

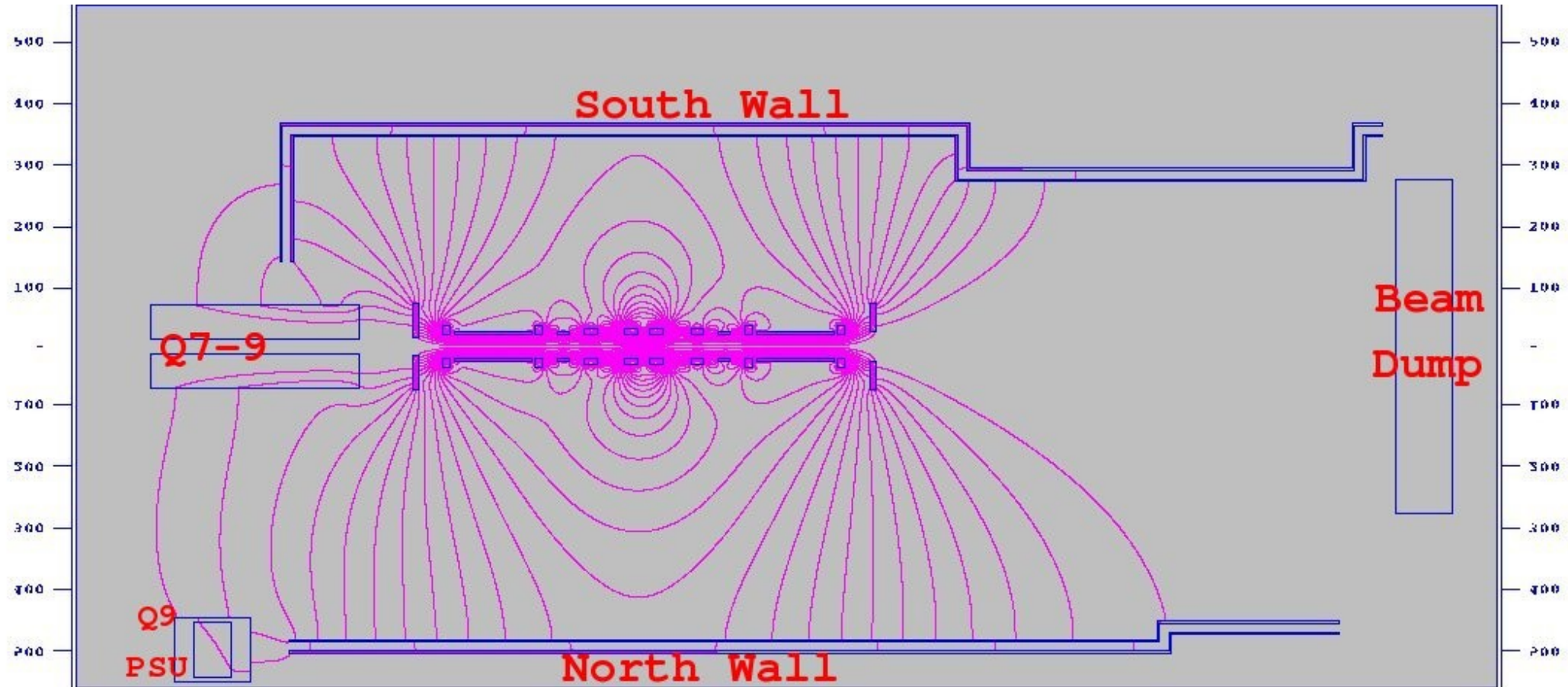


# ***Can 2D modelling help the 3D effort?***

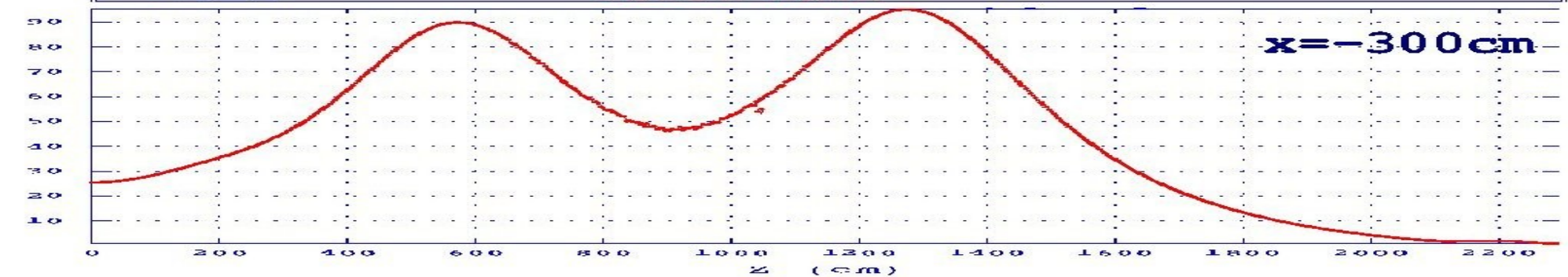
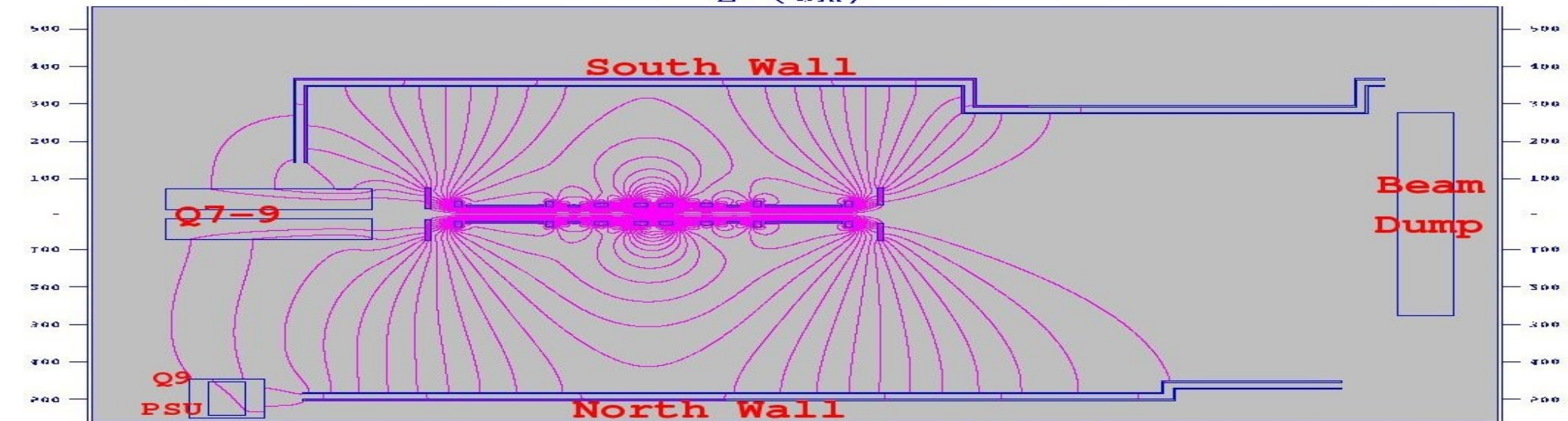
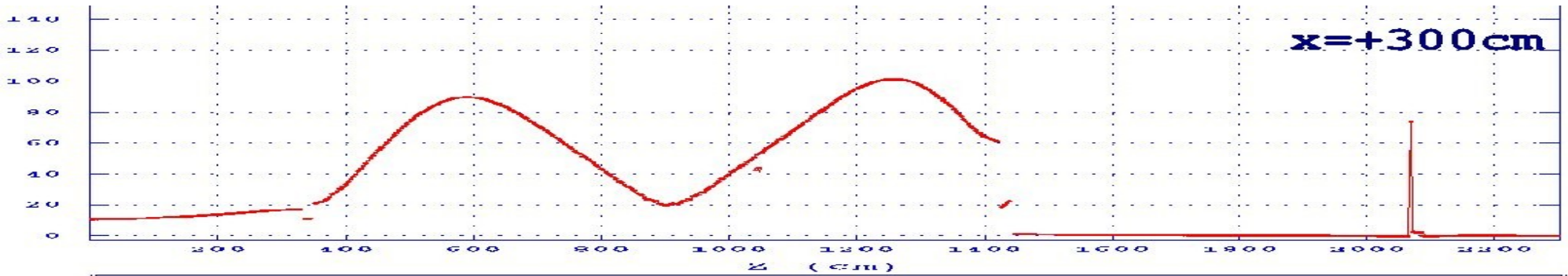
ILLINOIS INSTITUTE  
OF TECHNOLOGY

***Pierrick Hanlet***

# Step IV layout – $p=240\text{MeV}/c$ base

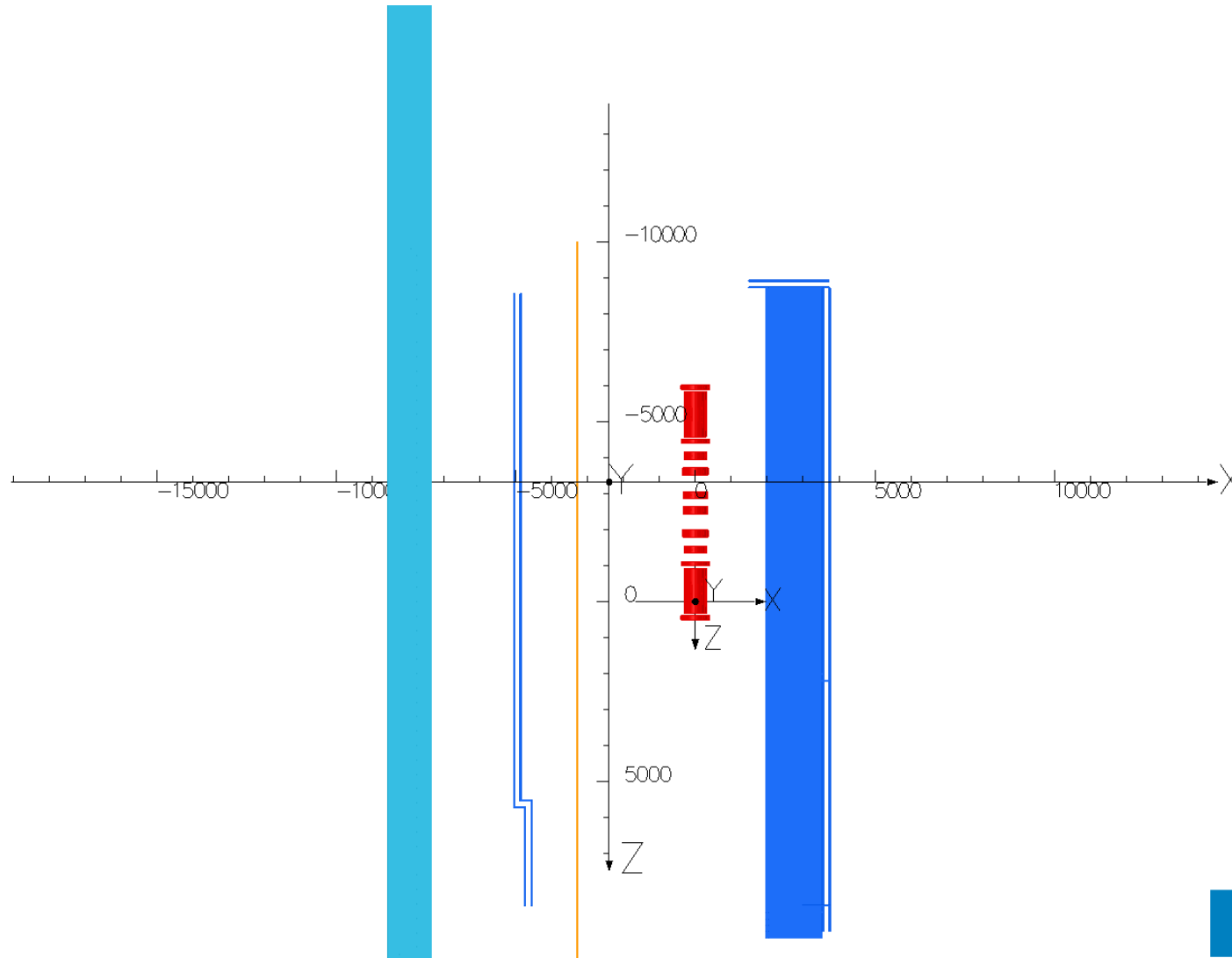


# Step IV layout – $p=240\text{MeV}/c$ base – normalization



# Step IV layout – $p=240\text{MeV}/c$ base 3D model

11/Sep/2012 16:34:44



## UNITS

Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm <sup>2</sup>
Power	W
Force	N

## MODEL DATA

Hall\_Test\_06.op3  
TOSCA Magnetostatic  
Nonlinear materials  
Simulation No 1 of 1  
4187564 elements  
6732372 nodes  
12 conductors  
Nodally interpolated fields  
Activated in global coordinates

## Field Point Local Coordinates

Local = Global

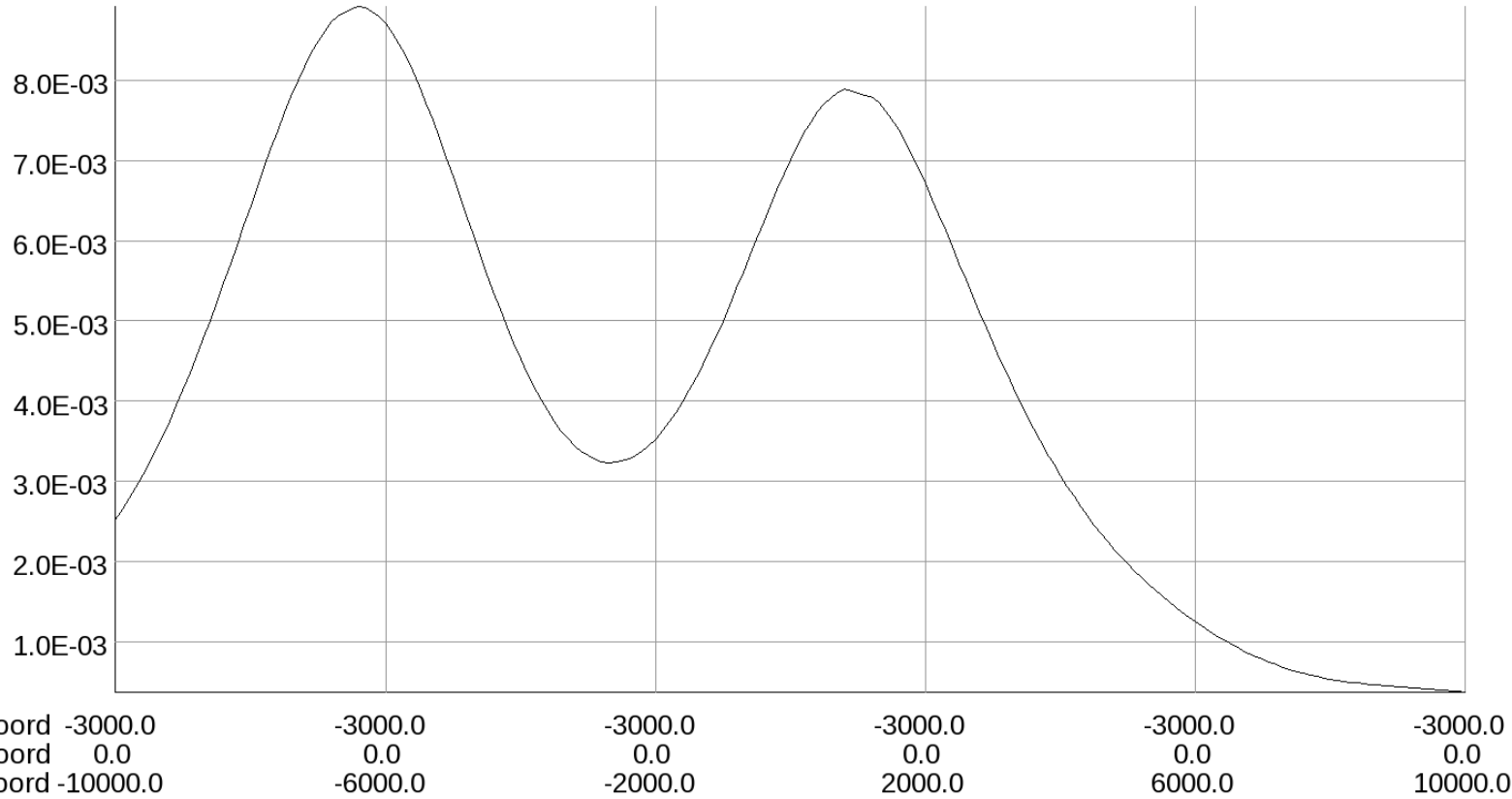
## FIELD EVALUATIONS

Cartesian	CARTESIAN	50x50	Cartesian
(nodal)			
x=-7000.0 to	y=-1000.0	z=-15000.0 to	
-7.7716E-13		-5000.0	
Line	LINE (nodal)	201	Cartesian
x=-3300.0	y=0.0	z=-10000.0 to	
		10000.0	

Opera

# Step IV layout – p=240MeV/c base – normalization

11/Sep/2012 16:38:45



UNITS	
Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm <sup>2</sup>
Power	W
Force	N

**MODEL DATA**  
Hall\_Test\_06.op3  
TOSCA Magnetostatic  
Nonlinear materials  
Simulation No 1 of 1  
4187564 elements  
6732372 nodes  
12 conductors  
Nodally interpolated fields  
Activated in global coordinates

**Field Point Local Coordinates**  
Local = Global

FIELD EVALUATIONS			
Cartesian	CARTESIAN	50x50	Cartesian
(nodal)			
x=-7000.0 to	y=-1000.0	z=-15000.0 to	
-7.7716E-13	-5000.0		
Line	LINE (nodal)	201	Cartesian
x=-3000.0	y=0.0	z=-10000.0 to	
		10000.0	

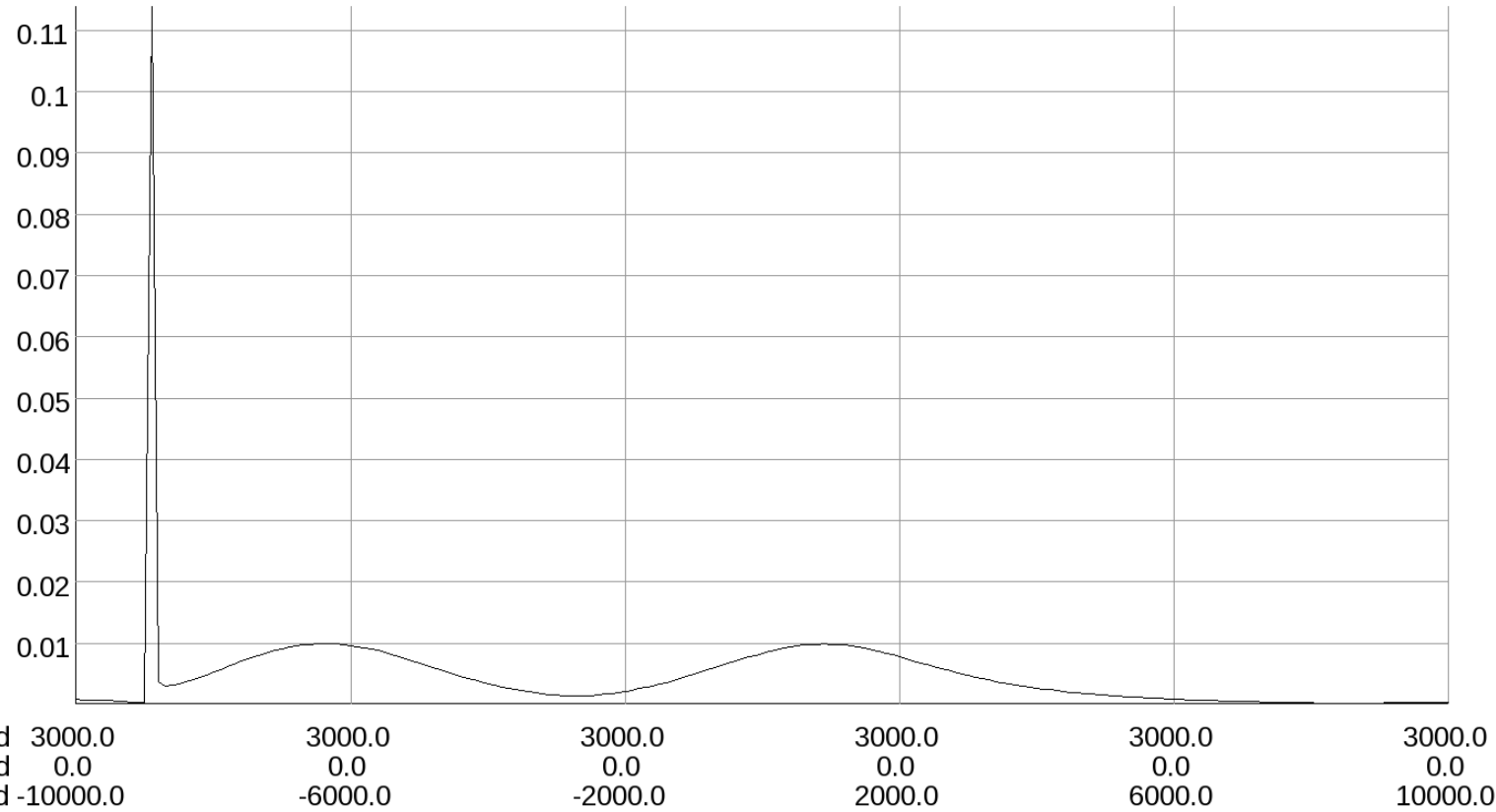
Opera

**2D has ~45G vs 3D ~33G at FC center in Z:**

- errors in currents (2D)
- different objects in simulation
- but NOT wildly different

# Step IV layout – p=240MeV/c base – normalization

11/Sep/2012 16:38:01



Component: BMOD, from buffer: Line, Integral = 96.4420426207193

**UNITS**  
Length mm  
Magn Flux Density T  
Magnetic Field A/m  
Magn Scalar Pot A  
Current Density A/mm<sup>2</sup>  
Power W  
Force N

**MODEL DATA**  
Hall\_Test\_06.op3  
TOSCA Magnetostatic  
Nonlinear materials  
Simulation No 1 of 1  
4187564 elements  
6732372 nodes  
12 conductors  
Nodally interpolated fields  
Activated in global coordinates

**Field Point Local Coordinates**  
Local = Global

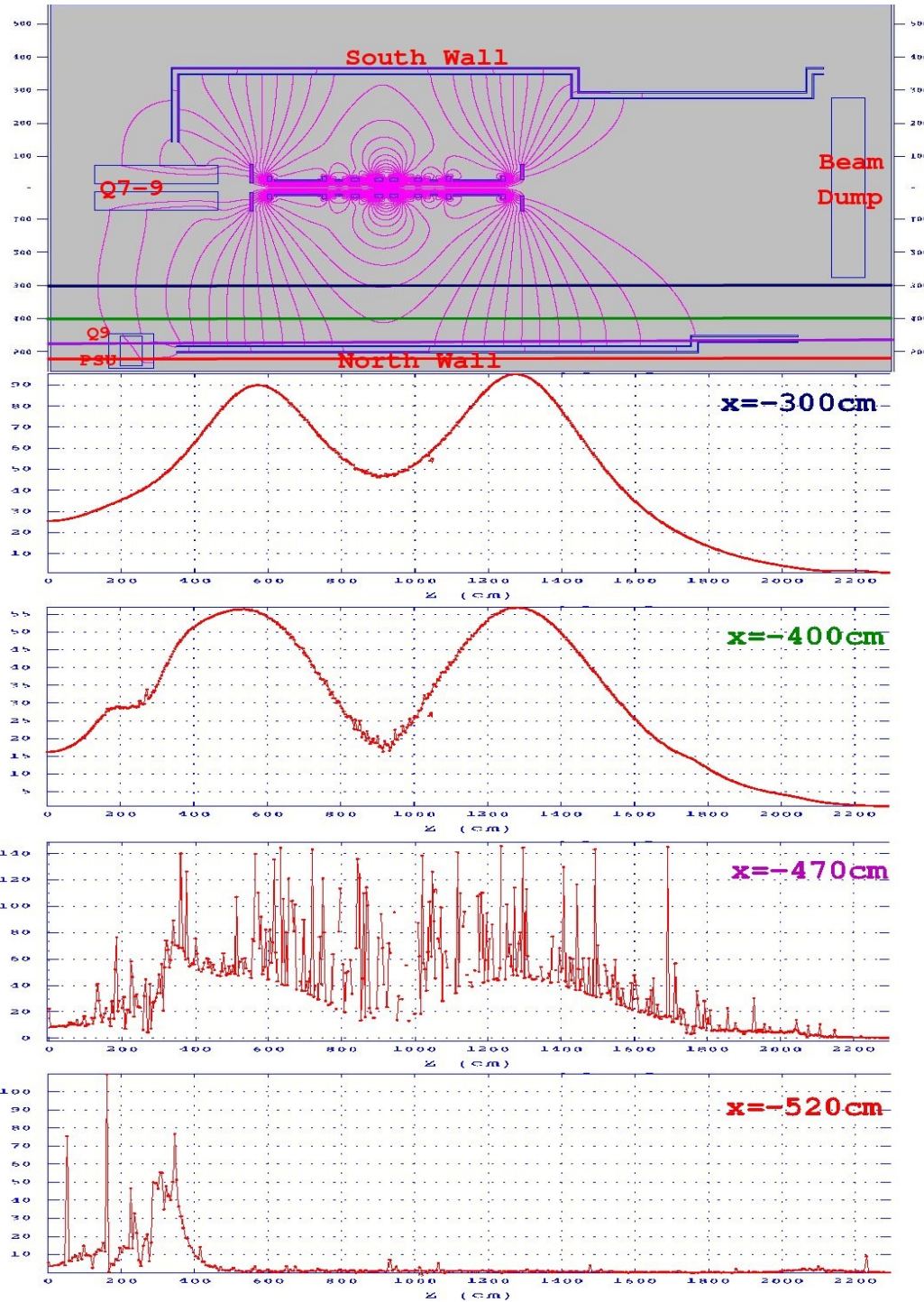
**FIELD EVALUATIONS**

Cartesian (nodal)	CARTESIAN	50x50	Cartesian
x=-7000.0 to -7.7716E-13		y=-1000.0	z=-15000.0 to -5000.0
Line	LINE (nodal)	201	Cartesian
x=3000.0		y=0.0	z=-10000.0 to 10000.0

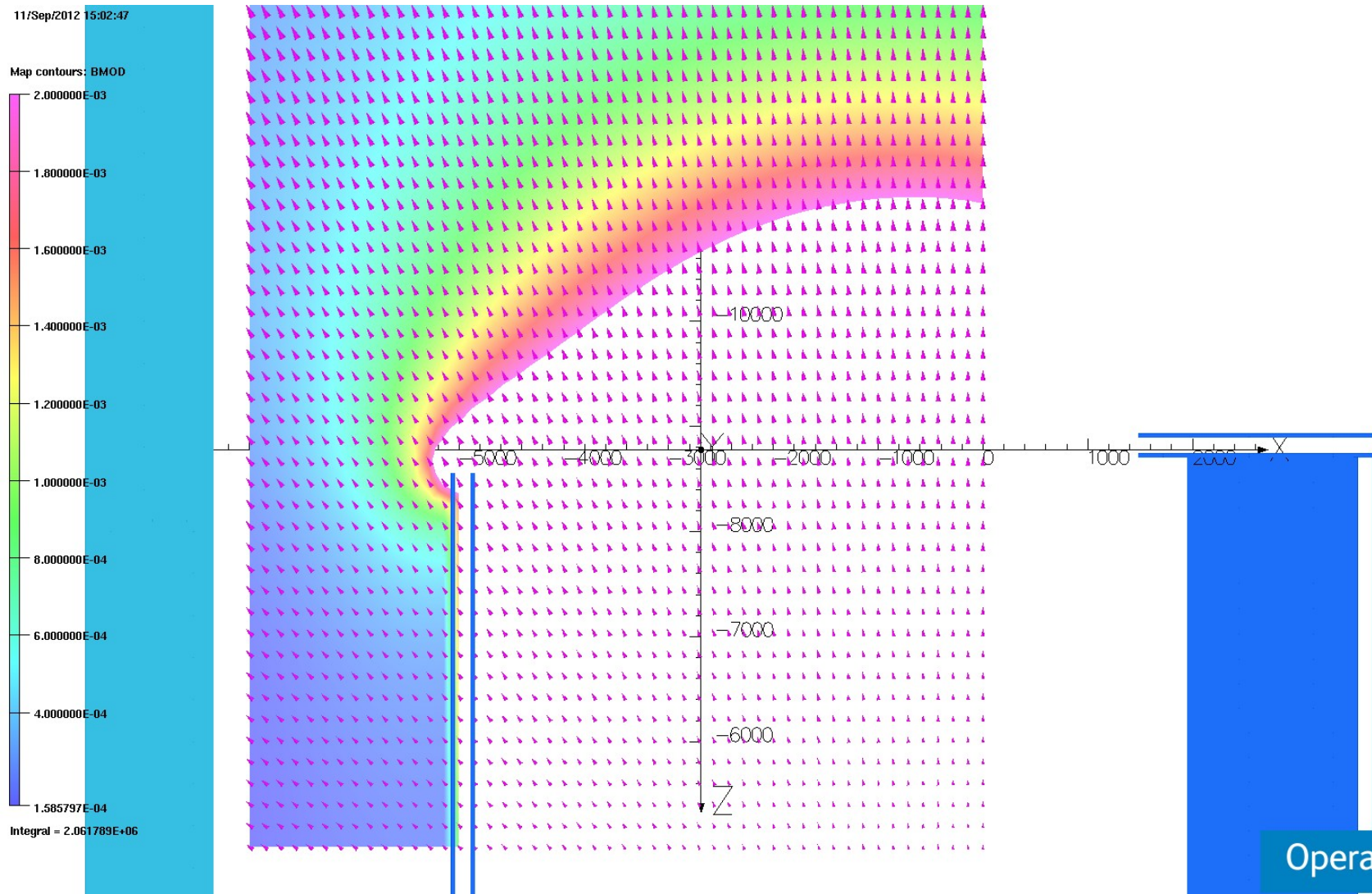
Opera

Not ready yet!

# Step IV layout – $p=240\text{MeV}/c$ base – normalization



# Step IV layout – 3D at different y: beam height



## UNITS

Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm <sup>2</sup>
Power	W
Force	N

## MODEL DATA

Hall\_Test\_06.op3  
TOSCA Magnetostatic  
Nonlinear materials  
Simulation No 1 of 1  
4187564 elements  
6732372 nodes  
12 conductors  
Nodally interpolated fields  
Activated in global coordinates

## Field Point Local Coordinates

Local = Global

## FIELD EVALUATIONS

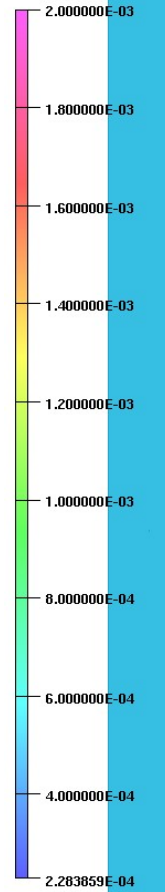
Cartesian	CARTESIAN	50x50 Cartesian
(nodal)		
x=-7000.0 to	y=0.0	z=-15000.0 to
-7.7716E-13		-5000.0



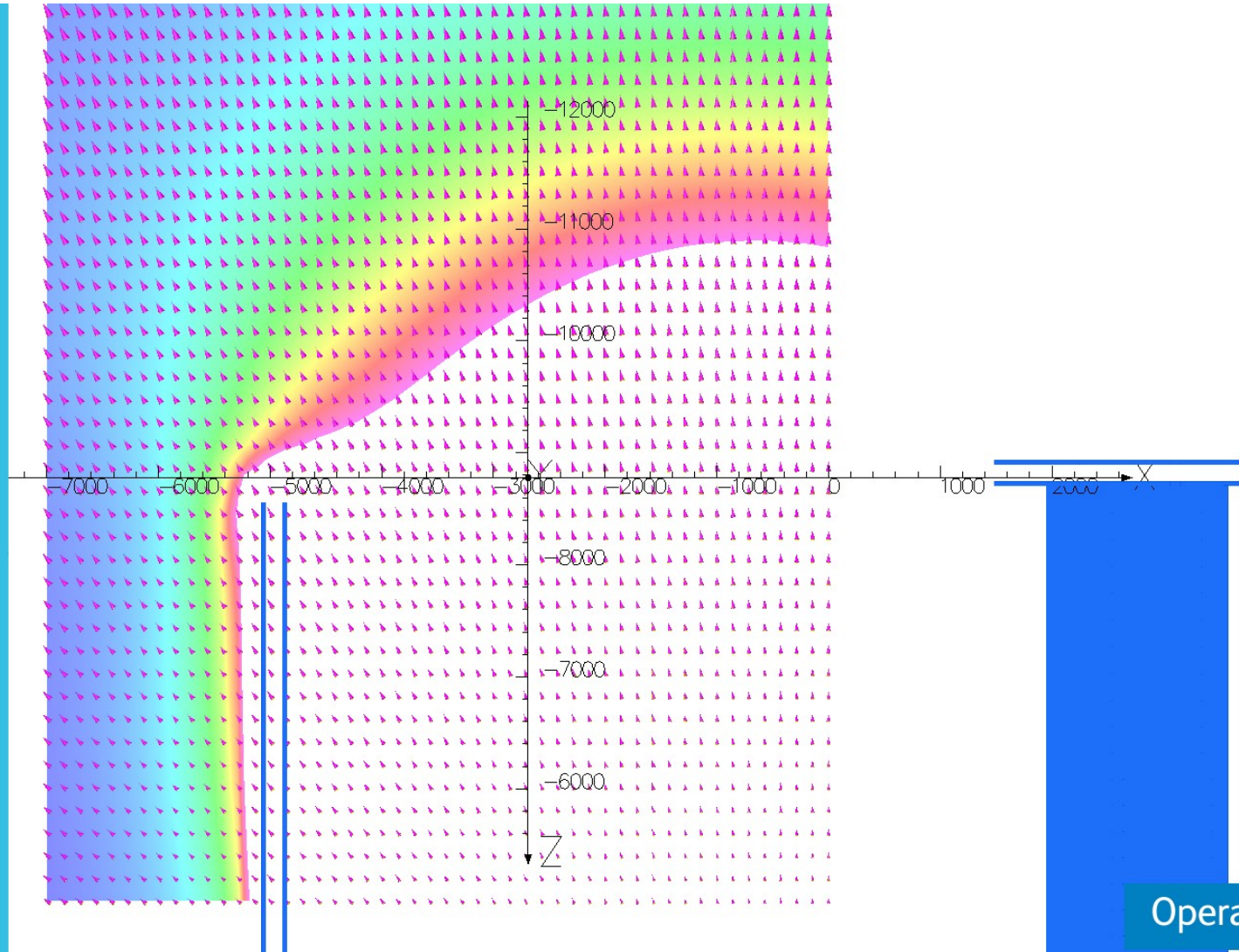
# Step IV layout – 3D at different y: floor

11/Sep/2012 15:04:04

Map contours: BMOD



Integral = 3.507473E+05



## UNITS

Length	mm
Magn Flux Density T	
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm <sup>2</sup>
Power	W
Force	N

## MODEL DATA

Hall\_Test\_06.op3  
TOSCA Magnetostatic  
Nonlinear materials  
Simulation No 1 of 1  
4187564 elements  
6732372 nodes  
12 conductors  
Nodally interpolated fields  
Activated in global coordinates

## Field Point Local Coordinates

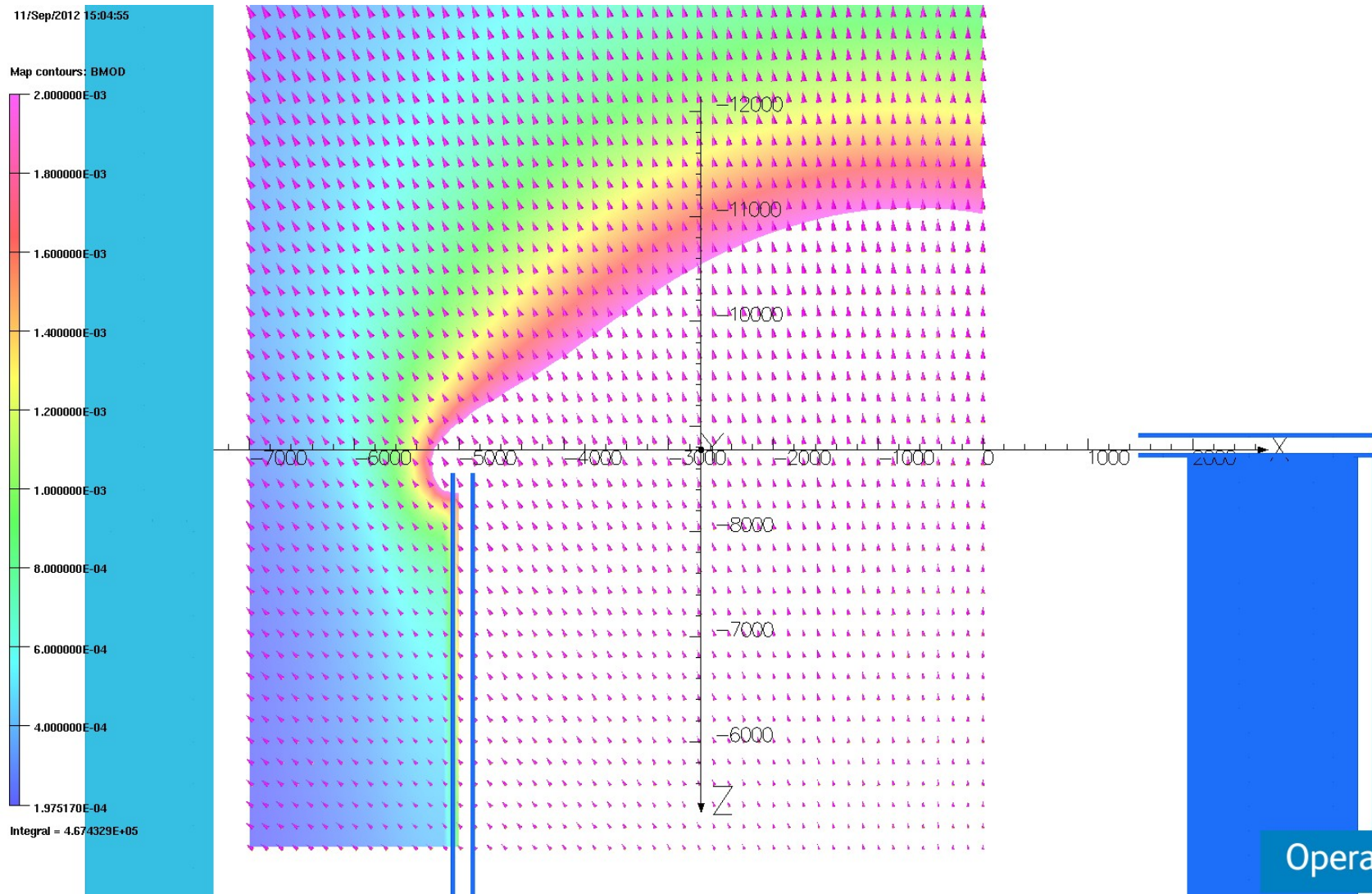
Local = Global

## FIELD EVALUATIONS

Cartesian	CARTESIAN	50x50	Cartesian
(nodal)			
x=-7000.0 to		y=-1684.0	z=-15000.0 to
-7.7716E-13			-5000.0

Opera

# Step IV layout – 3D at different y: +1m



## UNITS

Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm <sup>2</sup>
Power	W
Force	N

## MODEL DATA

Hall\_Test\_06.op3  
TOSCA Magnetostatic  
Nonlinear materials  
Simulation No 1 of 1  
4187564 elements  
6732372 nodes  
12 conductors  
Nodally interpolated fields  
Activated in global coordinates

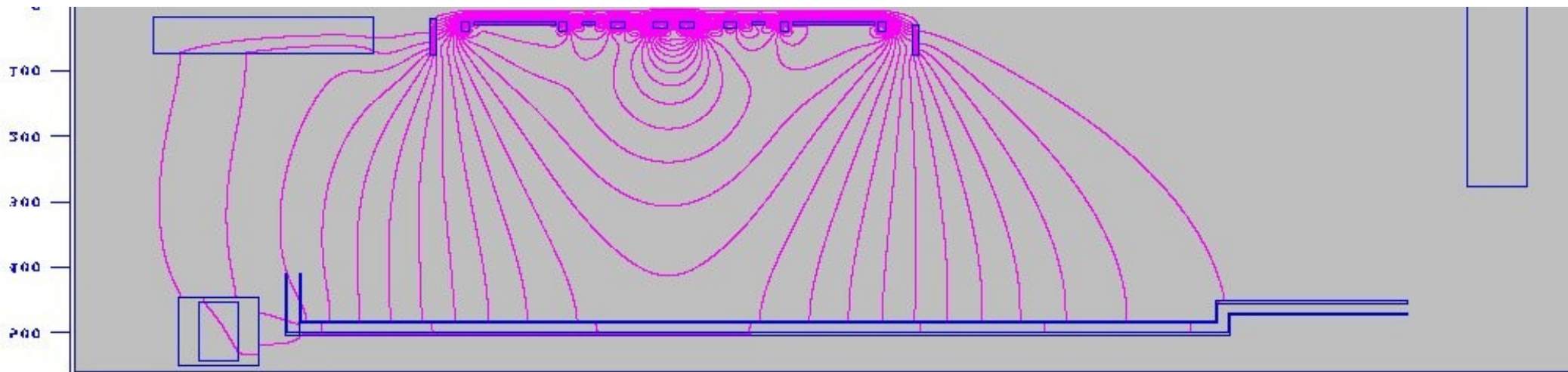
## Field Point Local Coordinates

Local = Global

## FIELD EVALUATIONS

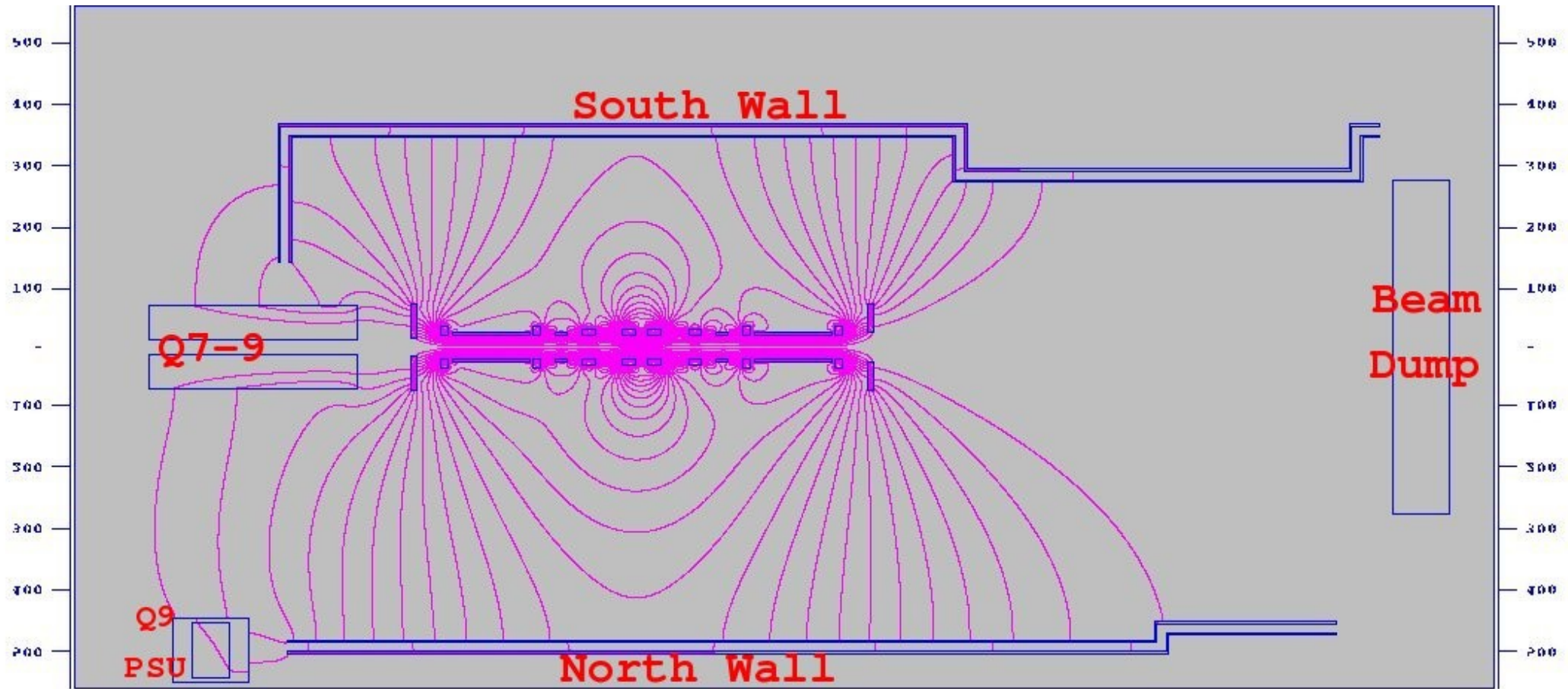
Cartesian	CARTESIAN	50x50	Cartesian
(nodal)	x=-7000.0 to	y=-1000.0	z=-15000.0 to
	-7.7716E-13	-5000.0	

# Step IV layout – $p=240\text{MeV}/c$ base



**Mike was correct, the N wall extension won't work.**

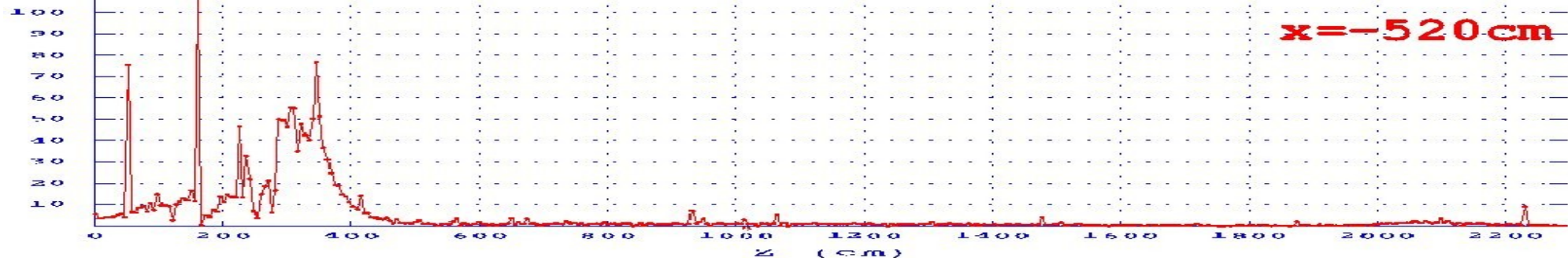
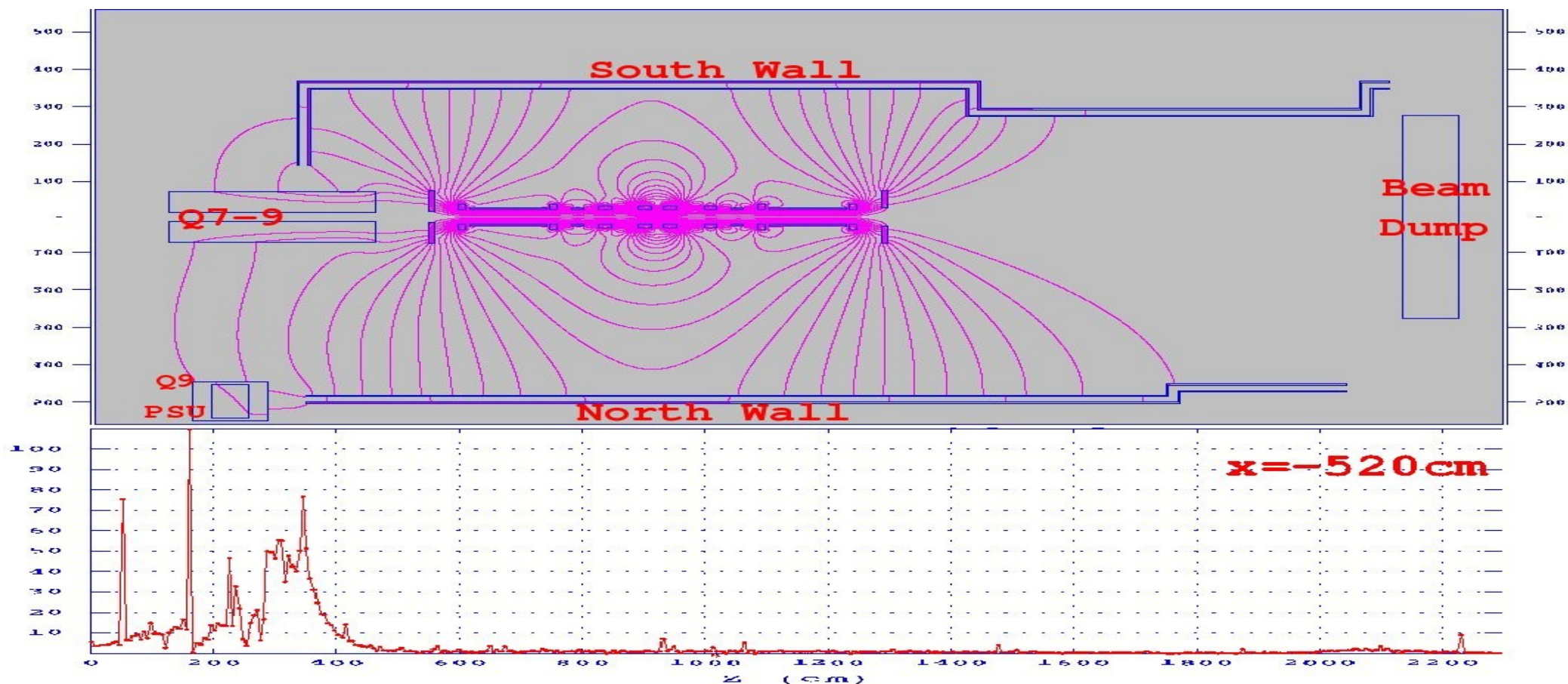
# Step IV layout – $p=240\text{MeV}/c$ base



## Notes:

- little to no field at substation
- little to no field at HV rack

# Step IV layout – $p=240\text{MeV}/c$ base



Magnetic field data from file STEP1V\_BASE240S.DAT  
Problem title line 1: MICE StepIV Solenoid Magnets -- South wall

