IDS120j WITHOUT RESISTIVE MAGNETS: NEW Hg MODULE

MARS1510 (DESKTOP) *vs.* MARS1512 (PRINCETON CLUSTER)

Nicholas Souchlas (PBL) and Xiaoping Ding (UCLA)

(4/25/2012)

IDS120j GEOMETRY, NO RESISTIVE MAGNETS: WITH 20 cm GAPS BETWEEN CRYOSTATS

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 # MODIFIED Hg MODULE SIMULATES VAN GRAVE'S DESIGN.

A SYSTEMATIC COMPARISON BETWEEN mars1510 (DESKTOP) AND mars1512 (CLUSTER).

TARGET STATION POWER DISTRIBUTION AND SC#1 + SC#2 SEGMENTATION STUDIES FROM 1E5 / 5E5 / 4x5E5 / 5E6 EVENTS SIMULATIONS USING mars1510 (DESKTOP) AND mars1512 (PRINCETON CLUSTER). Ding Xiaoping SET UP THE 5E6 EVENT SIMULATIONS IN THE CLUSTER, (100 SUBDIRECTORIES, 5E4 EVENTS EACH).

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LAST PRESENTATION WAS RUSHED, INCOMPLETE WITH SOME ERRORS. THE SAME MATERIAL IS INCLUDED IN THIS PRESENTATION WITH CORRECTED COMMENTS.

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>SIMULATIONS CODE: mars1510 / mars1512 (USING MCNP CROSS SECTION LIBRARIES)

>NEUTRON ENERGY CUTOFF: 10^{-11} MeV

>SHIELDING: 60% W + 40% He (WITH STST VESSELS)

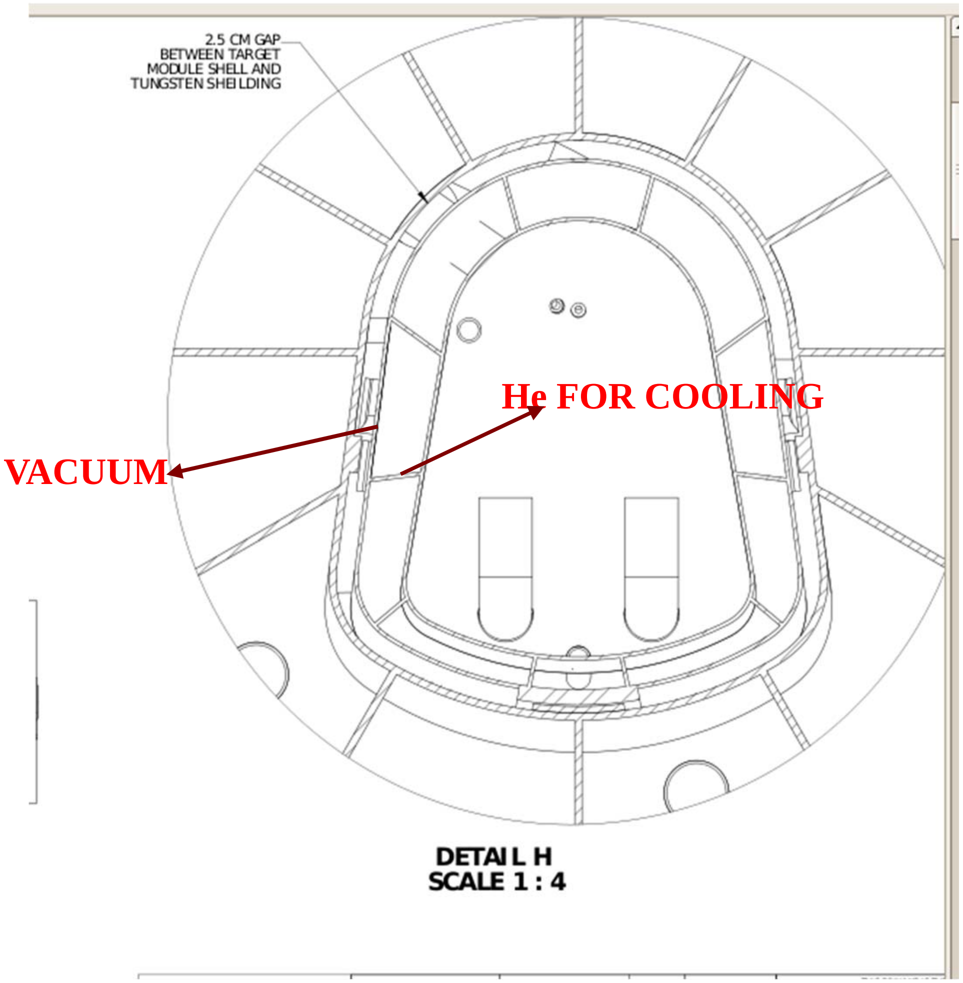
>PROTON BEAM POWER: 4 MW

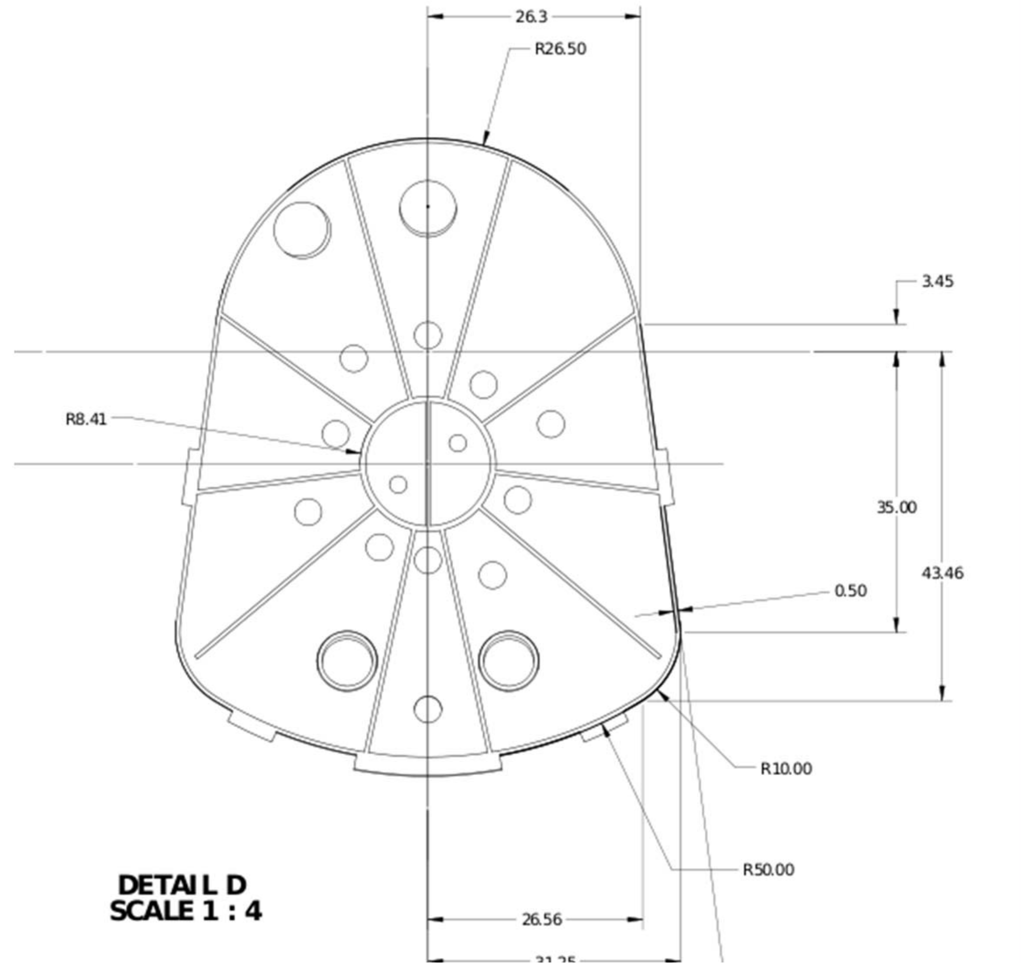
>PROTON ENERGY: E = 8 GeV

>PROTON BEAM PROFILE: GAUSSIAN, $\sigma_x = \sigma_y$ = 0.12 cm (P12)

>EVENTS IN SIMULATIONS : N_p = 100,000 / 500,000 / 4 x 500,000 / 5,000,000

IDS120j: yz CROSS SECTIONS WITH DETAILS OF Hg POOL MODULE FROM VAN GRAVE'S PRESENTATION (8 / 9 / 2012).

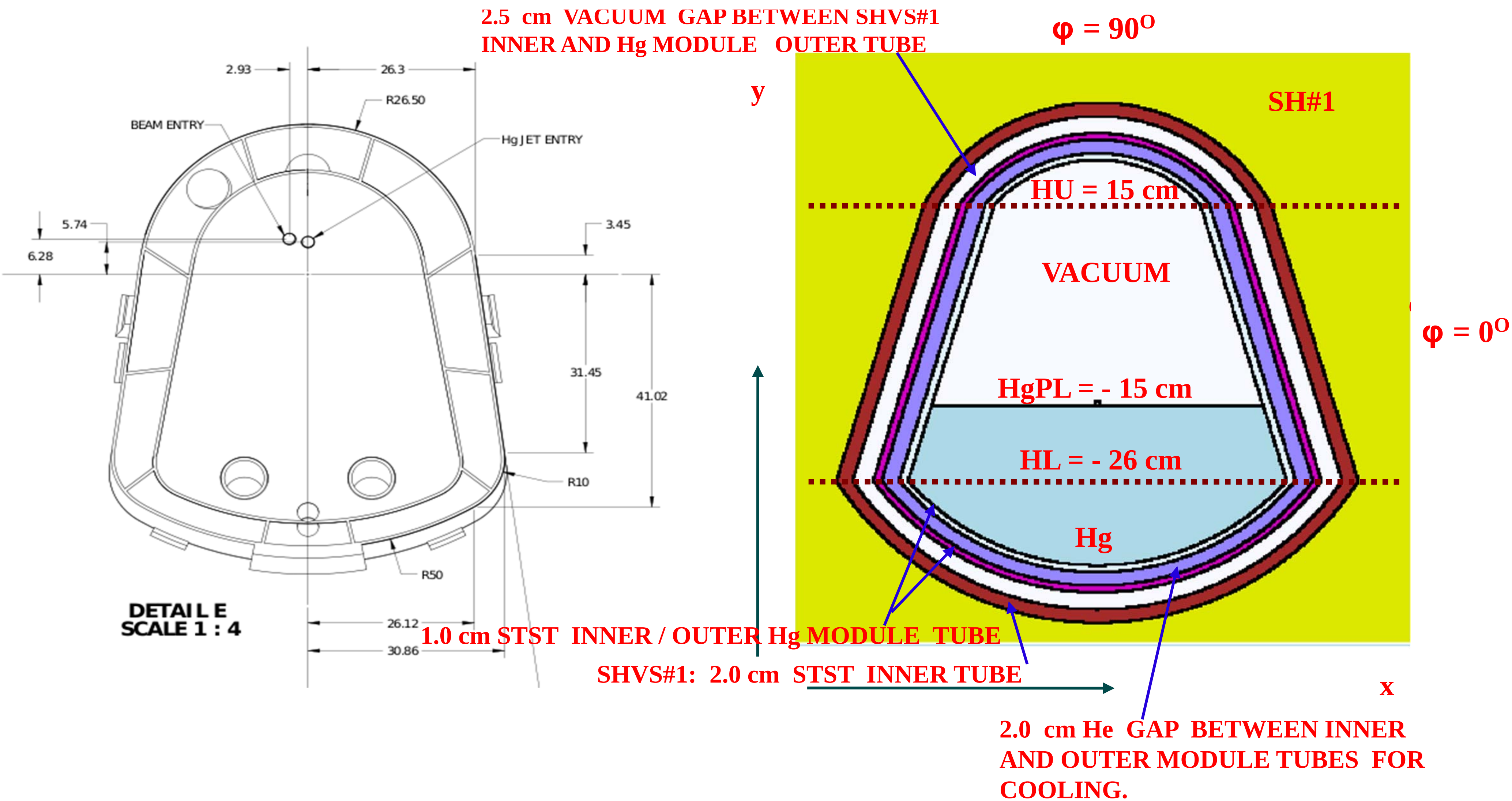




THE DESIGN REQUIRES A 2.5 cm ! GAP BETWEEN SH#1 INNER VESSEL AND Hg POOL MODULE OUTER VESSEL. AN EVEN LARGER SPACE APPEARS TO BE BETWEEN INNER AND OUTER VESSEL OF THE Hg POOL MODULE FOR THE FLOW OF He GAS FOR COOLING THE POOL.

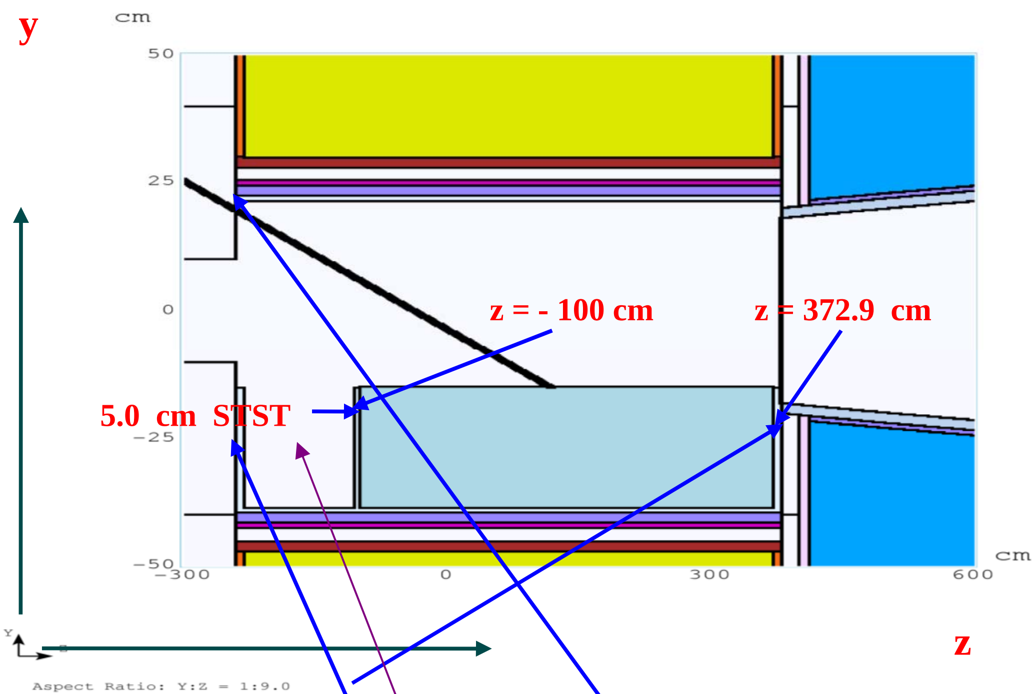
THE RADIUS OF THE UPPER HALF SEMICIRCULAR SECTION OF INNER Hg POOL VESSEL WILL BE 26.5 cm, MUCH LARGER THAN THE BEAM PIPE APERTURE AT THE END OF CRYO#1 (~ 17.7 cm).

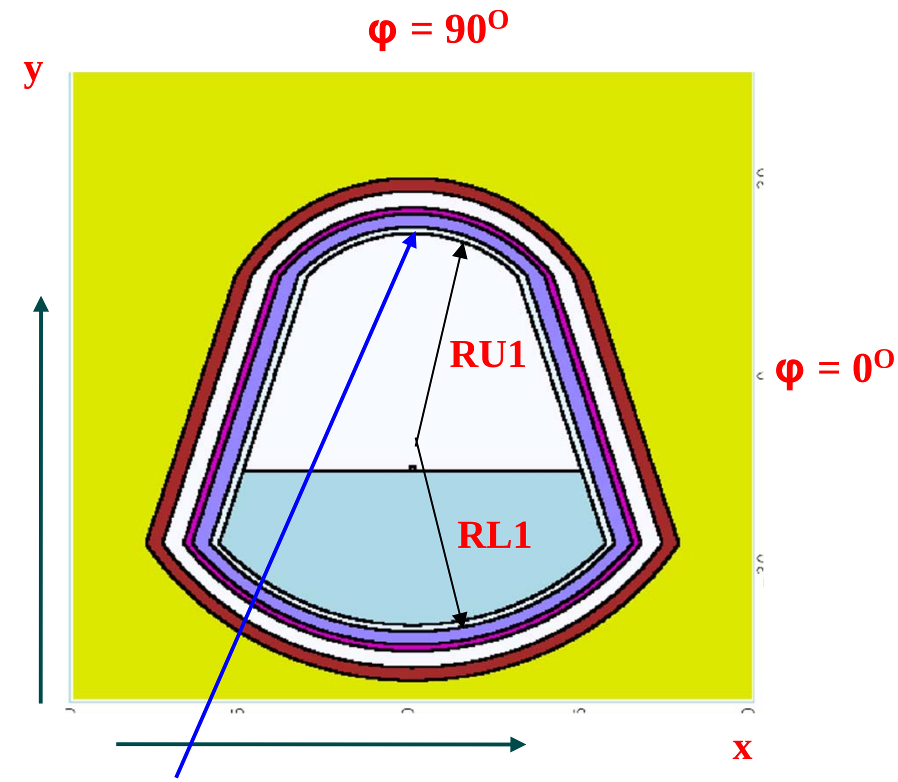
IDS120j: **yx CROSS SECTION WITH DETAILS OF Hg POOL MODULE FROM VAN's PLOTS (LEFT) AND ADAPTED DESIGN FOR MARS SIMULATIONS (RIGHT) [AT z = 100 m].**



EVERYTHING HAS BEEN PARAMETRIZED FOR FUTURE CONVINIENCE. THE HEIGHTS OF THE END POINTS OF THE STRAIGHT SECTIONS ARE HL = - 26 cm AND HU = 15 cm. THE FREE Hg POOL SURFACE IS AT y = - 15 cm. THE RADIUS OF THE LOWER HALF OF THE INNER VESSEL OF THE Hg MODULE IS NOW SMALLER THAN BEFORE : FROM ~ 45 cm ----> ~ 39 cm. THE REST OF THE SPACE BETWEEN SHVS#1 INNER AND OUTER TUBE (AT R ~ 115 cm) IS FILLED WITH SHIELDING.

IDS120j: yz (LEFT) AND yx AT z = 10 cm (RIGHT) CROSS SECTION WITH DETAILS OF THE NEW Hg MODULE AND THE LOWER HALF OF THE UPSTREAM REGION.





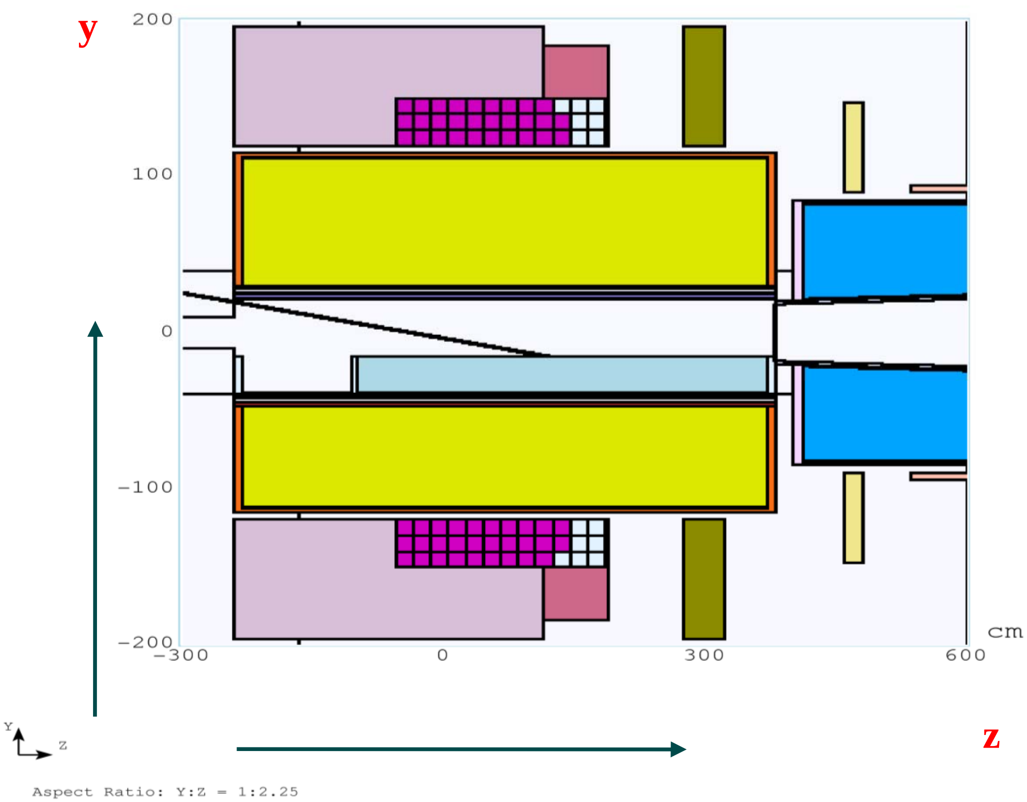
10 cm THICK STST FOR THE UPSTREAM AND DOWNSTREAM FLANGE OF Hg MODULE

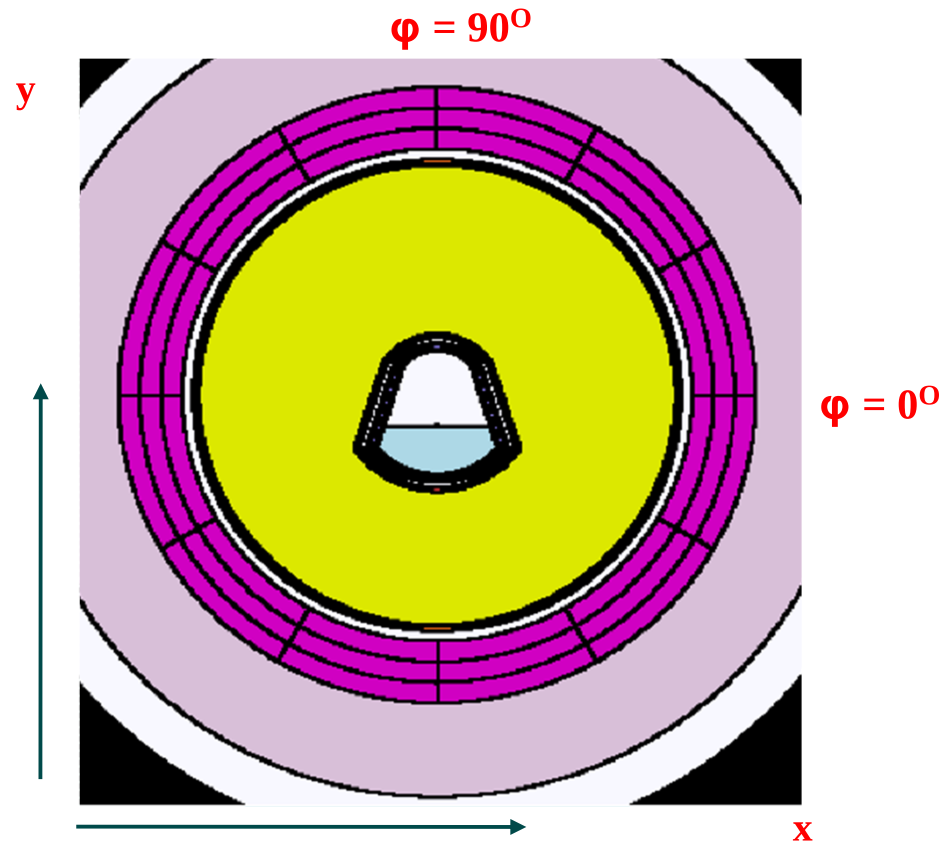
THE RADIUS OF THE TOP SEMICIRCULAR SECTION OF THE Hg INNER TUBE IS SUCH THAT WILL NOT INTERFERE WITH THE Hg JET AND THE BEAM PROTONS AT THE BEGINNING OF CRYO#1 (z ~ - 240 cm) [RU1 = 28.0 cm AND RL1 = 45.0 cm]

ACCORDING TO VAN'S DESIGN THE VOLUME FROM THE BEGINNING OF CRYO#1 (z ~ - 240 cm)TO THE BEGINNING OF THE Hg POOL (z ~ - 100 cm) AND FROM y ~ -15 cm TO THE BOTTOM OF THE Hg MODULE INNER VESSEL (R ~ 39 cm) WILL BE EMPTY TO ACCOMODATE THE PIPES AND OTHER COMPONENTS OF THE Hg POOL MODULE.

SOME IMPROVEMENT IN SHIELDING IS ACHIEVED BY UNIFYING SH#1 AND SH#4. THERE WILL BE SIGNIFICANT INCREASE IN THE SHIELDING MASS (> 200 tons) TO BE CONTAINED IN THE NEW VESSEL (SHVS#1) ==> GREATER ASSYMETRY IN THE WEIGHT DISTRIBUTION. He COOLING OF SUCH A LARGE VOLUME (> 22 m^3) OF SHIELDING CAN BE CHALENGING. *CURRENT STATUS OF TARGET STATION ??????*

IDS120j: yz (LEFT) AND yx CROSS SECTION WITH DETAILS OF THE SC#1+2 SEGMENTATION.





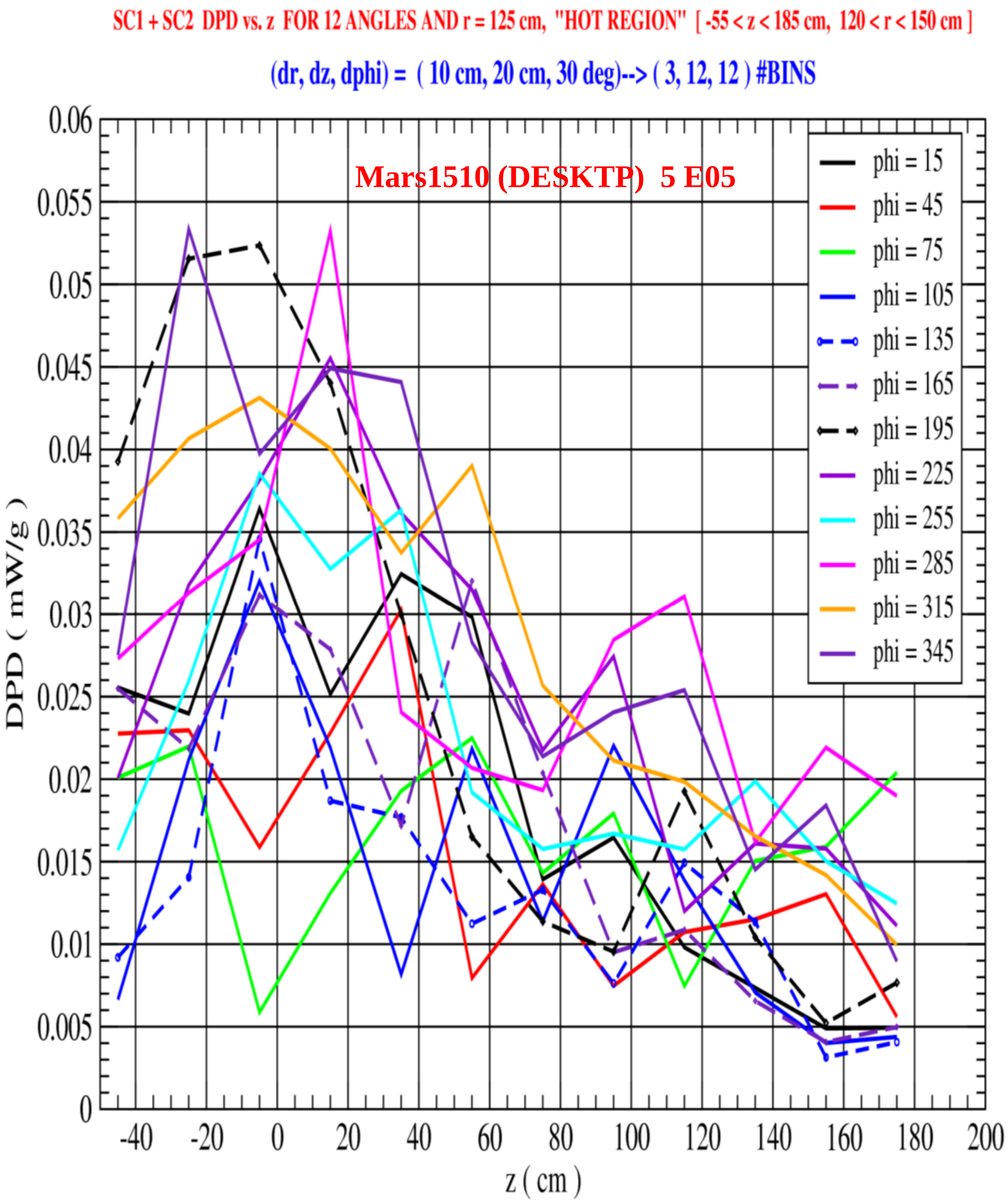
$120.0 < r < 150.0$ cm   dr = 10.0 cm N_r = 3 bins

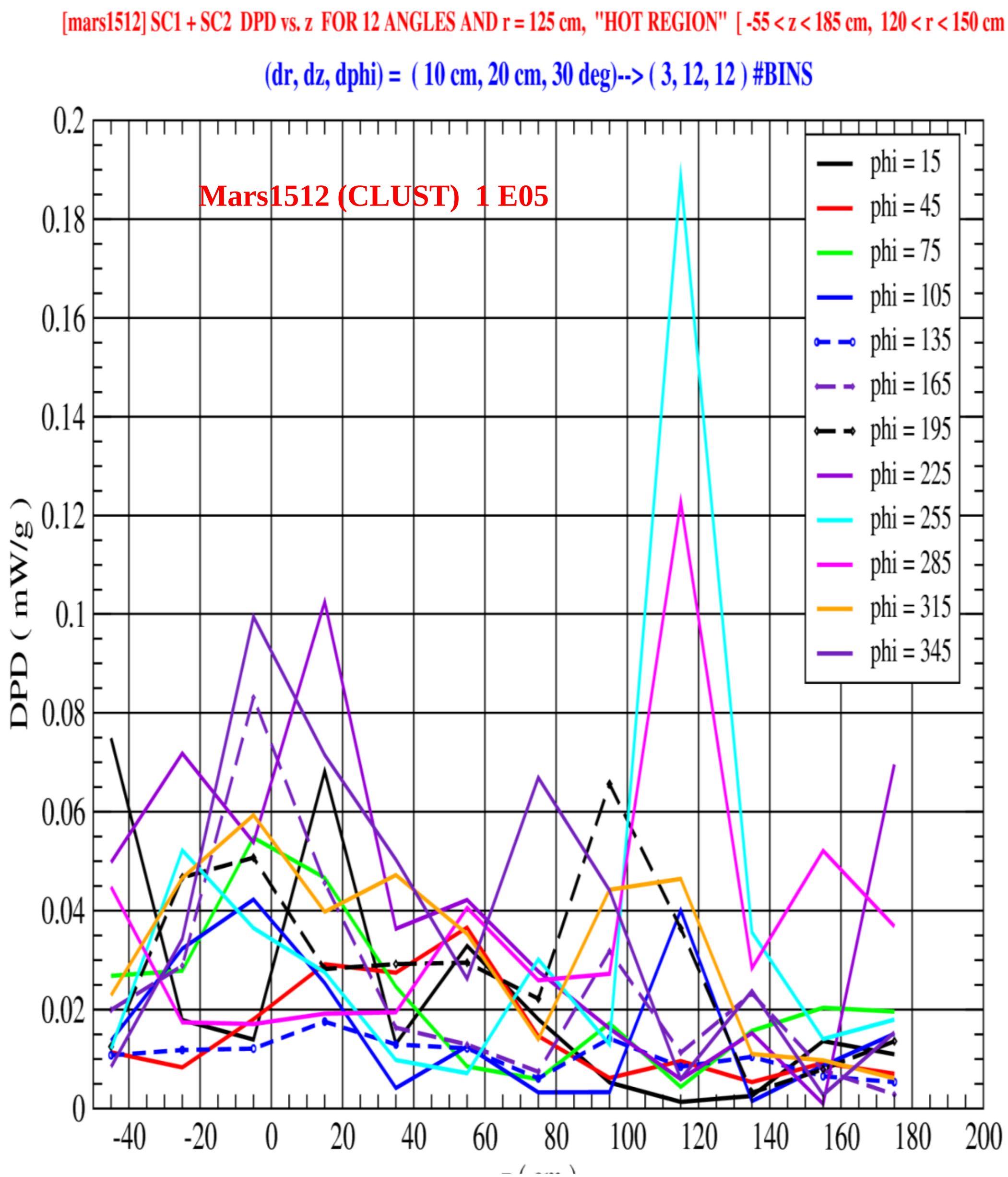
$-55.0 < z < 185.0$ cm   dz = 20.0 cm N_z = 12 bins

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

N_{tot} = 432 "pieces"

ONLY THE AREA WITH HIGHEST AVERAGE AZIMUTHAL DPD (DETERMINED FROM MARS PLOTS) WAS STUDIED.

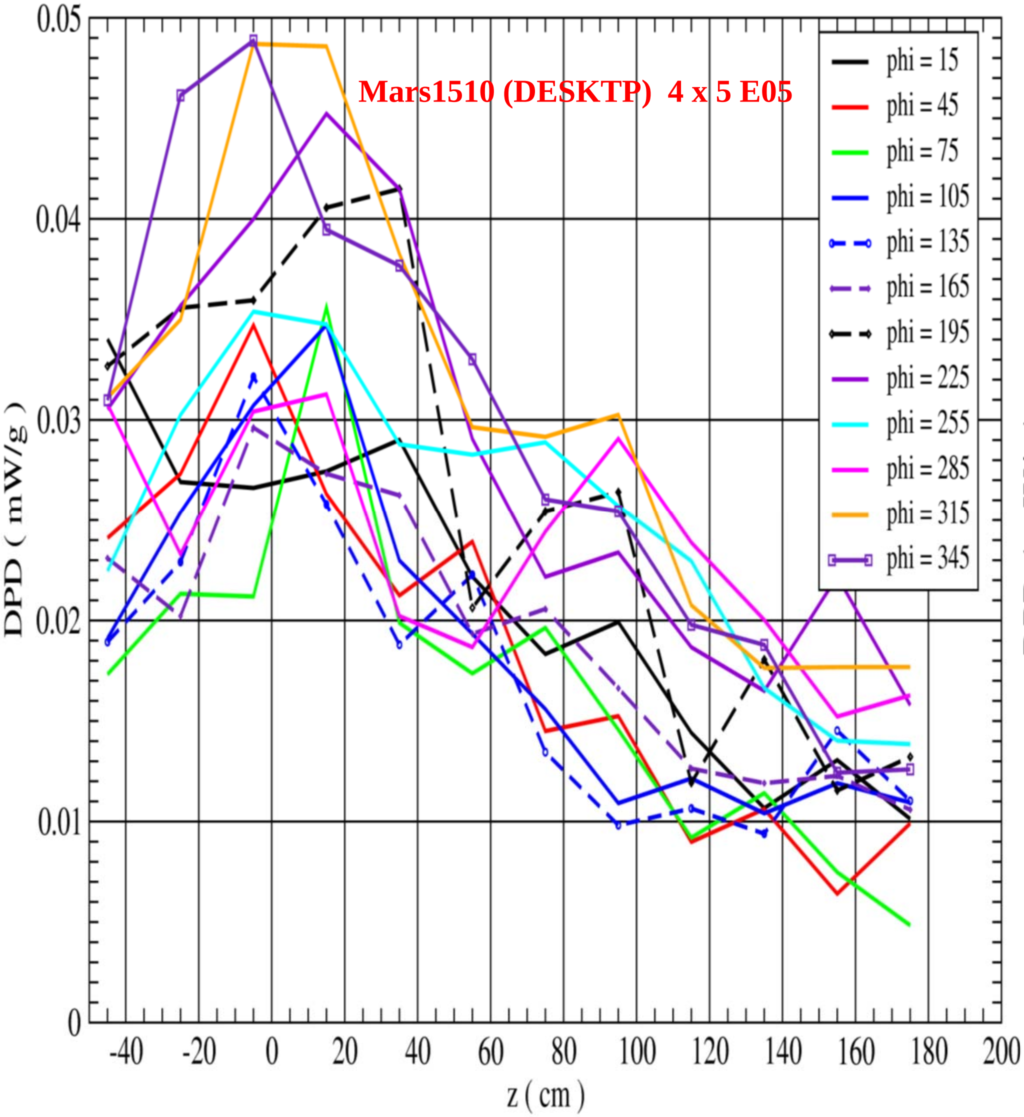




PEAK TDPD mars1510 ~ 0.055 mW / g IN SC#1 mars1512 ~ 0.19 mW / g IN SC#2.
BOTH CODES SHOW MOST OF THE DP TO BE BETWEEN ~ - 40 < z < 40 cm AND IN THE LOWER HALF OF SC#1+2, TOWARDS THE + x DIRECTION. NEW MARS CODE GIVES TDPD ~ 0.1 mW / g IN THE SAME REGION mars1510 GIVES PEAK TDPD. BUT THE PEAK TDPD ACCORDING TO mars1512 IS FURTHER DOWNSTREAM. mars1512 ISOLATED PEAK SPIKES INDICATE STATISTICALLY POOR DATA AND WE HAVE UNRELIABLE CONCLUSIONS FOR THE PEAK TDPD.

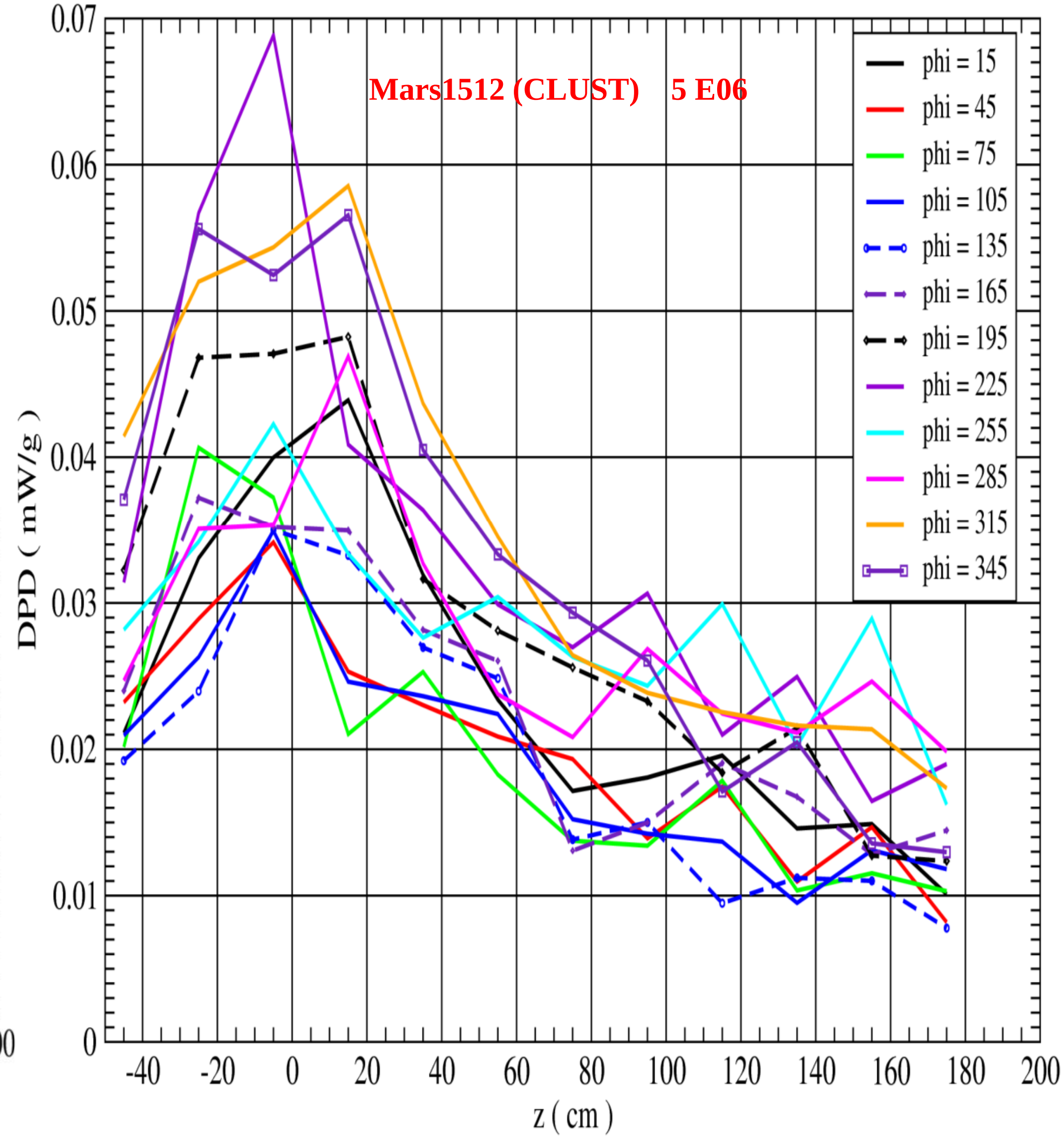
SC1 + SC2 DPD vs. z FOR 12 ANGLES AND r = 125 cm, "HOT REGION" [-55 < z < 185 cm, 120 < r < 150 cm]

(dr, dz, dphi) = (10 cm, 20 cm, 30 deg)--> (3, 12, 12) #BINS [AVERAGE FROM 4 x 5E05 RUN]

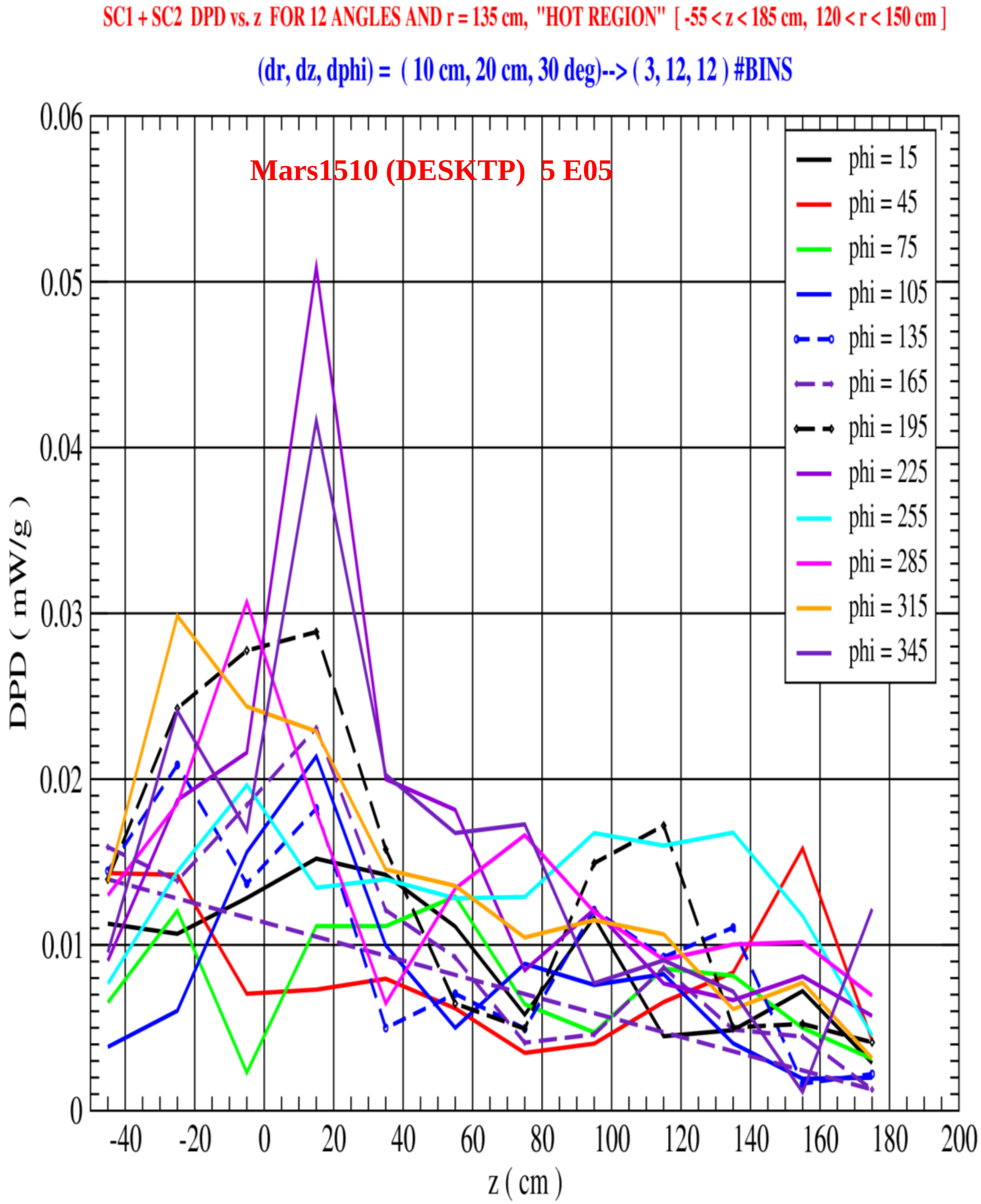


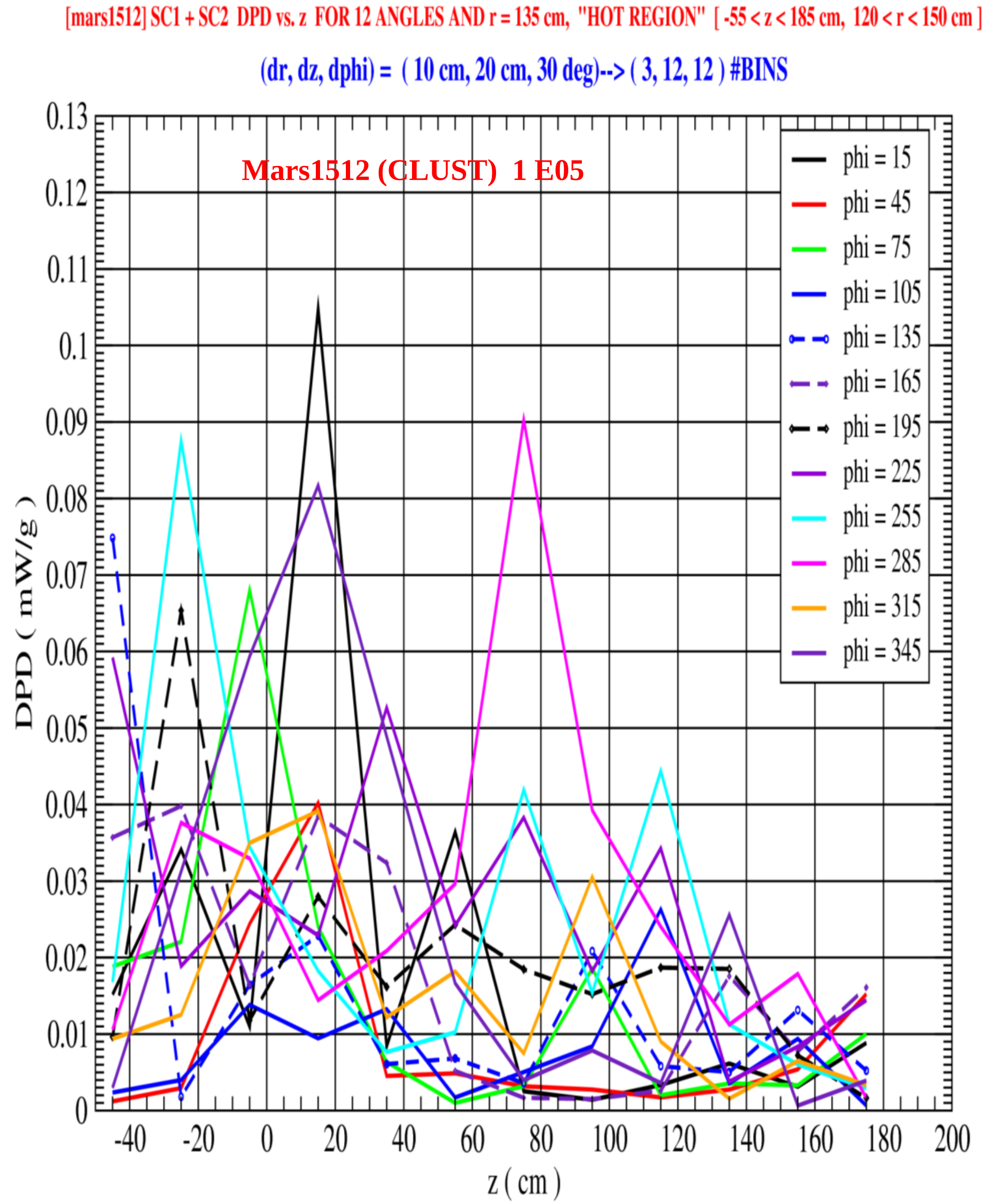
SC1 + SC2 DPD vs. z FOR 12 ANGLES AND r = 125 cm, "HOT REGION" [-55 < z < 185 cm, 120 < r < 150 cm]

(dr, dz, dphi) = (10 cm, 20 cm, 30 deg)--> (3, 12, 12) #BINS

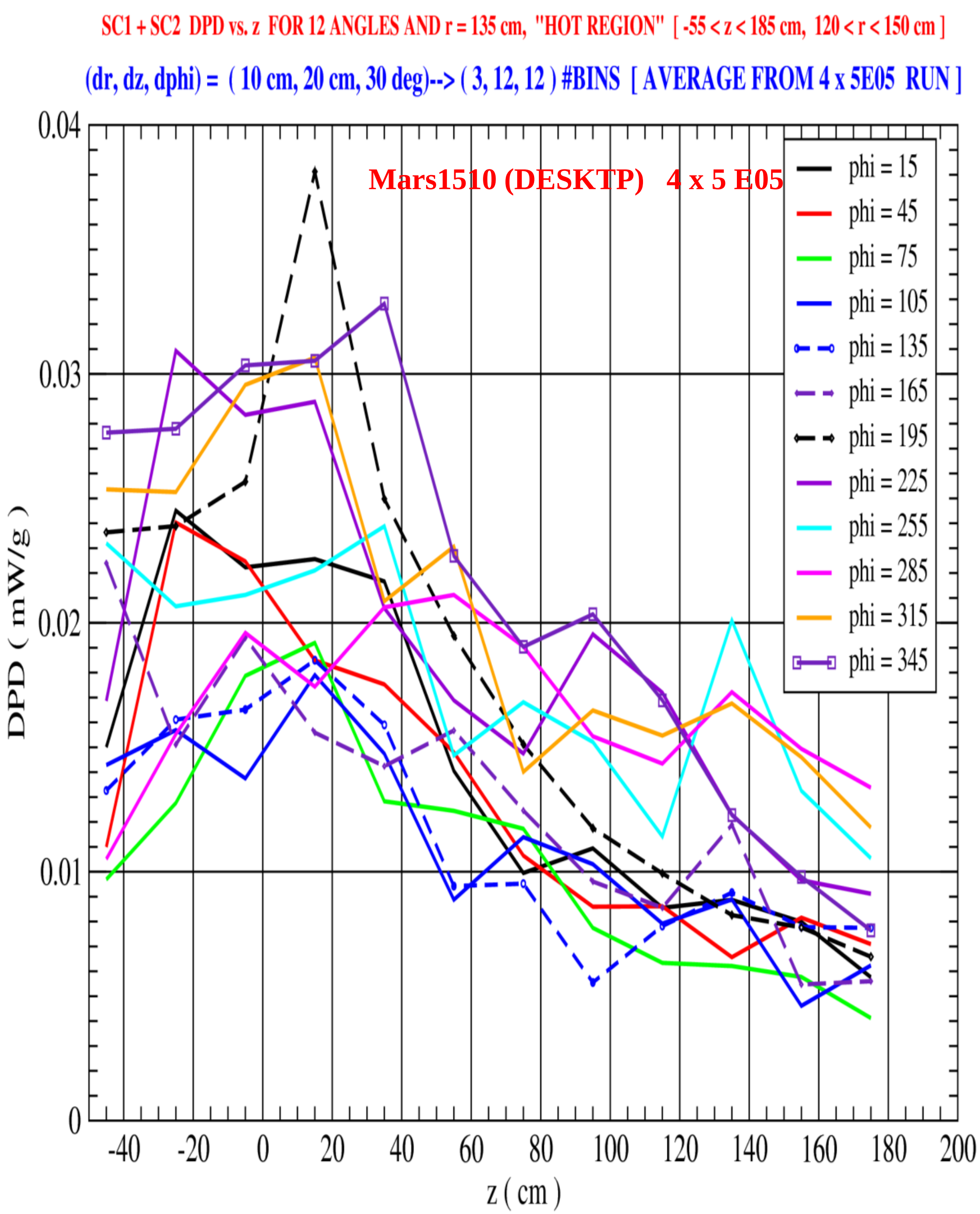


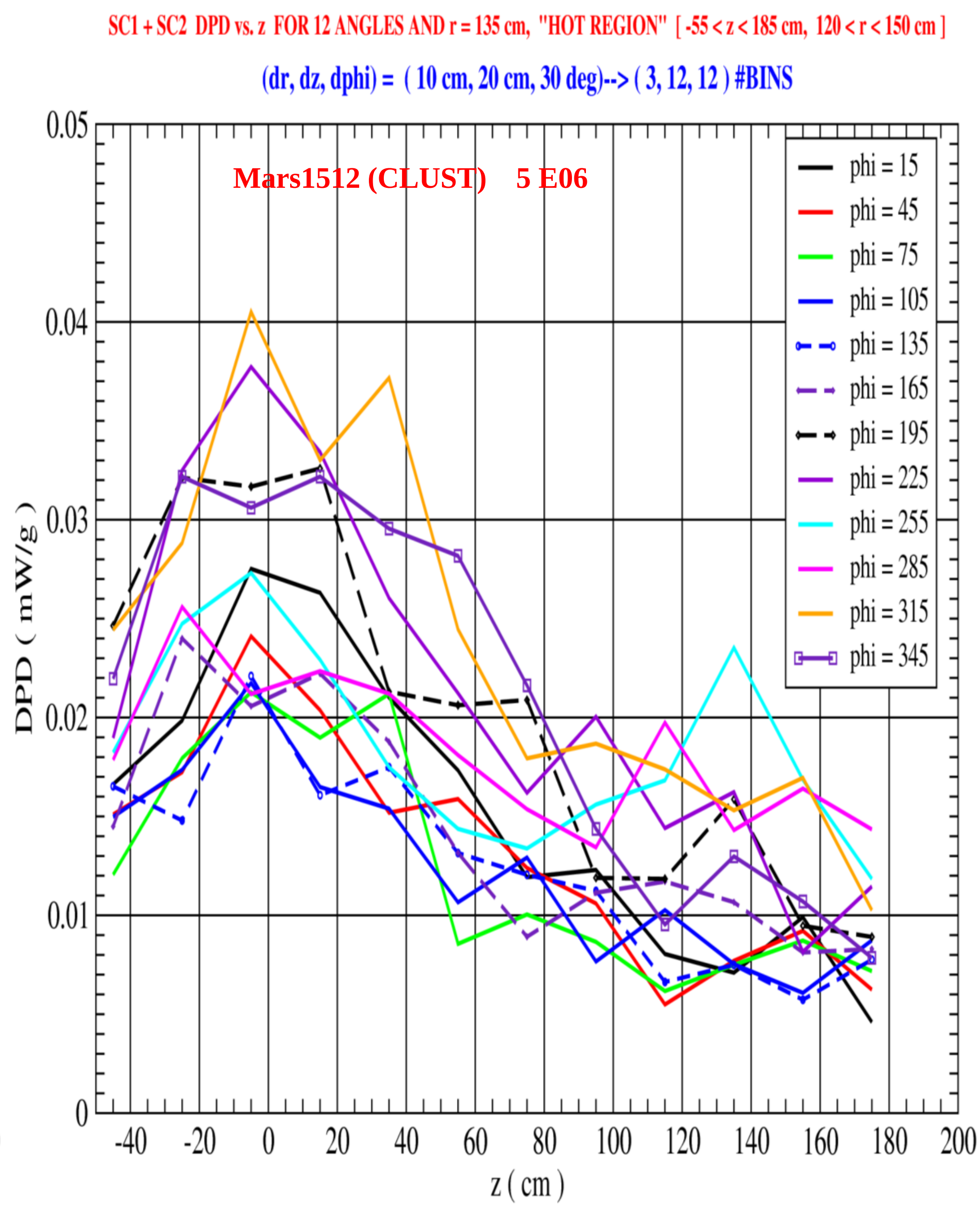
PEAK TDPD mars1510 ~ 0.049 mW / g IN SC#1 mars1512 ~ 0.069 mW / g IN SC#1.
BOTH CODES SHOW MOST OF THE DP TO BE BETWEEN ~ - 40 < z < 40 cm AND IN THE LOWER HALF OF SC#1+2, TOWARDS THE + x DIRECTION. THE SHAPE OF mars1512 PEAK LINE FOR phi = 225 deg. NEAR THE PEAK REGION INDICATES WE CAN NOT TRUST THAT ESTIMATION OF THE PEAK TDPD FROM mars1512. ON THE OTHER HAND FROM THE SHAPE OF THE LINES FOR THE ANGLES phi = 315 deg. AND phi = 345 deg. NEAR THE PEAK REGION IT LOOKS LIKE WE HAVE REACH A GOOD ESTIMATION OF THE PEAK TDPD FROM THE 4 x 5E5 mars1510 SIMULATIONS. SAME LINES FOR mars1512 GIVE A PEAK TDTD ~ 0.06 mW / g, IT APPEARS IS MORE RELIABLE THAN THE 0.07 mW / g FROM THE 225 deg. PREDICTION.



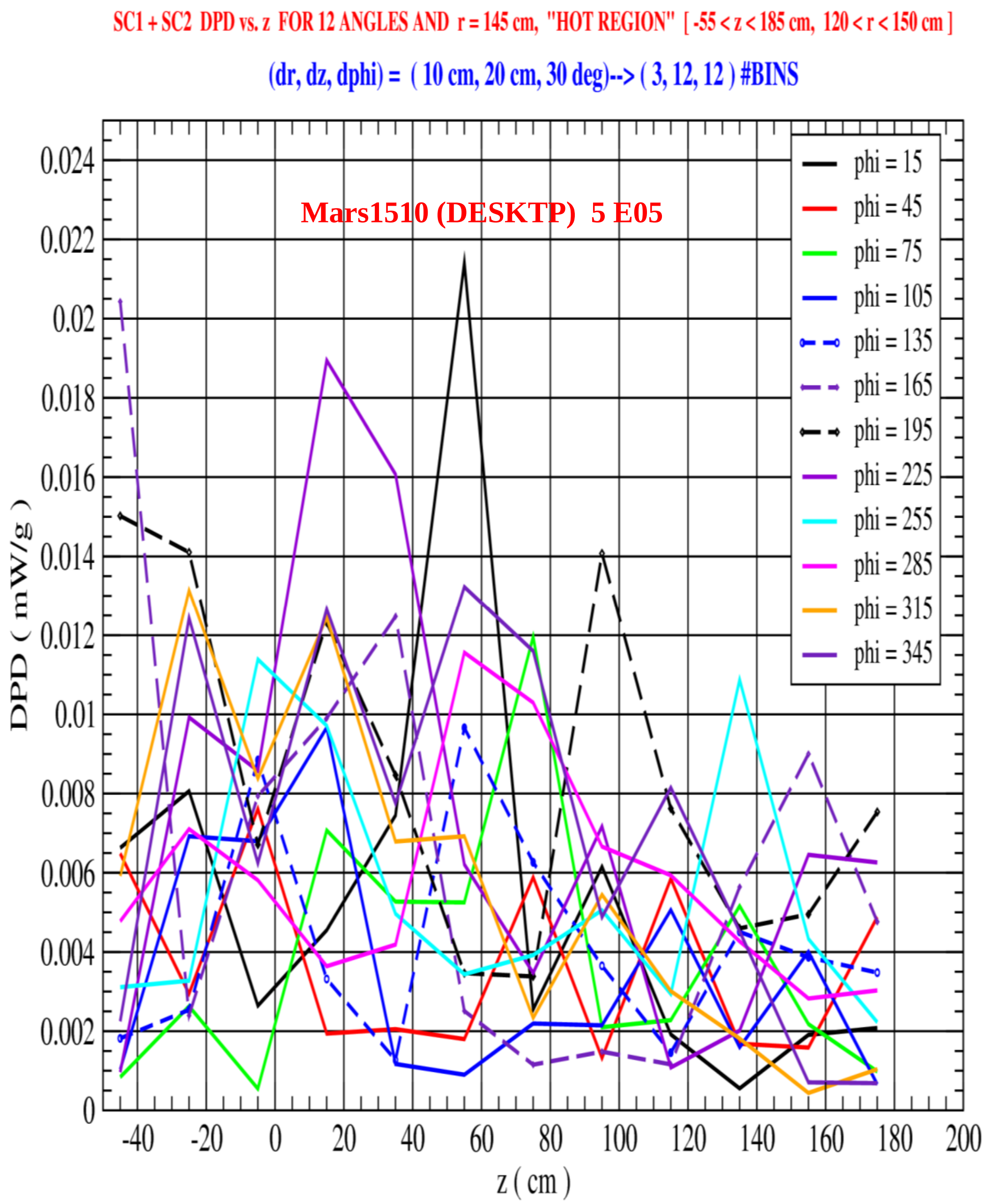


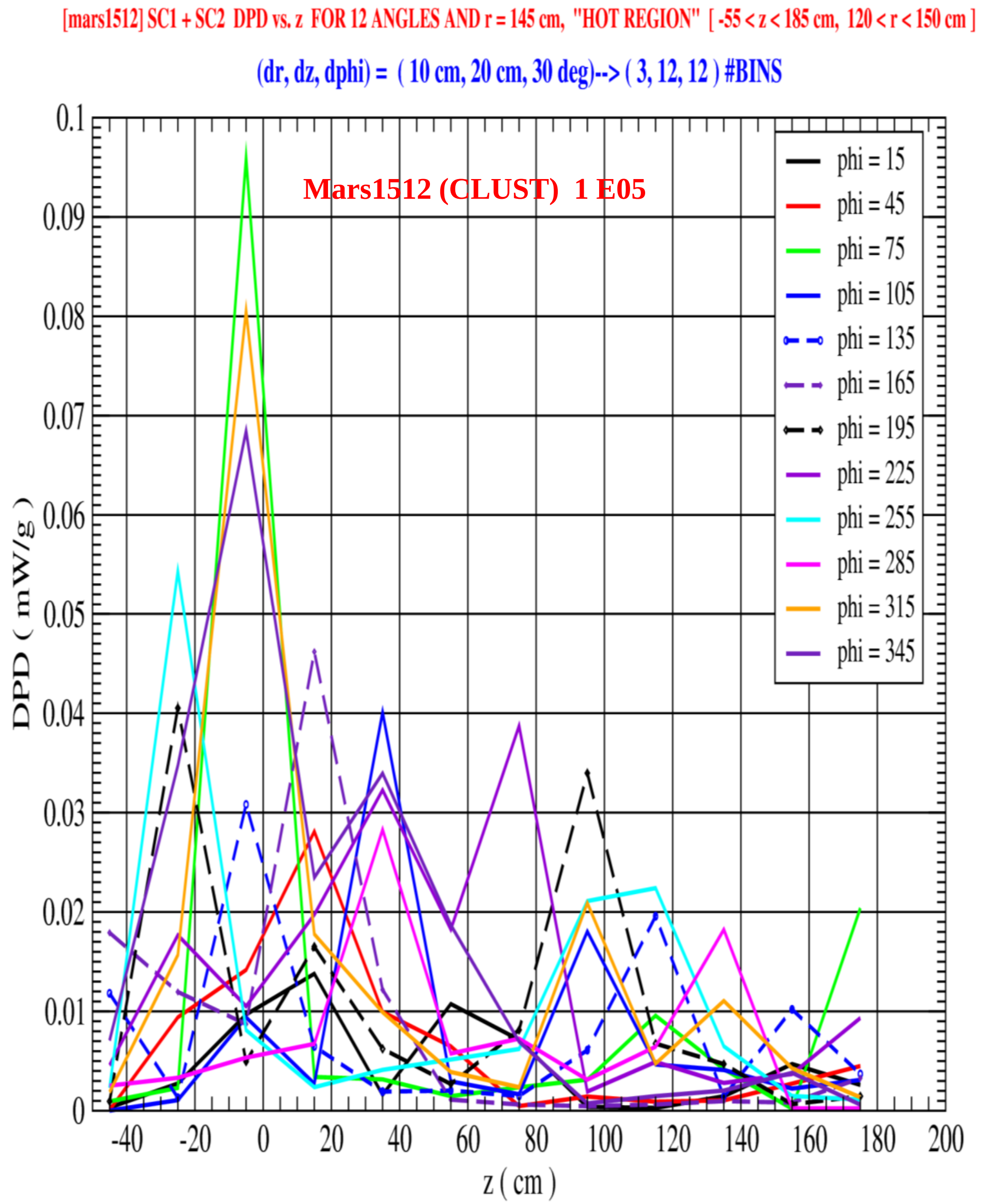
PEAK TDPD mars1510 ~ 0.051 mW / g mars1512 ~ 0.107 mW / g . mars1512 PREDICTS TDPD OVER ITER LIMIT EVEN AT THIS RADIUS. A 1E5 mars1510 SIMULATION ACTUALLY GIVES SAME PEAK TDPD (~ 0.19 mW / g) AS A 1E5 mars1512 SIMULATION, ALTHOUGH AT A DIFFERENT LOCATION. ALTHOUGH THERE WAS AN IMPROVEMENT IN THE PHYSICS MODELING AND HANDLING THE STATISTICS THE RESULTS ARE NOT CLOSER TO THE mars1510 (5E5). THE PEAKS ARE ISOLATED SPIKES AND INDICATE MORE EVENTS NEEDED FOR STATISTICAL CONVERGENCE FOR BOTH mars1510 AND mars1512.





PEAK TDPD mars1510 ~ 0.038 mW / g mars1512 ~ 0.041 mW / g . BOTH CODES PREDICT PEAK DENSITIES ~ 0.04 mW / g FOR THIS RADIUS ALTHOUGH AT DIFFERENT ANGLES. THE SHAPE OF THE CORRESPONDING LINES INDICATES THERE IS STILL STATISTICAL UNCERTAINTY NEAR THE PEAK REGION AND THE ESTIMATION CAN NOT BE TRUSTED.

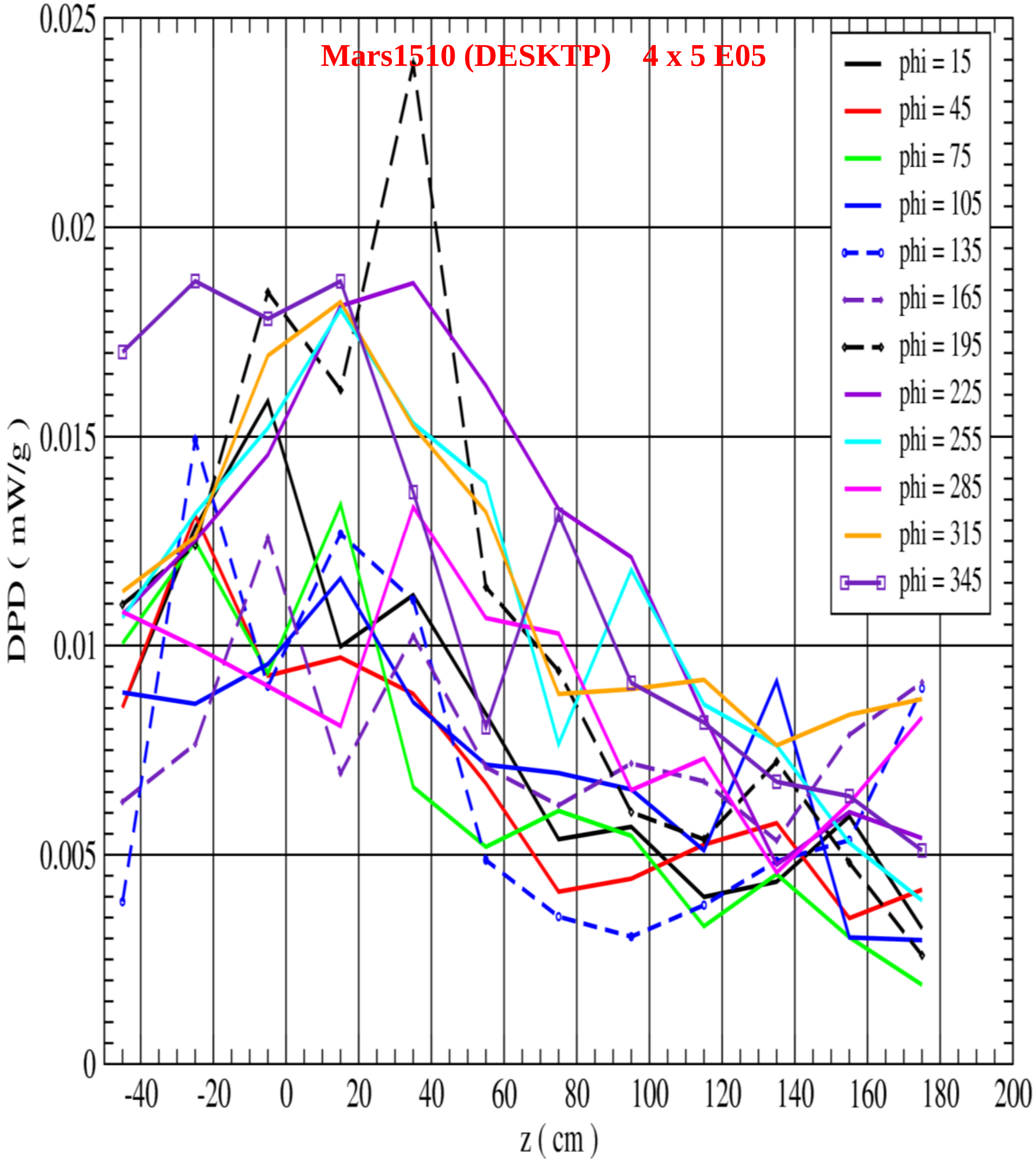




PEAK TDPD mars1510 ~ 0.022 mW / g mars1512 ~ 0.098 mW / g .

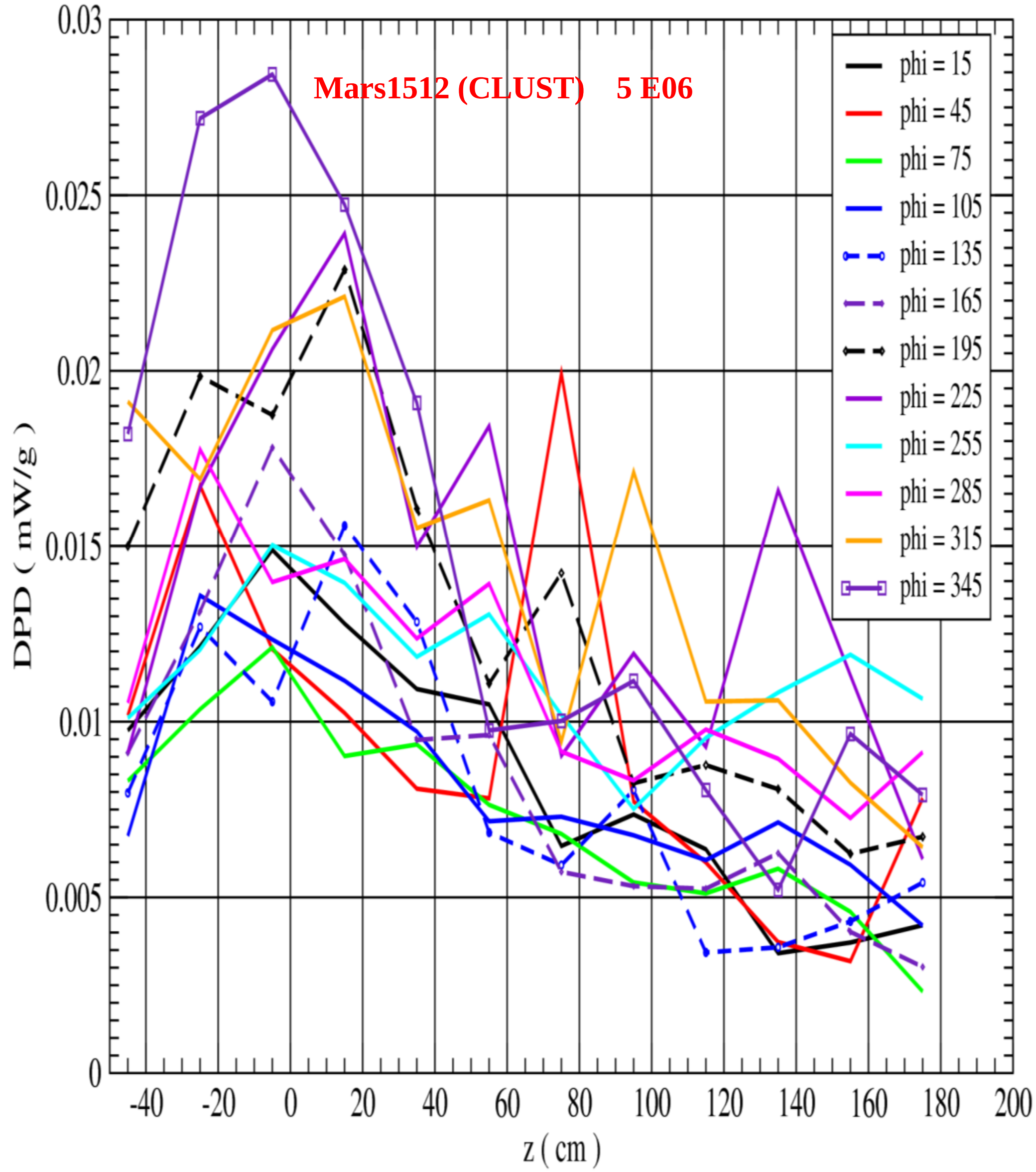
SC1 + SC2 DPD vs. z FOR 12 ANGLES AND r = 145 cm, "HOT REGION" [-55 < z < 185 cm, 120 < r < 150 cm]

(dr, dz, dphi) = (10 cm, 20 cm, 30 deg)--> (3, 12, 12) #BINS [AVERAGE FROM 4 x 5E05 RUN]



SC1 + SC2 DPD vs. z FOR 12 ANGLES AND r = 145 cm, "HOT REGION" [-55 < z < 185 cm, 120 < r < 150 cm]

(dr, dz, dphi) = (10 cm, 20 cm, 30 deg)--> (3, 12, 12) #BINS



PEAK TDPD mars1510 ~ 0.024 mW / g mars1512 ~ 0.028 mW / g .

GENERAL COMMENTS ON THE PLOTS .

PEAK TDPD IS THE MOST IMPORTANT NUMBER IN THE TARGET STATION SIMULATIONS. IT IS THE NUMBER THAT DETERMINES THE SIZE OF THE COILS AROUND THE TARGET REGION AND DOWNSTRTEAM AS WELL AS THE FEASIBILITY (IN PART) OF COOLING DIFFERENT PARTS OF THE STATION .
WE USE A SEGMENTATION SETUP FOR ESTIMATING THAT NUMBER.

THE "PIECES" SIZE IS RATHER ARBITRARY. WE TRY TO CHOOSE A SIZE THAT WILL GIVE US AS STATISTICALLY RELIABLE RESULTS AS POSSIBLE IN THE PEAK POWER DENSITY REGION.
THERE IS NO RULE OR RECIPE HOW TO CHOOSE THE SIZE.

*LESS ENERGY IS DEPOSITED IN "PIECES" IN CERTAIN DIRECTIONS THAN IN "PIECES" IN OTHER DIRECTIONS.
*THE OUTER REGION "PIECES" IN THE STATION RECIEVE LESS (LESS DENSE) ENERGY THAN THE "PIECES" CLOSER TO THE TARGET.
* LIKEWISE DOWNSTREAM "PIECES" GET LESS (LESS DENSE) ENERGY THAN "PIECES" CLOSER TO THE TARGET.

THE SEGMENTATION WE IMPLEMENT HAS "PIECES" OF THE SAME SIZE IN ALL ANGLES AND ALONG THE AXIAL DIRECTION. THE SIZE INCREASES ONLY IN THE RADIAL DIRECTION. THAT SOMEWHAT WILL TAKE CARE THE STATISTICAL PROBLEM IN THAT DIRECTION.

TO ACHIEVE SMOOTH VARIATION IN THE PLOTS FOR ALL DIRECTIONS (r,z, phi) WE MAY HAVE NOT ONLY TO INCREASE THE NUMBER OF EVENTS TO DEAL WITH THE STATISTICALLY POOREST REGIONS BUT ALSO DECRASE THE SIZE OF THE "PIECES" EVERYWHERE (UNLESS WE IMPLEMENT A MORE COMPLICATED SEGMENTATION SCHEME).
A LOT MORE TIME WILL BE DEVOTED IN SIMULATIONS.

IS THIS NECESSARY ? NO.
WE NEED TO MAKE SURE THERE IS SOME SMOOTH VARIATION IN THE PEAK REGION ONLY.
THE LINES FOR THE TWO ANGLES 315 AND 345 DEGREES (mars1510, 4 x 5E5 LEFT PLOT, PAGE 8) THAT GIVE US THE LARGEST TDPD ARE QUITE CLOSE TO EACH OTHER. THERE IS ALSO A RATHER SMOOTH AXIAL VARIATION FOR BOTH OF THEM IN THE PEAK REGION [$-40 < z < 40$ cm], THEREFORE THE PEAK TDPD ~ 0.05 mW / g IS A RESULT WE CAN TRUST. THE mars1512 (5E6) 225 DEGREE LINE THOUGH (RIGHT PLOT IN PAGE 8) THAT GIVES THE PEAK TDPD ~ 0.069 mW / g IT APPEARS LESS SMOOTH THAN THE LINES FOR THE 315, 345 DEGREE ANGLES THAT GIVE THE NEXT LARGEST TDPD. THEREFORE MORE WEIGHT SHOULD BE PUT IN THE SECOND LARGEST TDPD RATHER THAN THE FIRST ONE.

WE ALSO NEED TO PERFOM A SERIES OF SIMULATIONS WITH INCREASING NUMBER OF EVENTS UNTIL THERE IS STABILITY IN THE RESULT OF THE PEAK TDPD (EVEN IF THERE IS A SMOOTH VARIATION OF THE TDPD IN THE PEAK REGION WE STILL HAVE TO ENSURE WE ALSO HAVE REACH A STABLE SOLUTION IN THAT REGION) .

GENERAL COMMENTS ON THE MAKING OF THE PLOTS AND SETTING UP mars1512 .

IN THE FIRST STEP FOR THE CREATION OF THE PLOTS THE TDP (FROM MARS.OUT FILE) AND THE TDPD (FROM MTUPLE.NON FILE) DATA FOR ALL "PIECES" ARE COPIED IN TWO FILES.
DATA FOR THE TDP (FROM MARS.OUT FILE) IN THE DIFFERENT STATION PARTS ARE ALSO COPIED IN A FILE.

THREE SMALL c++ CODES WILL PROCESS THE DATA. THE TDP IN THE DIFFERENT VOLUMES OF THE STATION IS STORED IN A FILE AND THE DATA WILL BE COMPARED WITH OTHER CASES TO MAKE SURE THERE IS NO PROBLEM IN THE SEGMENTATION SET UP OF THE CODE. THE TDP OF THE UNSEGMENTED PART OF THE COIL (S) OR REGION (IF ANY) WILL BE USED WITH THE TDP FROM ALL PIECES (CALCULATED USING A c++ CODE) AND COMPARED WITH THE TDP FROM THE UNSEGMETNED COIL (S) OR REGION. THE CODE FOR THE TDPD WILL GIVE THE PEAK TDPD AND ALSO ORGANIZE THE DATA IN INCREASING r ORDER (FOR THE SEGMENTATION CASES WITH MORE THAN ONE RADIAL BIN).

FOR EACH r (IF MORE THAN ONE RADIAL BIN IS USED) THE DATA WILL BE SAVED IN SEPARATE FILES.
ANOTHER SMALL c++ CODE WILL ORGANIZE THE DATA IN INCREASING ANGULAR ORDER FOR EACH r.
THE DATA FOR EACH ANGLE WILL BE CO PIED / SAVED IN SEPARATE FILES.

USING "GRACE" THE DATA WILL BE PLOTED BY READING THEM FROM EACH FILE SEPARATELY .

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FIRST AND MOST IMPORTANT STEP IN SETTING UP MULTIPLE JOBS WITH mars1512 IS SETTING UP THE Makefile.
IT HAS SOME STRUCTURE THAT IT IS NOT CLEAR HOW DETERMINES THE EXECUTION OF THE MULTI-DIRECTORY JOB. MARS README FILE DOES NOT PROVIDE ANY DETAILS ON THAT.

ONE CAN RUN NEW MARS IN PRINCETON CLUSTER FOR ONE-DIRECTORY JOBS IN THE USUAL WAY. THE JOB WILL BE EXECUTED BY USING qsub -l cput= .... IN BATCH MODE OR ./rmars-mcnp-linux IN INTERACTIVE MODE IN C-SHELL ENVIOREMENT. YOU CAN ALSO CREATE THE EXECUTABLES AND SET UP THE MULTI-DIRECTORY JOB BUT WHEN YOU TRY TO RUN THE JOB WITH ./start-jobs 100 YOU GET THE MESSAGE n1=1 : Command not found n2=1 : Command not found If: Expression Syntax AND THE JOB IS NOT EXECUTED. AFTER ~ 15 - 20 EMAILS EXCHANGED WITH Ding I REALIZED THAT THE COMMAND DOES NOT WORK IN C-SHELL ENVIOREMENT.

NEW MARS WILL GIVE YOU THE AVERAGE FOR ALL DATA FILES *EXCEPT MARS.OUT !* ISOLATING THE DATA OF INTEREST AND GETTING THE AVERAGE IS NOT THAT SIMPLE FOR SOMEONE WITHOUT MUCH EXPERIENCE.
THE TDP CAN BE CALCULATED THOUGH FROM THE TDPD USING THE VOLUMES AND THE MATERIAL DENSITIES.

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A NEW c++ CODE WAS CREATED THAT WILL PERFORM THE JOB OF THE SMALL CODES AND PERFOM SOME OF THE JOBS DONE MANUALLY BEFORE. IT CAN ALSO READ THE DATA FROM MTUPLE.NON FROM BOTH MARS VERSIONS (NEW MARS MTUPLE.NON FILE HAS MORE COLUMNS), IT CAN HANDLE ONE OR UP TO THREE RADIAL BIN SEGMENTATIONS. THE CODE IS MORE FLEXIBLE AND IT CAN SAVE TIME WHEN PROCESSING THE DATA.

mars1510: 1E5 ~ 7.72 hrs, [5E5 ~ 38.33 hrs] VS. mars1512: 1E5 ~ 111.06 hrs, [5E5 ~ *555.3 hrs (23.6 d) !!!* (ESTIM)]

A) THE PEAK DPD IN SC#1+2:

mars1510: ~ 0.19 mW / g AT (r, z, phi) = (125 cm, 35 cm, 225 deg) IN SC#1 [1E5 EVENTS]

mars1510: ~ 0.07 mW / g AT (r, z, phi) = (125 cm, 35 cm, 225 deg) IN SC#1 [5E5 EVENTS]

mars1512: ~ 0.19 mW / g AT (r, z, phi) = (125 cm, 115 cm, 255 deg) IN SC#2 [1E5 EVENTS]

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

B) SC#1+2: 0.687 (+0.211) = 0.898 [0.670 (+0.248)=0.918] 0.759(+0.289)=1.048 (..)= DP IN UNSEGMENTED PART

SC#3:	0.048	[0.060]	0.076	SC#4:	0.130	[0.146]	0.146
SC#5:	0.012	[0.014]	0.016	SC#6:	0.004	[0.005]	0.005
SC#7:	0.006	[0.008]	0.005	SC#8:	0.010	[0.010]	0.009
SC#9:	0.003	[0.004]	0.005	SC#10-12:	0.152	[0.108]	0.127

TOTAL DP SC#1-12: 1.263 [1.273] 1.437

C) DP IN SHIELDING	SH#1 :	575.00	[574.13]	583.00
	SH#2 :	95.85	[93.84]	94.00
	SH#3 :	10.37	[10.07]	9.69
	SH#4 :	5.22	[4.81]	4.69
D) DP IN VESSELS	SHVS#1 :	3.12	[3.13]	3.04
	SHVS#2 :	42.56	[36.08]	24.30
	SHVS#3 :	4.10	[6.62]	1.26
	SHVS#4 :	0.56	[0.50]	0.50
E) DP IN	Hg JET :	406.60	[406.25]	382.90
DP IN	Hg POOL :	1240.00	[1246.12]	1254.50
F) DP IN	Be WINDOW :	10.31	[10.18]	11.88
DP IN	BP#2 :	106.60	[107.37]	116.40
DP IN	BP#3 :	19.87	[19.26]	18.73
DP IN	Hg POOL INNER TUBE :	275.50	[272.91]	263.20
DP IN	Hg POOL OUTER TUBE :	165.20	[164.26]	159.95
DP IN	SHVS#1 INNER TUBE :	163.30	[163.41]	155.80

TOTAL DP : 3,125.51 [3,117.58] 3,085.29

mars1510: 4 x 5E5 ~ 50 hrs VS. mars1512: ***5E6 > 100 hrs ~ 4 - 5 days {100 SUBDIRECTORY, 5E04 EVENTS EACH***

JOB (DEPENDS ALSO ON QUE / WAITING TIME [WT] }, 4 x 5E6 > ? hrs ~ ? days (SAME AS BEFORE SET UP)

A) THE PEAK DPD IN SC#1+2:

mars1510: ~ 0.049 mW / g AT (r, z, phi) = (125 cm, -5 cm, 345 deg) IN SC#1 [4 x 5E5 EVENTS]

mars1512: ~ 0.069 mW / g AT (r, z, phi) = (125 cm, -5 cm, 225 deg) IN SC#1 [5E6 EVENTS] >>>>>> [Ding]

Mars1512: ~ 0.0 mW / g AT (r, z, phi) = (125 cm, -5 cm, 225 deg) IN SC#1 [4 x 5E6 EVENTS] ***NOT FINISHED***

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

B) (..)= DP IN UNSEGMENTED PART

SC#1+2:	[0.647 (+0.271)=0.918]	0.730 (+0.315)=1.045	0.0				
SC#3:	[0.066]	0.064	0.0	SC#4:	[0.149]	0.154	0.0
SC#5:	[0.017]	0.016	0.0	SC#6:	[0.005]	0.004	0.0
SC#7:	[0.008]	0.008	0.0	SC#8:	[0.010]	0.010	0.0
SC#9:	[0.004]	0.005	0.0	SC#10-12:	[0.159]	0.149	0.0
TOTAL DP SC#1-12:	[1.336]	1.455					

C) DP IN SHIELDING	SH#1 :	[573.30]	584.10	0.0
	SH#2 :	[93.70]	92.95	0.0
	SH#3 :	[10.12]	9.62	0.0
	SH#4 :	[4.77]	4.65	0.0
D) DP IN VESSELS	SHVS#1 :	[3.13]	3.12	0.0
	SHVS#2 :	*[39.82]*	*25.08*	*0.0*
	SHVS#3 :	[3.33]	1.35	0.0
	SHVS#4 :	[0.49]	0.45	0.0
E) *DP IN*	*Hg JET :*	*[406.23]*	*380.93*	*0.0*
DP IN	Hg POOL :	[1248.78]	1252.61	0.0
F) DP IN	Be WINDOW :	[10.17]	11.87	0.0
DP IN	BP#2 :	[106.09]	114.47	0.0
DP IN	BP#3 :	[19.23]	18.73	0.0
DP IN Hg POOL INNER TUBE :		[273.53]	263.82	0.0
DP IN Hg POOL OUTER TUBE :		[164.73]	160.20	0.0
DP IN SHVS#1 INNER TUBE :		[163.53]	156.27	0.0
	TOTAL DP :	[3,122.37]	3,081.79	0.0

COMMENTS AND CONCLUSIONS ON mars1510 vs. mars1512 .

# A mars1512 JOB TAKES MORE TIME TO FINISH IN THE CLUSTER DUE TO QUE WAITING (~ SEVERAL DAYS).
A 5E6 mars1512 JOB IN THE CLUSTER TAKES ~ TWICE AS MUCH THE TIME OF A 4 x 5E5 mars1510 IN THE DESKTOP (**** mars1512 EXECUTES THE JOB IN 100 SUBDIRECTORIES WITH 5E4 EVENTS EACH (Ding) // ALL 4 5E5 mars1510 JOBS RUNNING AT THE SAME TIME) . FOR CERTAIN SEEDS IT TAKES MORE TIME TO RUN THE SUBDIRECTORY JOB THAN OTHERS. ################ A 4 x 5 E06 AND A 2E06 mars1512 JOBS ARE IS IN PROGRESS AND DUE IN A FEW DAYS TO COMPLETE THE SYSTEMATIC STUDY AND COMPARISON OF TWO MARS VERSIONS.

THERE IS NO INFORMATION IF MARS CAN COLECT THE DATA FROM fort. FILES FROM DIFFERENT SUBDIRECTORIES
IN ONE fort. FILE. A ROOT CODE THAT CAN ANALYSE THE DATA IN fort. FILES IN EACH SUBDIRECTORY IS AVAILABLE BUT IT APPEARS YOU HAVE TO COPY AND PASTE TO COLLECT THEM IN ONE FILE TO BE USED AS AN INPUT IN ANOTHER SIMULATION.

IF SIMULATION DATA ARE READ FROM A DATA FILE THERE IS NO INFORMATION HOW TO BREAK THE JOB IN A NUMBER OF SUBDIRECTORIES USING A SPECIFIC NUMBER OF DATA FOR EACH SUB - JOB. I ASSUME THIS HAS TO BE DONE MANUALLY.

****

BOTH mars VERSIONS SHOW IN GENERAL A FAST CONVERGENCE IN THE ESTIMATION OF THE DEPOSITED POWER IN DIFFERENT VOLUMES OF THE STATION, EVEN FOR VOLUMES THAT ARE FAR FROM THE TARGET REGION. A mars1510 OR mars1512, 5E5 EVENT SIMULATION CAN PROVIDE RELIABLE INFORMATION ON THE DEPOSITED POWER IN DIFFERENT PARTS OF THE TARGET STATION.

TO ACHIEVE STATISTICAL CONVERGENCE AND STABILITY IN THE PEAK TDPD REQUIRES A MUCH LARGER NUMBER OF EVENTS IN BOTH mras1510 AND mars1512 SIMULATIONS. IN BOTH CASES IT APPEARS WE NEED AT LEAST 2E6 EVENTS TO REACH SOME RELIABLE ESTIMATION OF THE PEAK TDPD (IN SC#1+2 AT LEAST).

BOTH CODES HAVE IN GENERAL GOOD AGREEMENT IN THE DP IN DIFFERENT VOLUMES OF THE STATION (LIKE THE DP IN THE SCs) WITH FEW EXCEPTIONS. THE MOST IMPORTANT DIFFERENCES ARE OBSERVED IN THE Hg JET (~ - 25 kW) , SHVS#2 (~ - 15 kW) SH#1 (~ + 11 kW), Hg POOL INNER TUBE (~ - 10 kW) DEPOSITED POWER.

DING SET UP THE 5E06 SIMULATIONS IN PRINCETON CLUSTER AND HELPED ME LEARN AND SOLVE MY PROBLEMS IN SETTING UP AND RUNNING MULTI-DIRECTORY mars1512 JOBS. DURING THE PERIOD OF ONE DAY ONLY AND UNTIL 12 AM WE EXCHANGED OVER 10 EMAILS UNTIL I REALIZED THE PROBLEM WAS THE C-CELL ENVIOREMENT I WAS WORKING.

I AM REALLY GRATEFUL FOR HIS HELP AND PATIENCE.

SOMETHING OF THE LAST MOMENT ...

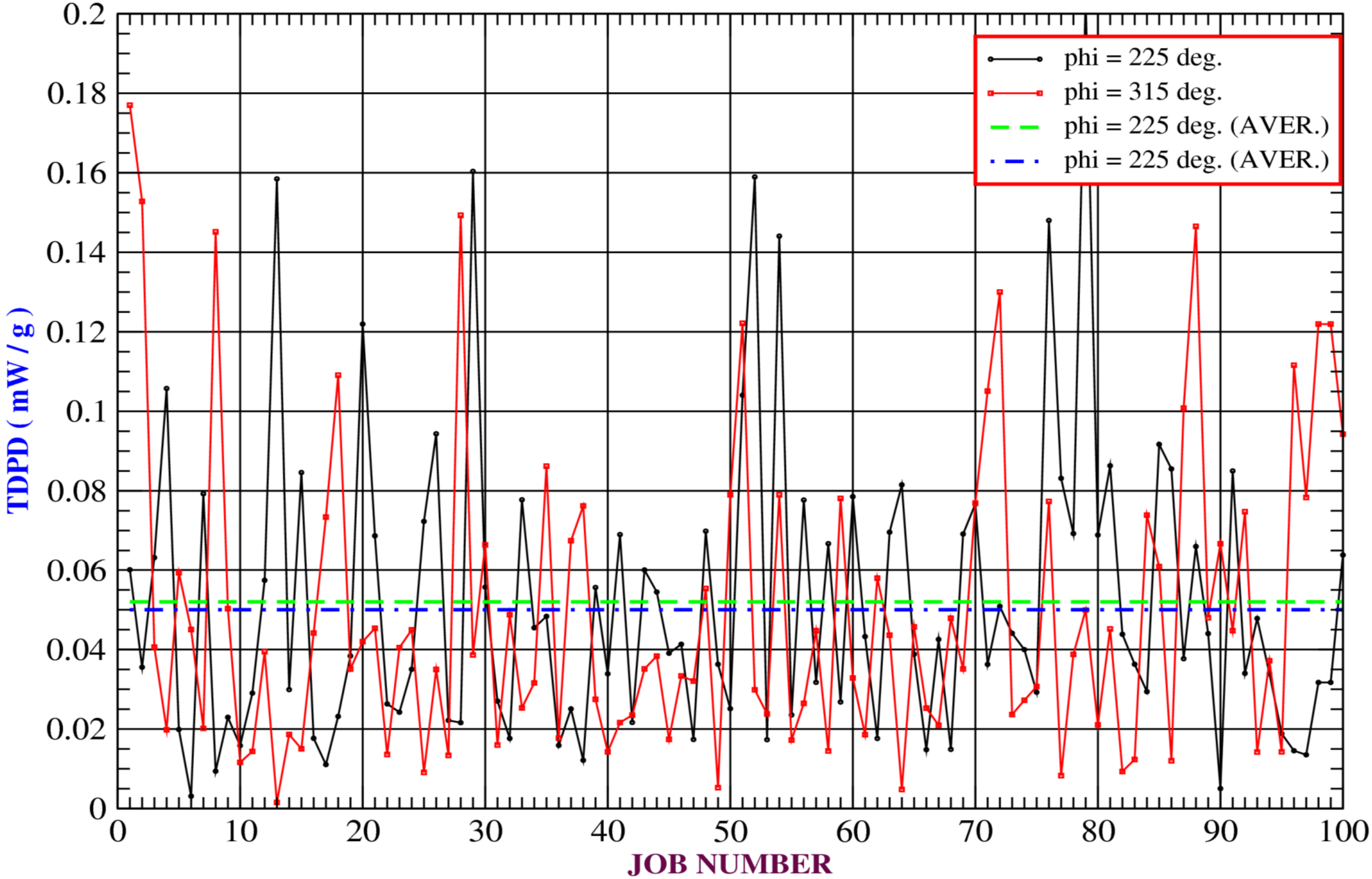
DING EMAILED ME YESTARDAY FOR PLOTTING A PARAMETER FROM MY STUDIES AS THE JOB NUMBER FUNCTION. WE AGREED THE PARAMETER TO BE THE TDPD FOR THE PIECES WITH PEAK TDPD.

UNFORTUNATELY THE DATA FROM THE SECOND JOB USED FOR THE PLOTS IN PREVIOUS PAGES HAVE BEEN DELETED AND A 2E06 WITH 100 x 2E04 SUB-DIRECTORY JOBS IS RUNNING NOW IN ITS PLACE.

FOR THE PLOT IN NEXT PAGE I CHOOSE THE TDPD FOR “PIECES” #137 AND # 176 THAT I HAVE THE HIGHEST AND SECOND HIGHEST TDPD FROM THE SECOND JOB. IN THE FIRST JOB WE HAVE THE FOURTH AND SIXTH LARGEST TDPD FOR THESE “PIECES” (THE PEAK TDPD ~ 0.0631 mW / g AT 345 deg.) .

I BELIEVE IT IS ADEQUATE TO GIVE US AN IDEA ABOUT THE FLUCTUATION OF THE TDPD IN PIECES WITH THE MOST DP.

TDPD variation vs. job number for 225 deg. and 315 deg. for the segmentation "piece"
with average peak TDPD (5 E06 = 100x 5E04 jobs, Ding first job set up).



AVERAGE TDPD mars1512 (5E06 = 100 x 5E04) -- 225 deg ~ 0.0520 mW / g sigma ~ 0.0380 mW / g
AVERAGE TDPD mars1512 (5E06 = 100 x 5E04) -- 315 deg ~ 0.0497 mW / g sigma ~ 0.0383 mW / g
IF INSTEAD OF 100 SUB-JOBS WE HAVE 50 WITH MORE EVENTS EACH IS SIGMA GOING TO BE SMALLER ?