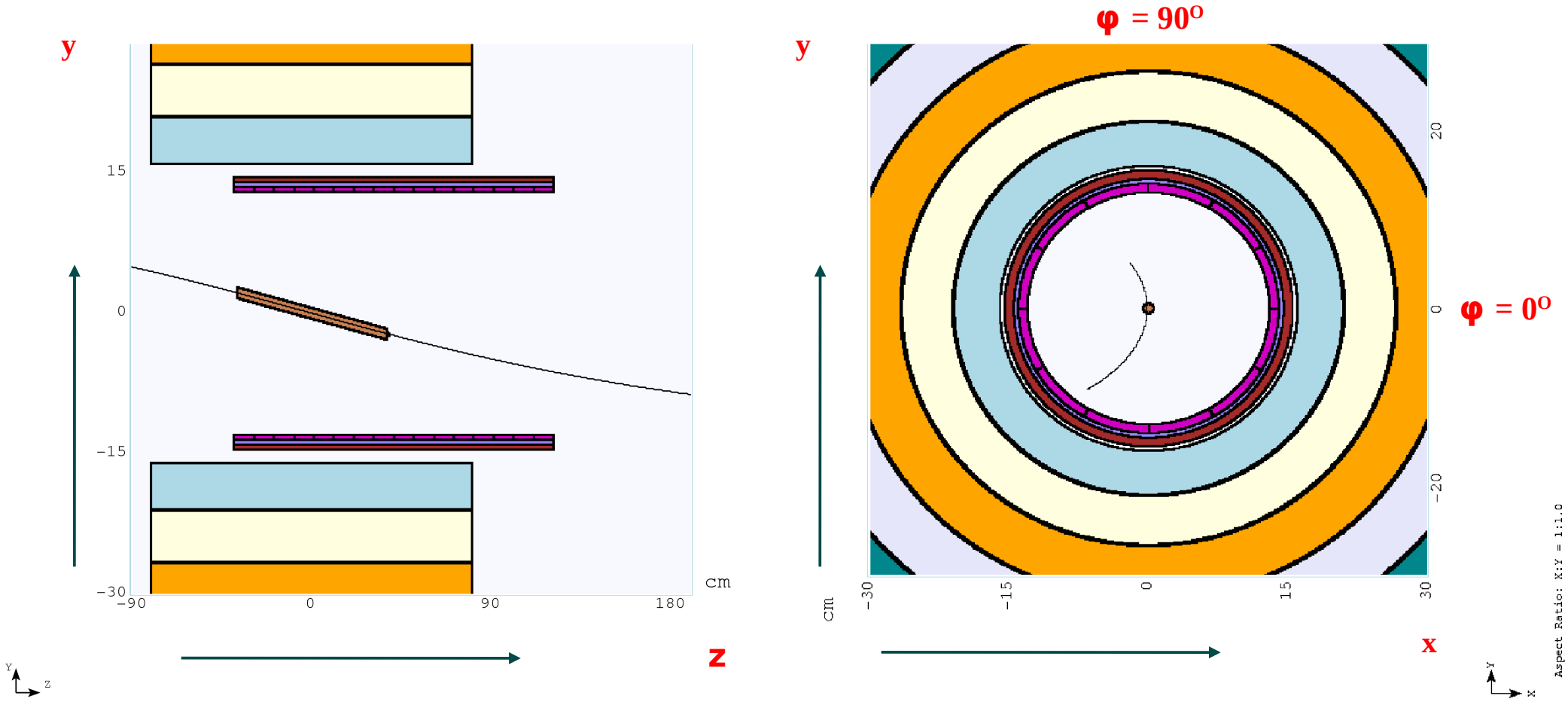
Aspect Ratio: Y:Z = 1:4.54545

IDS120j, 20to2T5m: yz CROSS SECTION (x = 0.0 cm) WITH AZIMUTHALLY AVERAGE TDPD DISTRIBUTION IDS120j WITH Hg TRGT (LEFT) AND 20to2T5m WITH C TRGT (RIGHT)





BP#1 SEGMENTATION DETAILS : yz AT x = 0.0 cm [LEFT] AND xy AT z = 0.0 cm [RIGHT]
CROSS SECTION WITH SEGMENTATION DETAILS OF INNER TUBE.



$13.0 < r < 13.5$ cm $dr = 0.5$ cm $N_r = 1$ bins

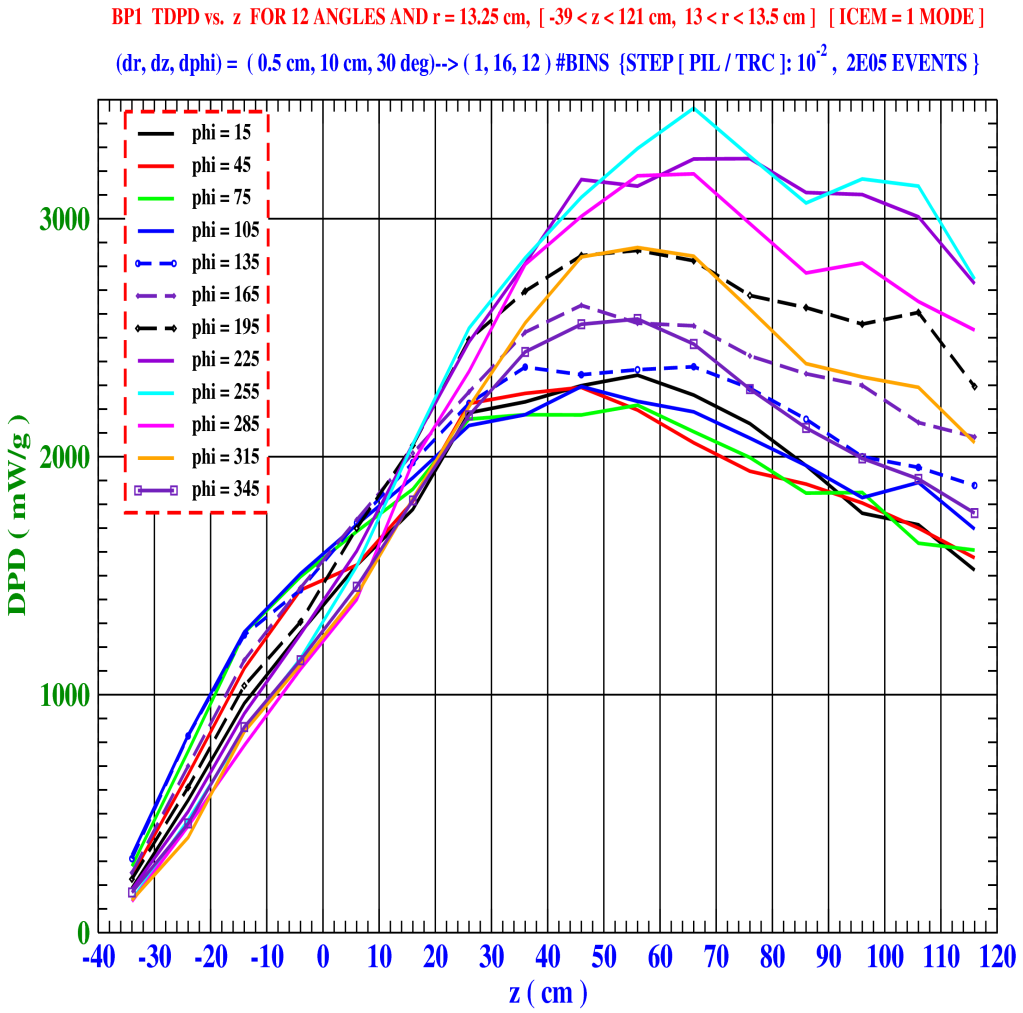
$-39.0 < z < 121.0$ cm $dz = 10.0$ cm $N_z = 16$ bins

$0.0 < \varphi < 360.0$ deg. $d\varphi = 30$ deg. $N_\varphi = 12$ bins

$N_{tot} = 192$ "pieces"

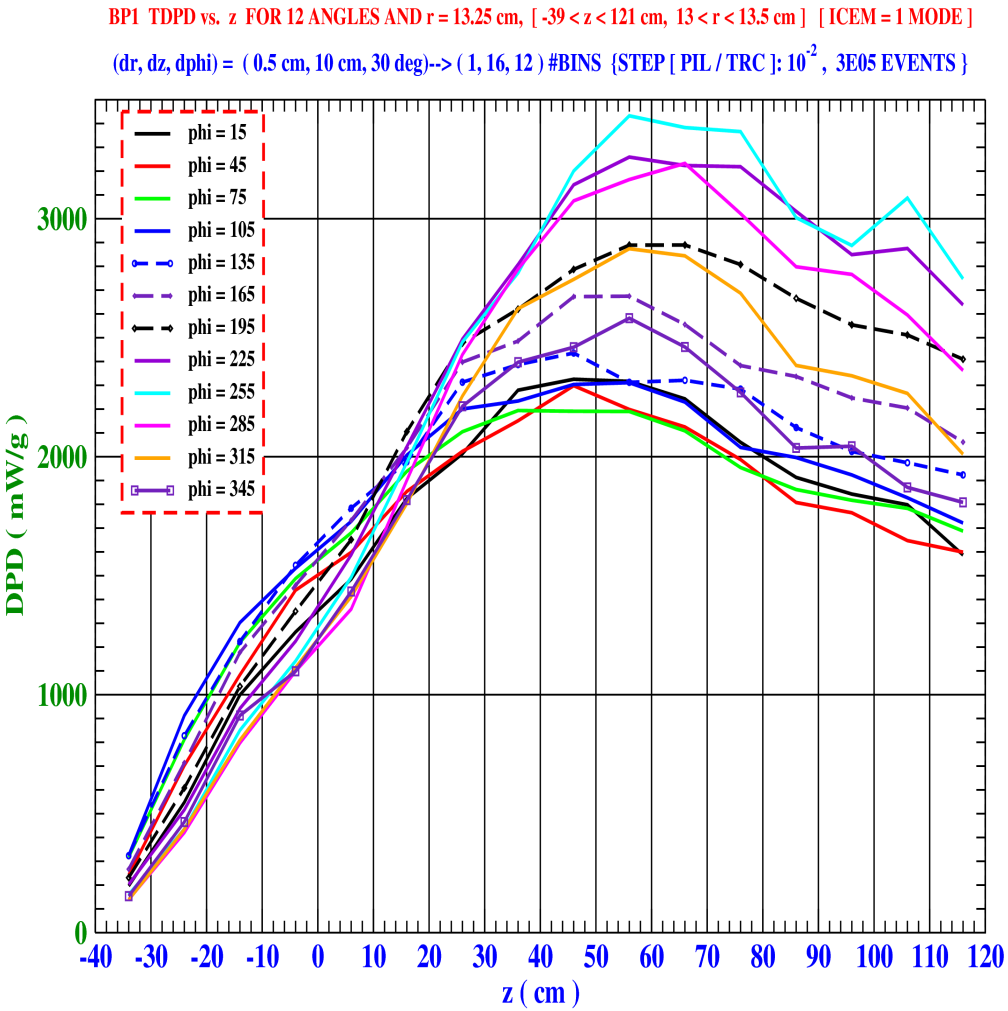
BP#1 : TDPD AZIMUTHAL DISTRIBUTION FOR 12 ANGLES FROM mars1510 (DESKTOP)

N= 200,000 STEP =0.01 cm



PEAK: 3464.28 mW/g (r, z, phi) = (13.25 66.0 255)
TDP: 101.41 kW (PIECES) vs. 113.48 kW (TUBE 2)

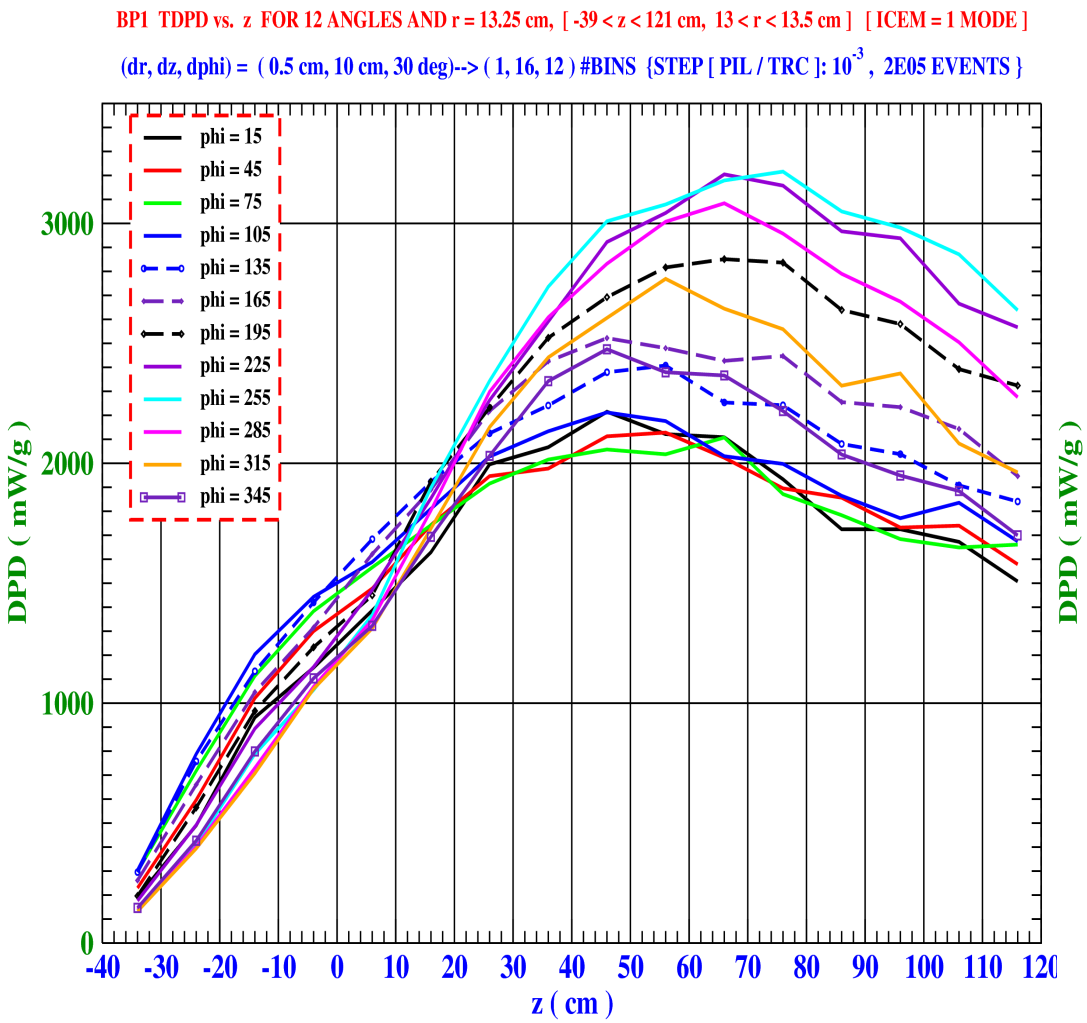
N=300,000 STEP= 0.01 cm



PEAK: 3432.28 mW/g (r, z, phi) = (13.25 56.0 255)
TDP: 101.407 kW (PIECES) vs. 112.83 kW (TUBE 2)

BP#1 : TDPD AZIMUTHAL DISTRIBUTION FOR 12 ANGLES FROM mars1510 (DESKTOP)

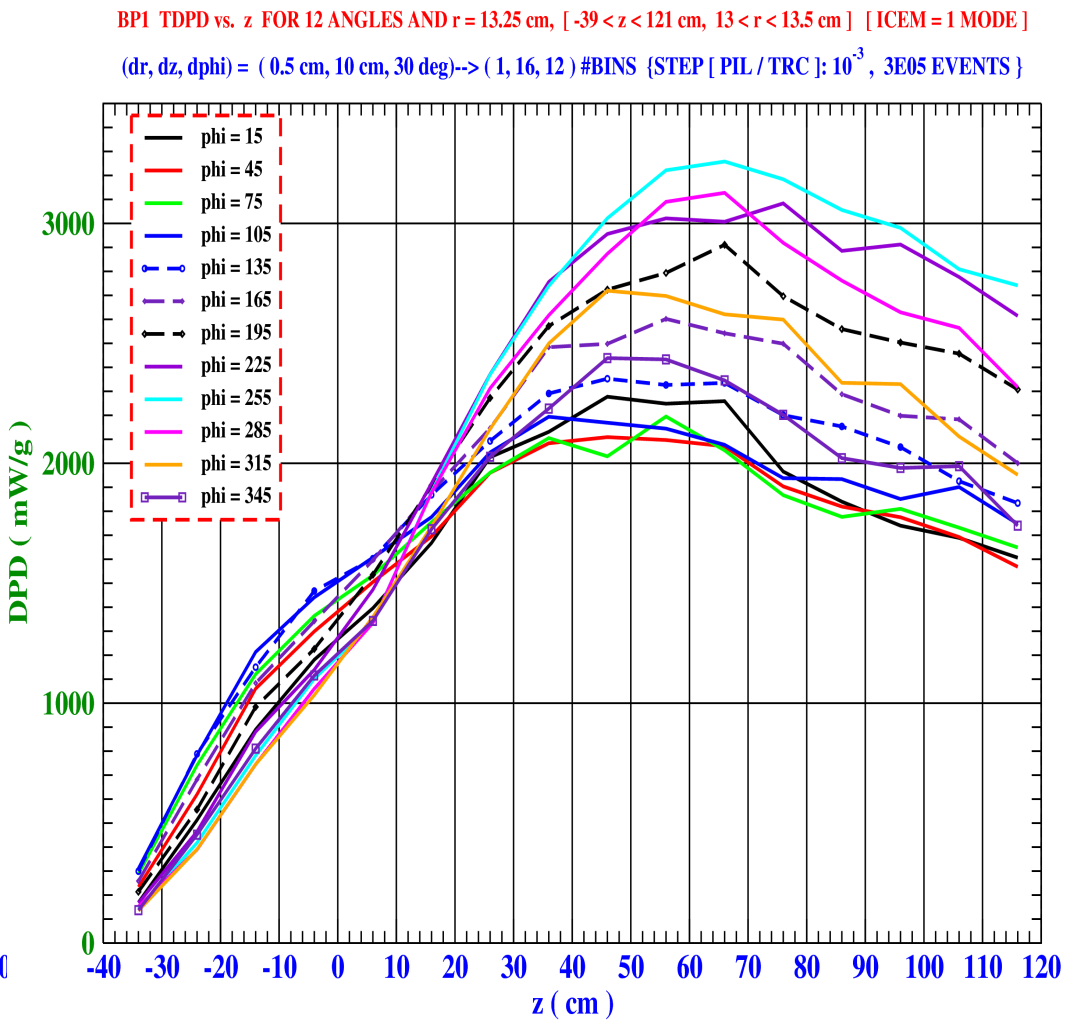
N= 200,000 STEP =0.001 cm



PEAK: 3215.99 mW/g (r, z, phi) = (13.25 76.0 255)

TDP: 96.51 kW (PIECES) vs. 113.54 kW (TUBE 2)

N=300,000 STEP= 0.001 cm

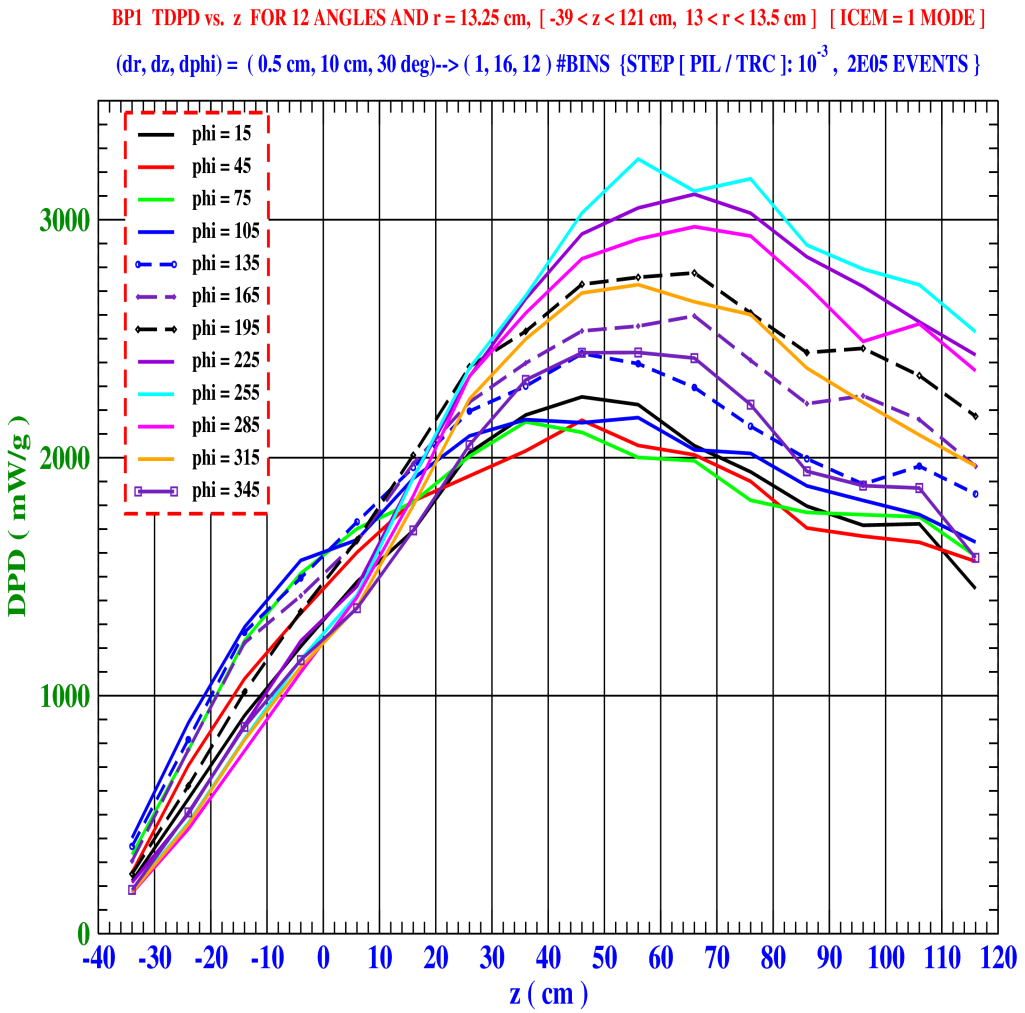


PEAK: 3258.06 mW/g (r, z, phi) = (13.25 66.0 255)

TDP: 97.28kW (PIECES) vs. 114.31 kW (TUBE 2)

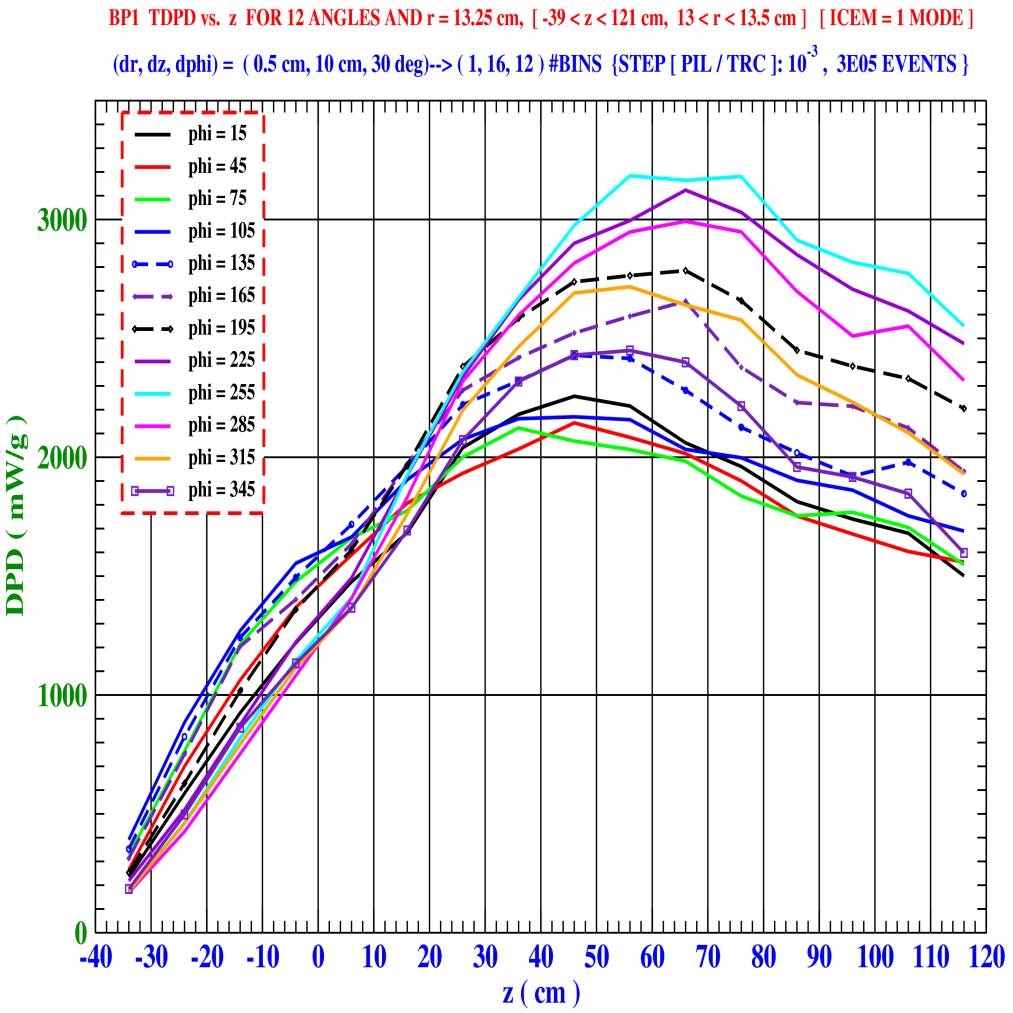
BP#1 : TDPD AZIMUTHAL DISTRIBUTION FOR 12 ANGLES FROM mars1514 (PRINCETON)

N= 200,000 STEP =0.001 cm



PEAK: 3255.1 mW/g (r, z, phi) = (13.25 56.0 255)
TDP: 97.31 kW (PIECES) vs. 108.86 kW (TUBE 2)

N=300,000 STEP= 0.001 cm



PEAK: 3183.99 mW/g (r, z, phi) = (13.25 56.0 255)
TDP: 97.21kW (PIECES) vs. 108.74 kW (TUBE 2)

mars1510: 2E5 / 3E5 ~ 22 - 24 HRS VS. mars1514: *~22 - 25 HRS { ONE DIRECTORY }* [BOTH:MCNP, ICEM =1]

JOB IN PRINCETON DEPENDS ALSO ON QUE / WAITING TIME. mars1514 + new Princeton cluster much faster than mars1512

>>>CASE: (Np / STEP): (m1510)[2E5 / 1E-2 ** 3E5 / 1E-2 ** 2E5 / 1E-3 ** 3E5 / 1E-3] (m1514)[2E5 / 1E-3 ** 3E5 / 1E-3]

******* DEPOSITED POWER IN DIFFERENT PARTS OF THE TARGET STATION IN kW *******

A)	SC#1:	0.807	0.796	0.812	0.818	1.575	1.569	SC#6: 0.004	0.003	0.004	0.003	0.006	0.006
	SC#2:	0.339	0.347	0.351	0.334	0.665	0.668	SC#7: 0.003	0.003	0.003	0.003	0.004	0.006
	SC#3:	0.140	0.130	0.141	0.129	0.226	0.227	SC#8: 0.005	0.005	0.002	0.004	0.009	0.008
	SC#4:	0.011	0.010	0.009	0.011	0.024	0.021	SC#9: 0.008	0.006	0.008	0.007	0.014	0.013
	SC#5:	0.015	0.015	0.015	0.015	0.030	0.030	SC#10: 0.002	0.002	0.002	0.002	0.002	0.002
	TOTAL DP SC#1-10:		1.335	1.317	1.347	1.325	2.558	2.550					

B) DP IN RS COILS	RS#1 :	504.89	502.28	502.10	505.30	499.26	499.02
	RS#2 :	190.58	190.81	190.99	191.11	198.87	199.35
	RS#3 :	89.48	88.89	88.95	89.36	97.96	98.37
	RS#4 :	49.51	49.55	49.46	49.53	56.75	57.13
	RS#5 :	27.37	27.54	27.42	27.45	32.70	32.87
	TOTAL:	861.83	859.07	858.93	862.76	885.53	886.73

Deposited power = kinetic energy/sec

C) DP IN SHIELDING	SH#1 :	343.88	343.41	342.52	342.75	393.36	392.71
	SH#2 :	890.66	895.40	895.40	889.48	954.07	953.48
	SH#3 :	42.54	42.44	42.60	43.03	46.35	46.55
	TOTAL :	1277.08	1281.26	1280.52	1275.27	1393.78	1392.73

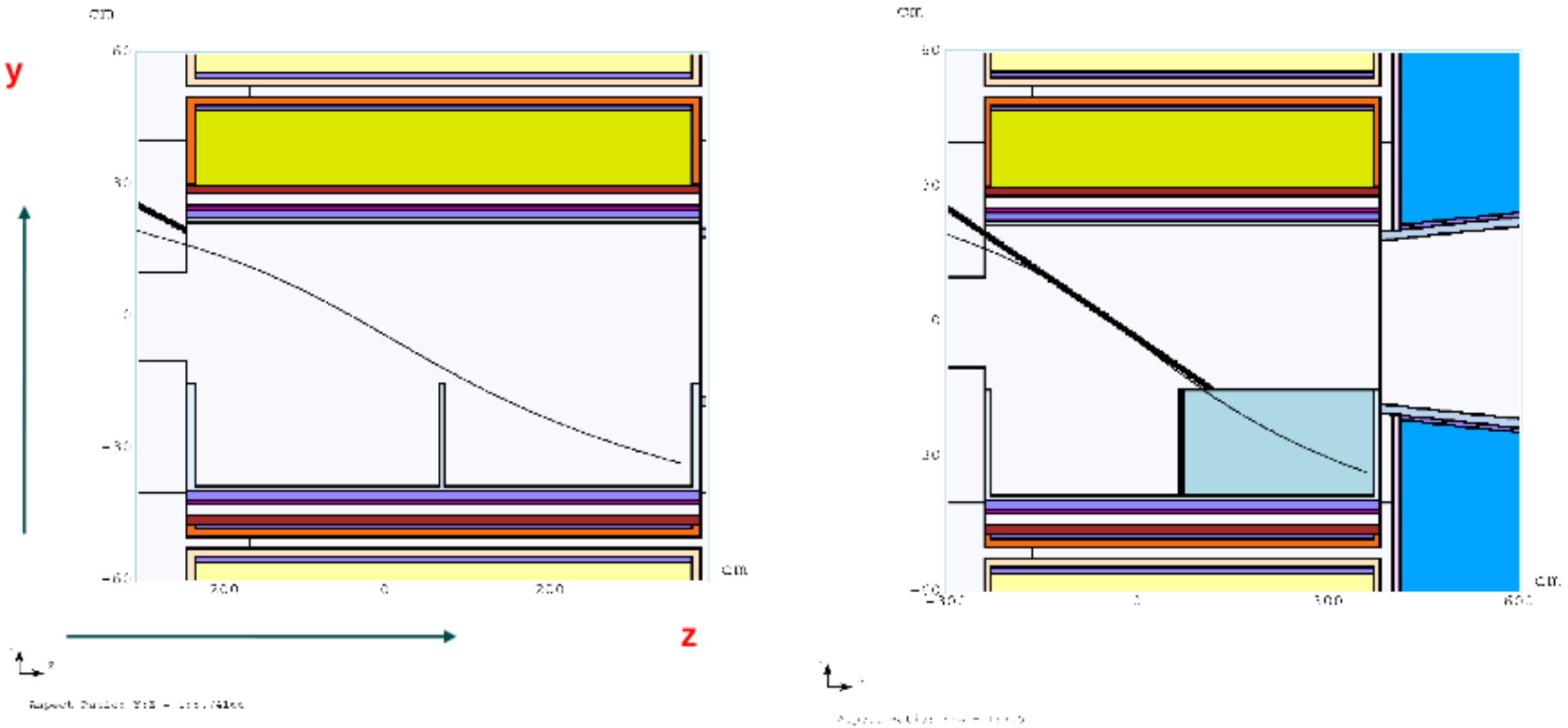
D) DP IN VESSELS	SHVS#1 :	130.61	129.42	130.90	130.61	131.79	131.56
	SHVS#2 :	174.58	173.75	172.98	173.10	171.02	170.43
	SHVS#3 :	3.05	3.07	3.05	3.10	3.35	3.29
	TOTAL:	308.24	306.24	306.93	306.8 0	306.16	305.28

E) DP IN	C TRGT :	114.43	114.43	114.07	114.01	108.03	107.97
DP IN	C DUMP :	7.60	7.60	7.54	7.52	7.03	7.02

F) DP IN	Be WINDOW 1:	3.24	3.23	3.20	3.19	3.08	3.08
DP IN	Be WINDOW 2:	1.74	1.76	1.70	1.71	1.64	1.64
DP IN	Be WINDOW 3:	1.65	1.66	1.60	1.61	1.50	1.51
DP IN	Be WINDOW 4:	1.40	1.40	1.34	1.34	1.43	1.53

TOTAL DP :	3,122.33	3,122.49	3,115.65	3,116.51	3,231.13	3,229.81

IDS120j: yz CROSS SECTION WITH THE PROTON BEAM CENTROID P12 TRAJECTORY SHOWING (RIGHT) AND WITHOUT SHOWING (LEFT) THE Hg POOL AND Hg JET.



PROTONS ENTER THE Hg POOL AT (x, y, z) ~ (- 1.61, -15.00, 104.66) cm AND WILL BE STOPPED BY THE SIDE (SEMICIRCULAR) WALL AT (x, y, z) ~ (-19.39, -33.26, 358.80) cm (~ 10 cm BEFORE THEY REACH THE RIGHT SIDE FLANGE OF Hg MODULE) COVERING A DISTANDE ~ 255.41 cm ~ 17 IL (1 IL ~ 15 cm).
IS IT POSSIBLE FOR POOL TO BE SORTER AND FILL THE REST OF THE UPSTREAM VOLUME WITH SHIELDING ?

NOTICE : R1, HU (HL ?) DIMENSIONS OF Hg MODUL ARE DETERMINED FROM THE SPACE NEEDED FOR THE PROTON BEAM TRAJECTORY. DIFFERENT INJECTION POINTS WILL PROBABLY REQUIRE DIFFERENT VALUES FOR THESE PARAMETERS.

IDS120j: yx (AT z = 200 cm) (LEFT) AND xz (RIGHT) CROSS SECTION WITH THE PROTON BEAM CENTROID P12 TRAJECTORY.