



R9 Progress

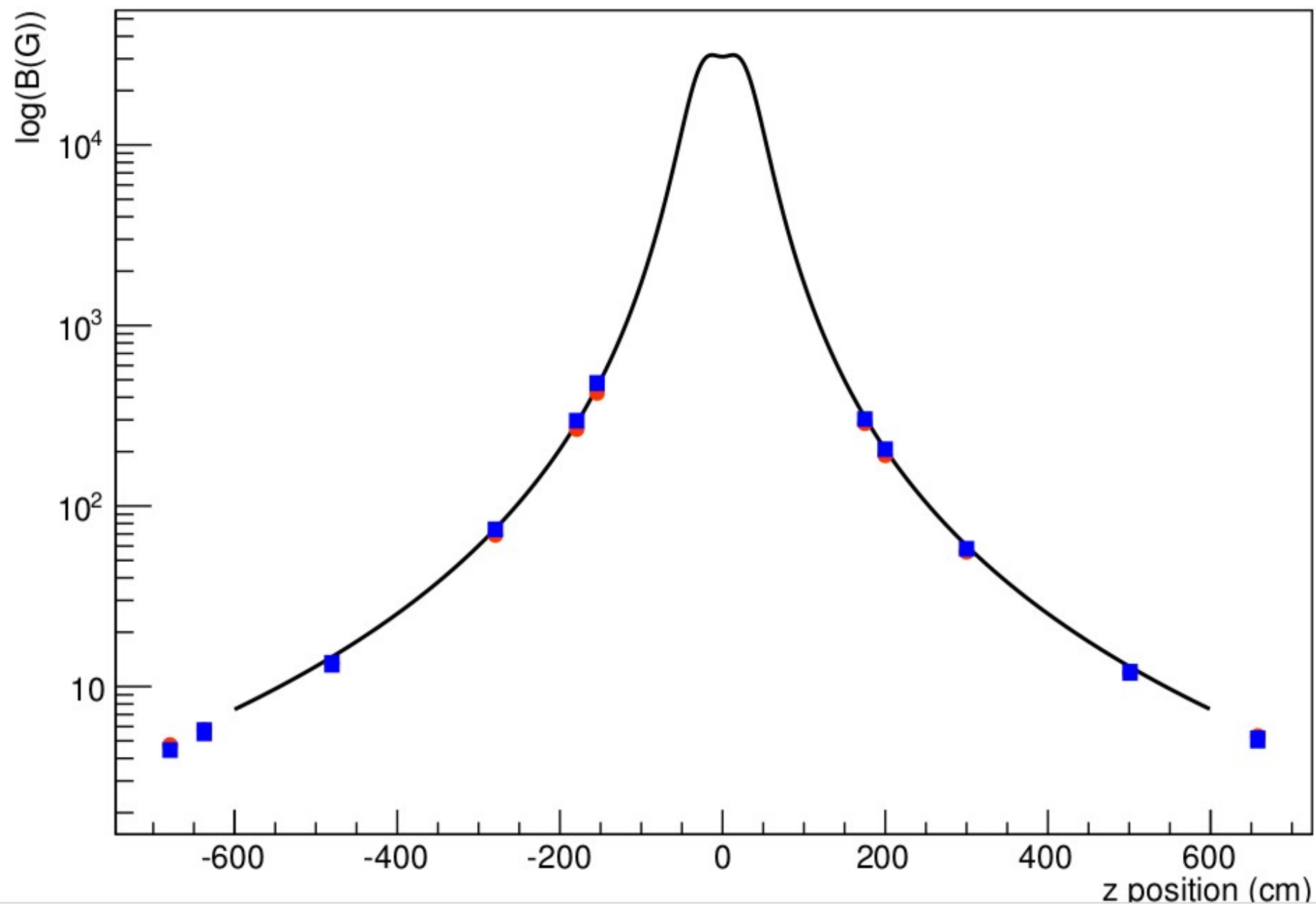
Melissa George

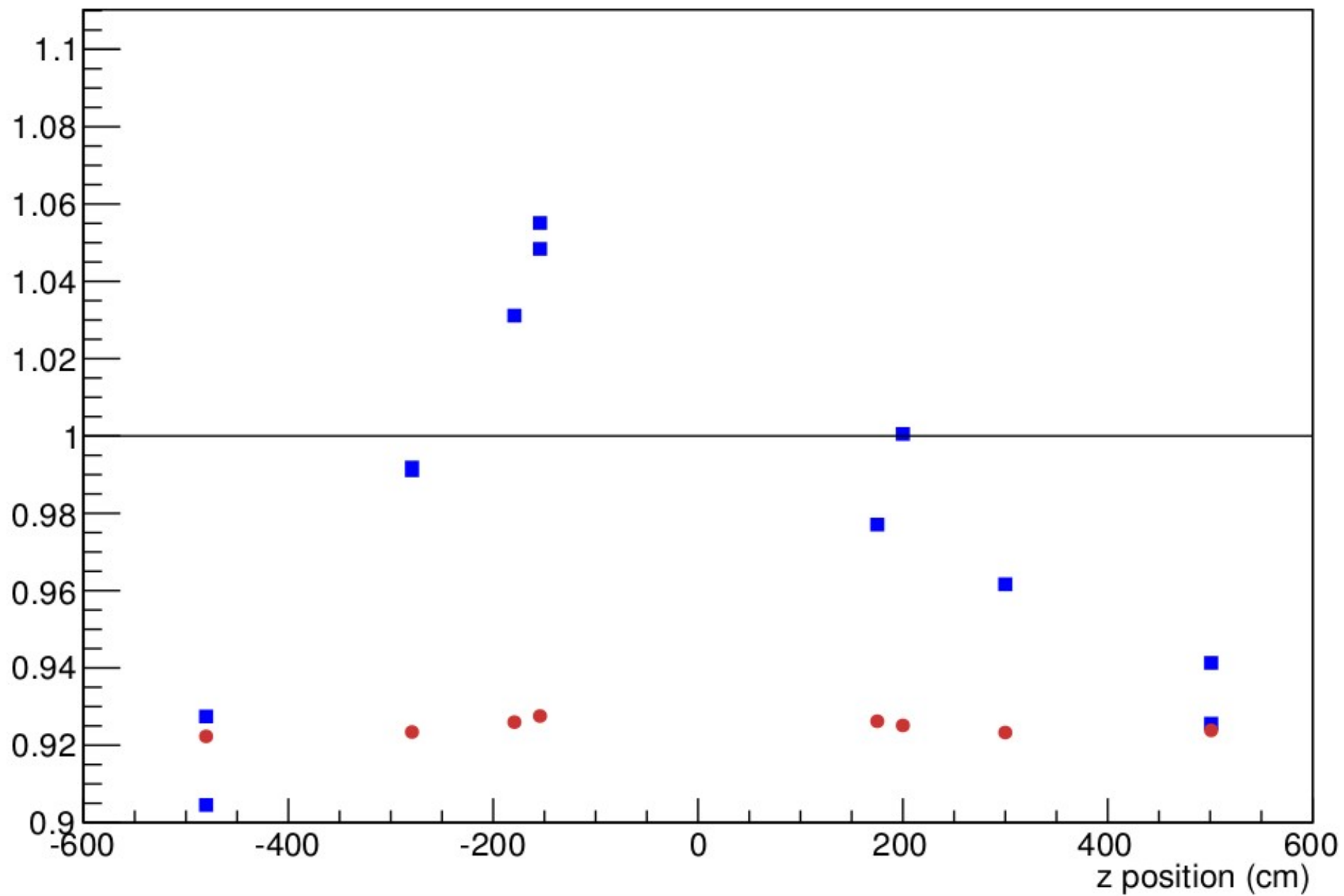
11/6/13

Field Comparisons Using Integration and Improved Mesh

- Looks much better as you will see
 - Celeste to present fully

Comparing model data to probe data at $x=0, y=0$



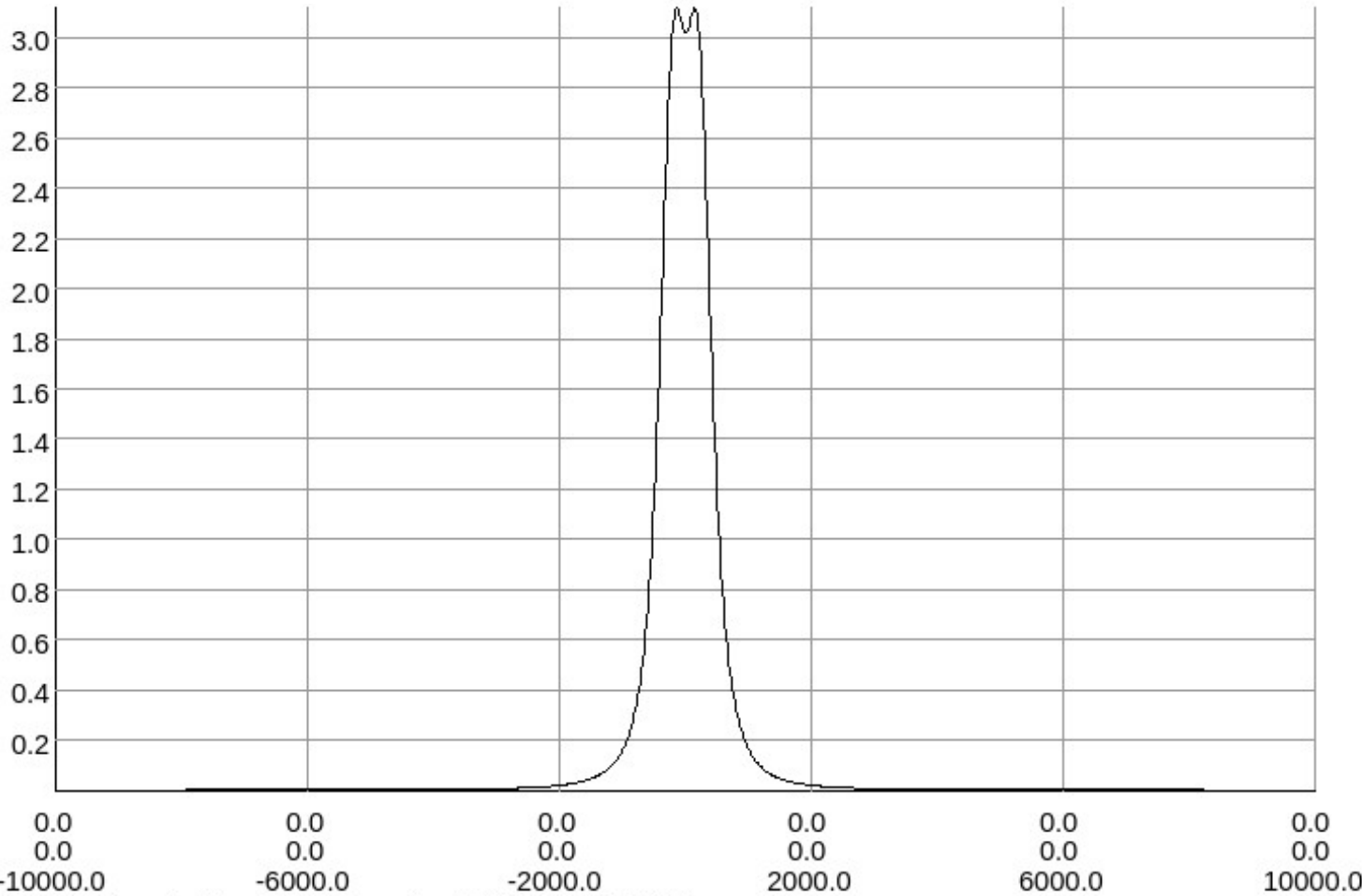
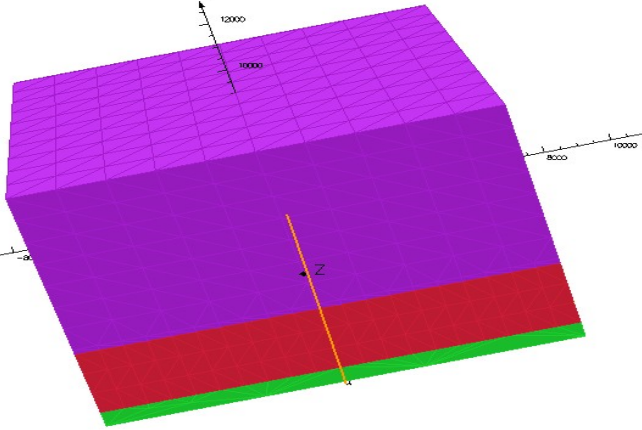


Fields Along Lines

- Full data set in Bx By Bz Bmod given to Celeste for comparison
 - Fields calculated:
 - Along z for (x=0, y=0), (x=0, y=800mm), (x=0, y=-800mm), (x=0, y=-1474mm)
 - Along x for (y=0, z=0), (y=800mm, z=0), (y=-800mm, z=0), (y=-1474mm, z=0)

R9 Fields

**X=0, Y=0
BMOD**



X coord 0.0 0.0 0.0 0.0 0.0 0.0
Y coord 0.0 0.0 0.0 0.0 0.0 0.0
Z coord -10000.0 -6000.0 -2000.0 2000.0 6000.0 10000.0

Component: B, from buffer: Line, Integral = 3164.87758621459

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

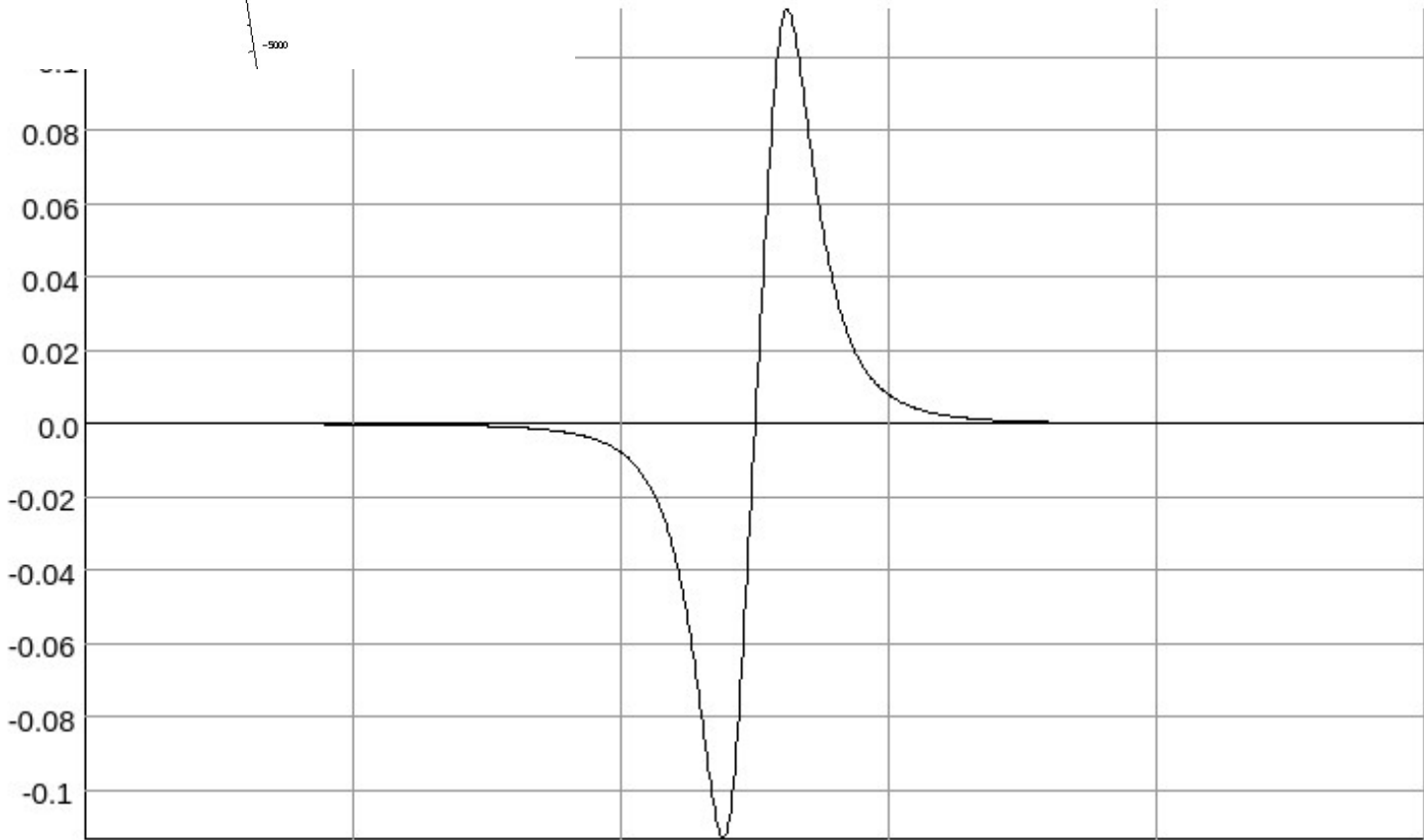
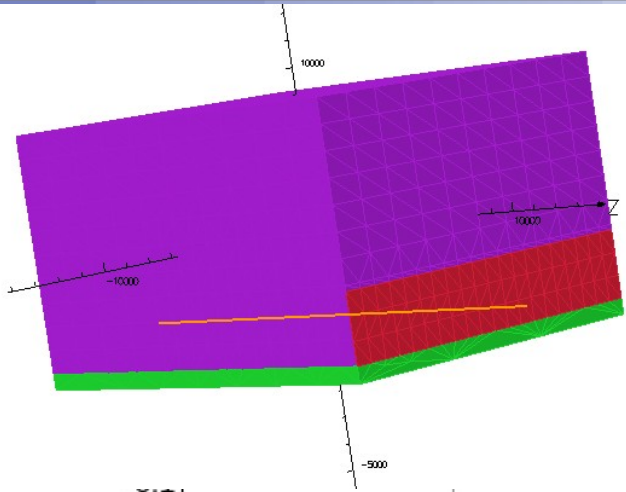
MODEL DATA
R9ModelIncMildAvWalls
V4.op3
TOSCA Magnetostatic
Linear materials
Simulation No 1 of 1
2254366 elements
442989 nodes
2 conductors
Fields by integration
Activated in global
coordinates

**Field Point Local
Coordinates**
Local = Global

FIELD EVALUATIONS
Line LINE 1001 Carte
(integ sian
ral)
x=0.0 y=0.0 z=-10
000.0
to
1000
0.0

R9 Fields

**X=0, Y=800
By**



X coord	0.0	0.0	0.0	0.0	0.0	0.0
Y coord	800.0	800.0	800.0	800.0	800.0	800.0
Z coord	-10000.0	-6000.0	-2000.0	2000.0	6000.0	10000.0

Component: BY, from buffer: Line, Integral = -0.0205768818943516

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

MODEL DATA
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 2254366 elements
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 2 conductors
 Fields by integration
 Activated in global
 coordinates

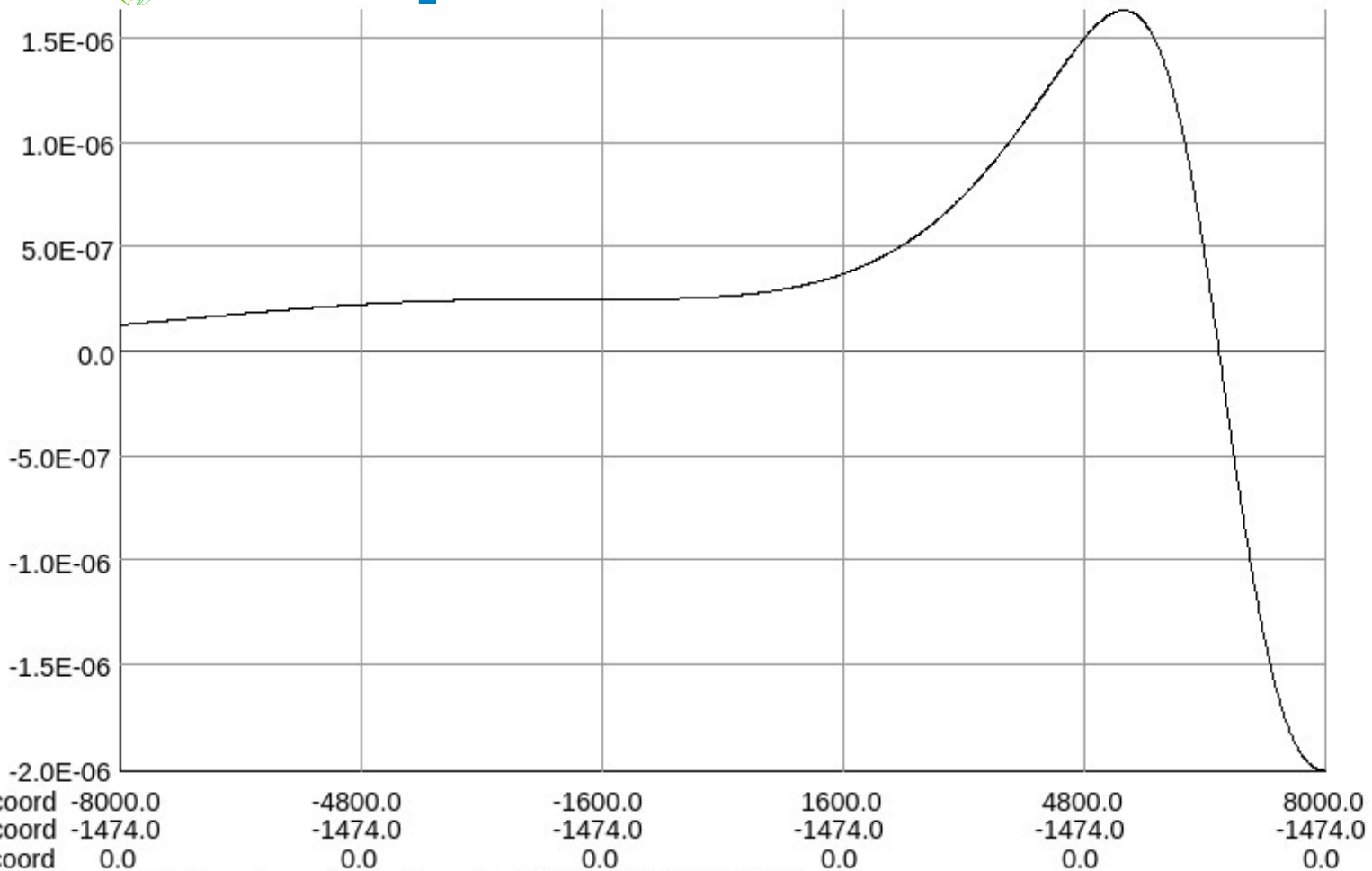
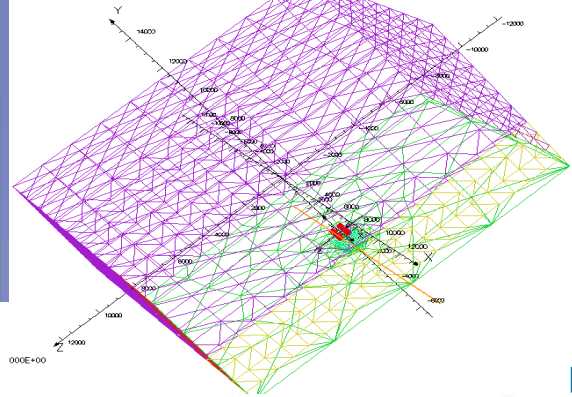
**Field Point Local
 Coordinates**
 Local = Global

FIELD EVALUATIONS

Line	LINE	1001	Carte
	(integ	sian	
	ral)		
	x=0.0	y=80	z=-10
		0.0	000.0
			to
			1000
			0.0

R9 Fields

Y= -1474, Z=0
Bx



Component: BX, from buffer: Line, Integral = 5.18389128468638E-03

R9MODEL\MAGNETO\AV\watts
V4.op3
TOSCA Magnetostatic
Linear materials
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Fields by integration
Activated in global
coordinates

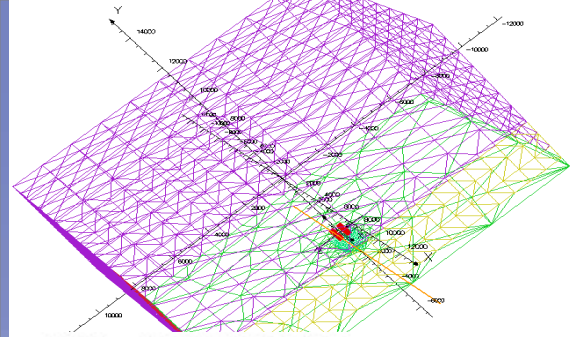
**Field Point Local
Coordinates**
Local = Global

FIELD EVALUATIONS

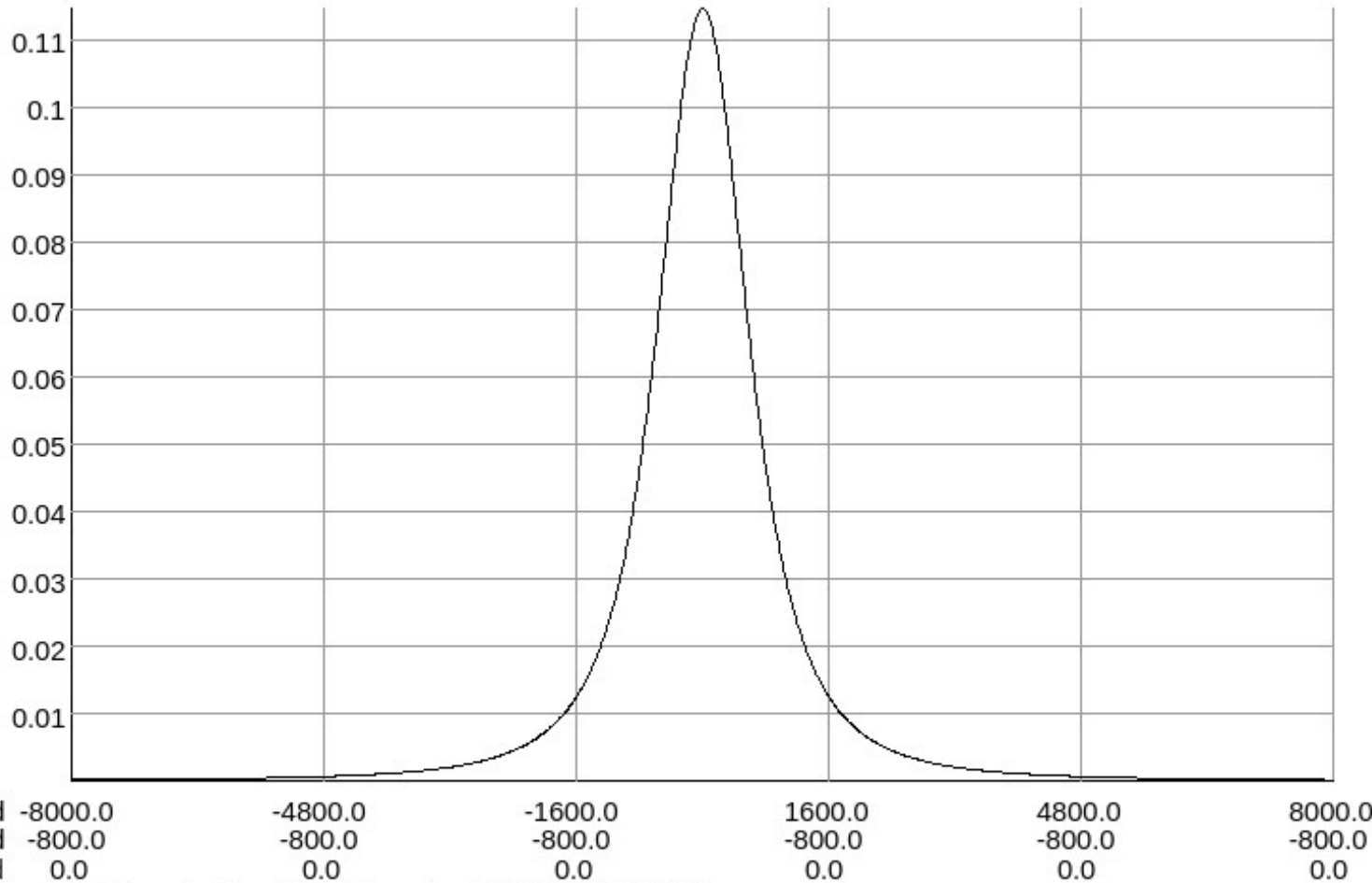
Line	LINE	1601	Carte
(inte	gral)	sian	gral)
x=-80	y=-14	z=0.0	
00.0	74.0		
to			
8000.			
0			
Carte	CART	10x1	Carte
sian	ESIA	0	sian
N	(inte		gral)
x=-80	y=-10	z=0.0	
00.0	00.0		
to	to		
1000	1000		
0.0	0.0		

R9 Fields

**Y= -800, Z=0
BMOD**



11/Jun/2013 14:27:59



Component: B, from buffer: Line, Integral = 199.847662979451

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Fields by integration
Activated in global
coordinates

**Field Point Local
Coordinates**
Local = Global

FIELD EVALUATIONS

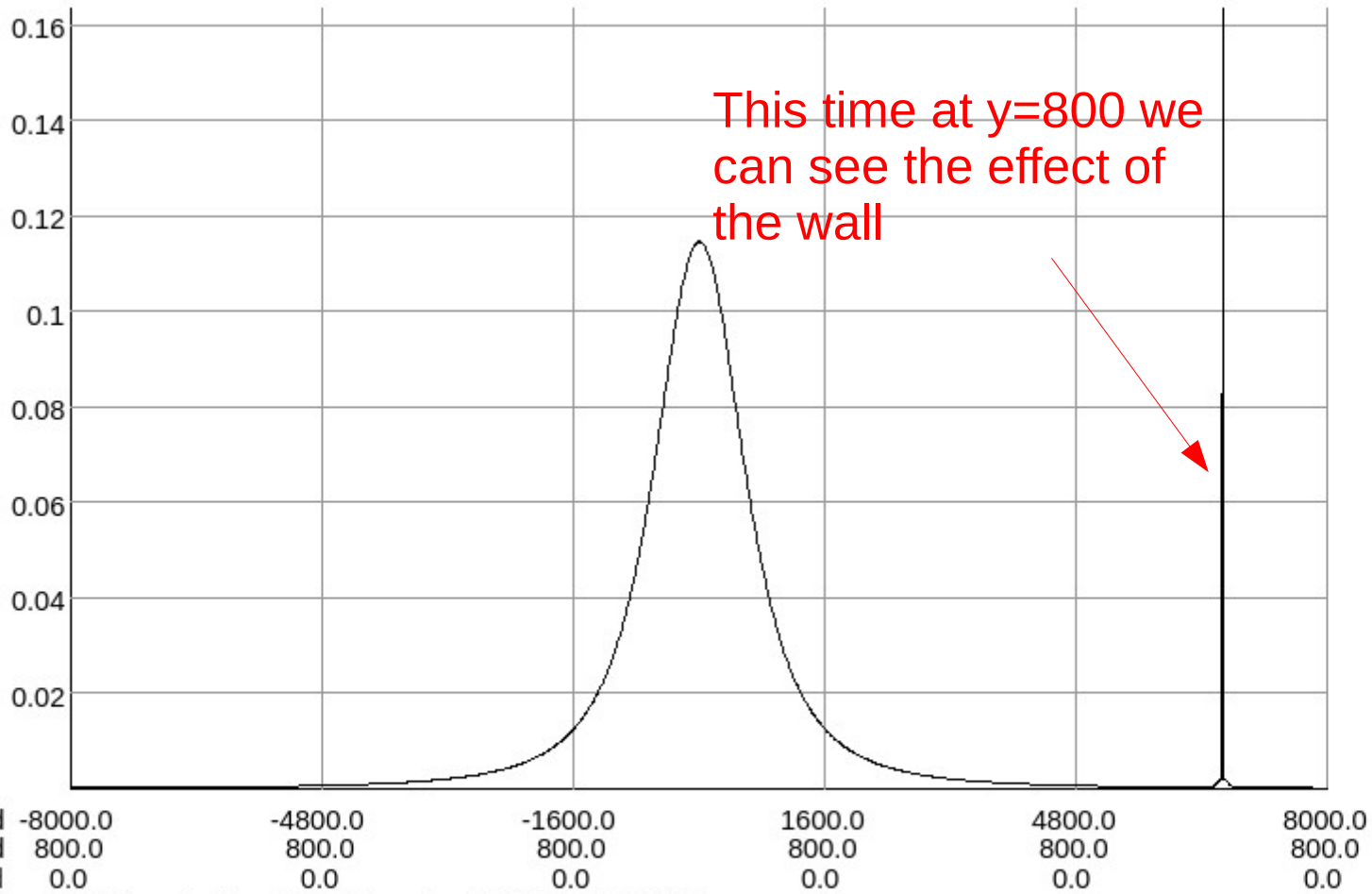
Line	LINE	1601	Carte
	(inte		sian
	gral)		
	x=-80	y=-8	z=0.0
	00.0	00.0	
	to		
	8000.		
	0		
Carte	CART	10x1	Carte
sian	ESIA	0	sian
	N		
	(inte		
	gral)		
	x=-10	y=-1	z=0.0
	0000	0000	
	0.0	00.0	

Opera

R9 Fields

Y= 800, Z=0
BMOD

11/Jun/2013 14:29:52



Component: B, from buffer: Line, Integral = 202.249348260199

MODEL DATA
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Activated in global
coordinates

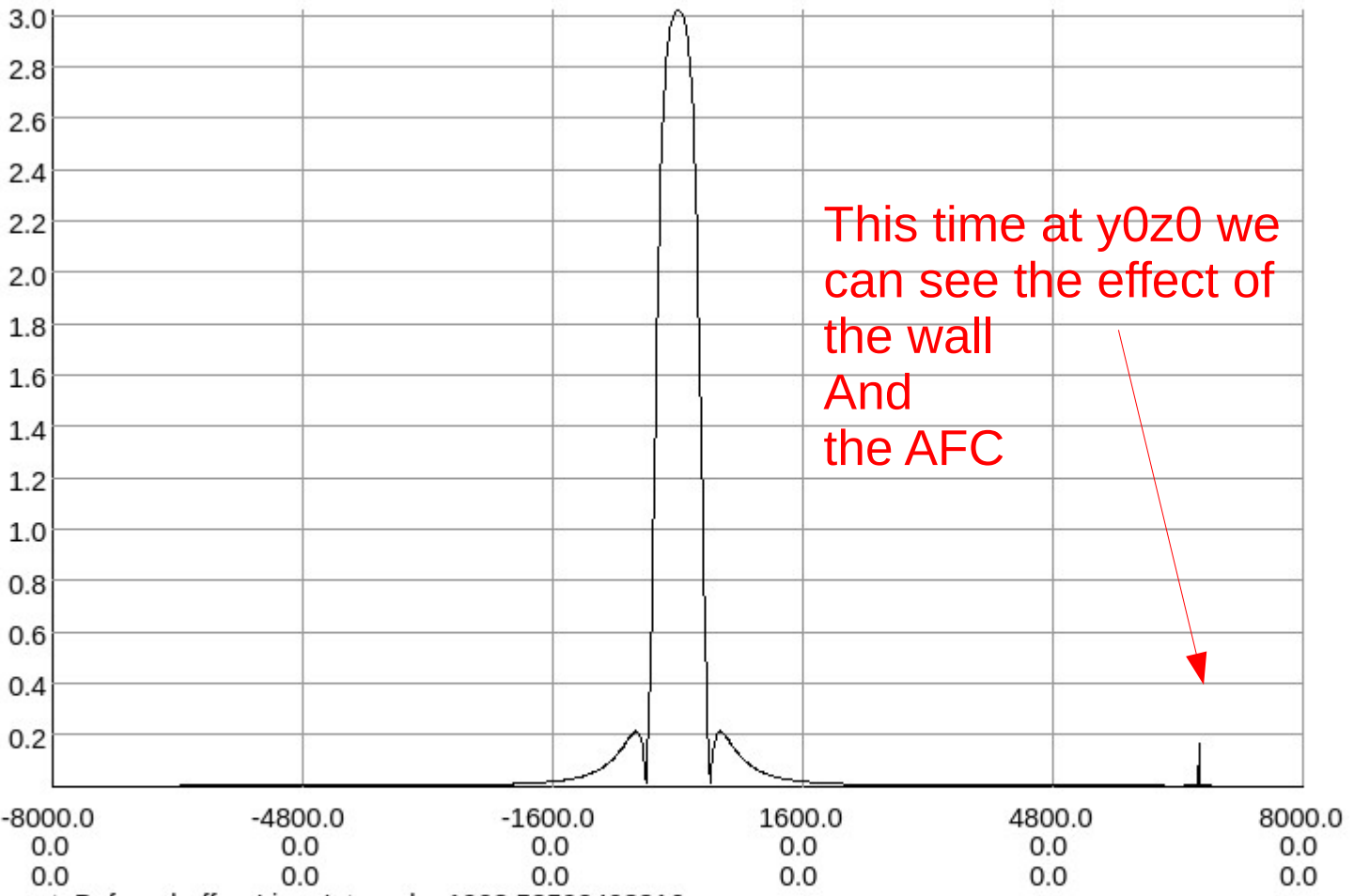
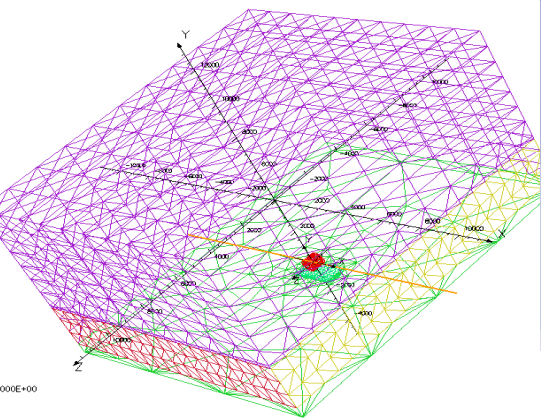
**Field Point Local
Coordinates**
Local = Global

FIELD EVALUATIONS

Line	LINE	1601	Carte
	(inte		sian
	gral)		
	x=-80	y=80	z=0.0
	00.0	0.0	
	to		
	8000.		
	0		
Carte	CART	10x1	Carte
sian	ESIA	0	sian
	N		
	(inte		
	gral)		
	x=-10	y=-1	z=0.0
	0000	0000	
	0.0	00.0	

R9 Fields

**Y= 0, Z=0
BMOD**



This time at y0z0 we
can see the effect of
the wall
And
the AFC

X coord -8000.0 -4800.0 -1600.0 1600.0 4800.0 8000.0
Y coord 0.0 0.0 0.0 0.0 0.0 0.0
Z coord 0.0 0.0 0.0 0.0 0.0 0.0

Component: B, from buffer: Line, Integral = 1908.58502408816

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Activated in global
coordinates

**Field Point Local
Coordinates**
Local = Global

FIELD EVALUATIONS

Line	LINE	1601	Carte
	(inte		sian
	gral)		
	x=-80	y=0.0	z=0.0
	00.0		
	to		
	8000.		
	0		
	Carte	CART 10x1	Carte
	sian	ESIA 0	sian
	N		
	(inte		
	gral)		
	x=-10	y=-1	z=0.0
	0000	0000	
	0.0	00.0	

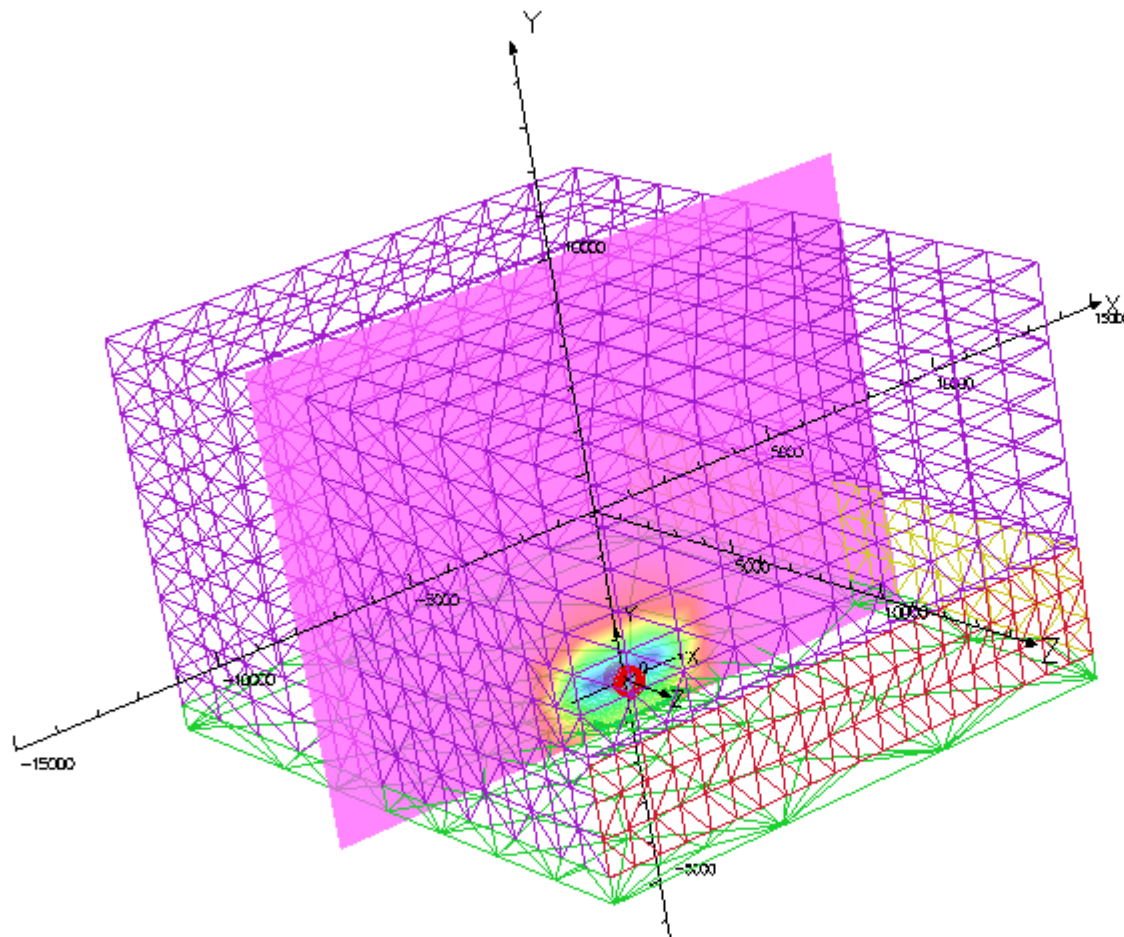
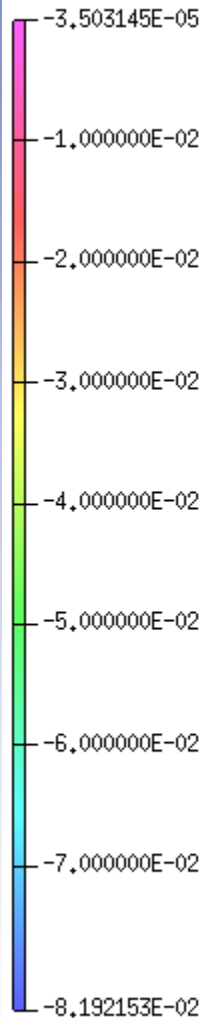
Field Planes

R9 Fields **XY plane through Bore**

Bz

11/ Jun/2013 13:49:33

Map contours: Bz



Integral = -5.779393E+05

R9 Model Name: R9_V4.op3
 TOSCA Magnetostatic
 Linear materials
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 Activated in global coordinates

Field Point Local Coordinates
 Local = Global

FIELD EVALUATIONS

Line	LINE (integral)	2001 (Cartesian)	Carte sian
	x=0.0 y=80 z=-10	0.0 000.0	to 1000 0.0
	Carte sian	CART 10x1 ESIA 0 N (integral)	Carte sian
	x=-80 y=-10 z=0.0	00.0 00.0	to 8000. 1000 0 0.0

Opera

R9 Fields XY plane through Bore, Bx

11/ Jun/2013 13:56:42

Map contours: Bx

9.783348E-06

8.000000E-06

6.000000E-06

4.000000E-06

2.000000E-06

0.000000E+00

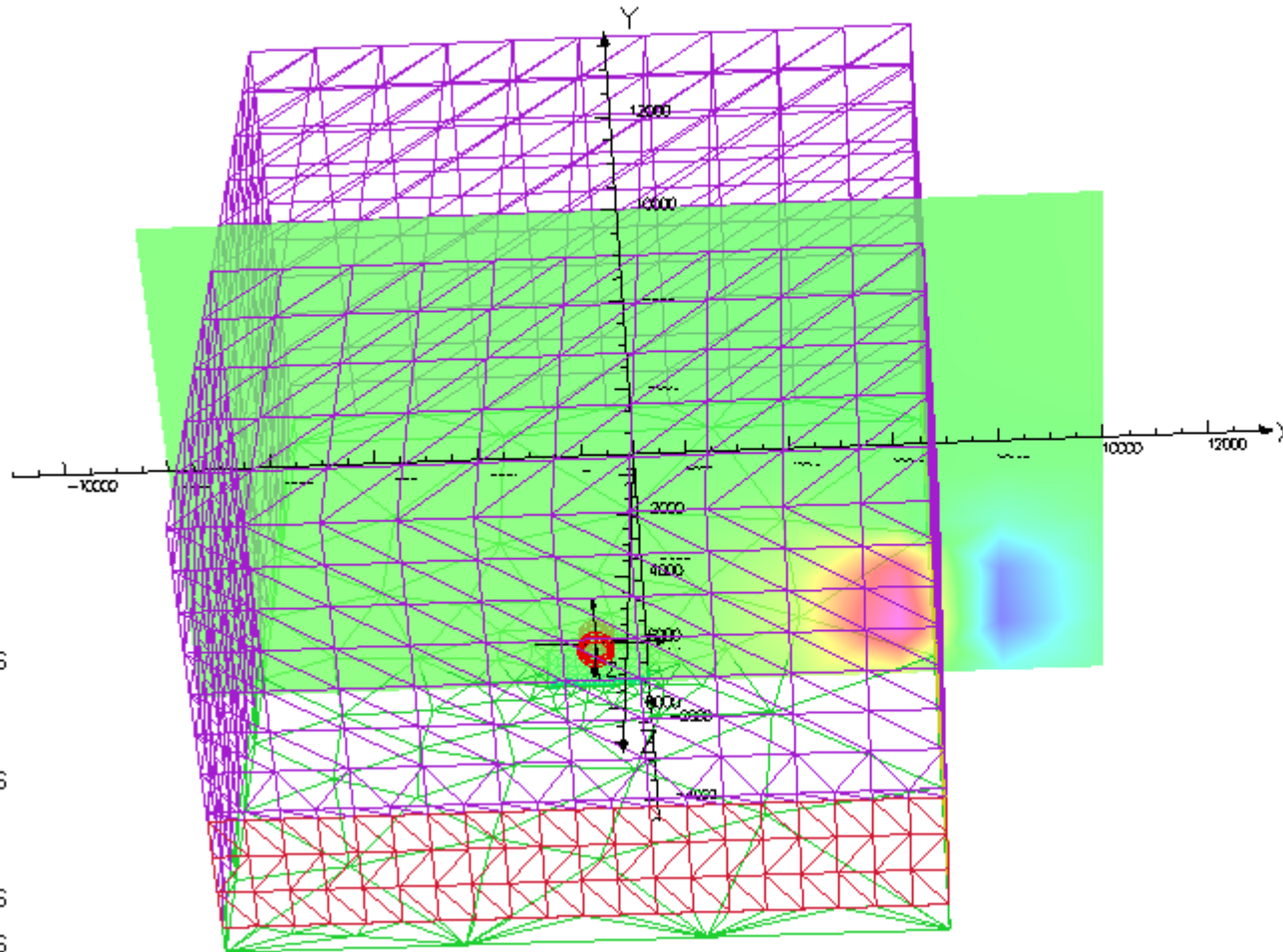
-2.000000E-06

-4.000000E-06

-6.000000E-06

-6.754310E-06

Integral = 2.364747E+01



TO MODELING MICROAVIATION
 V4.op3
 TOSCA Magnetostatic
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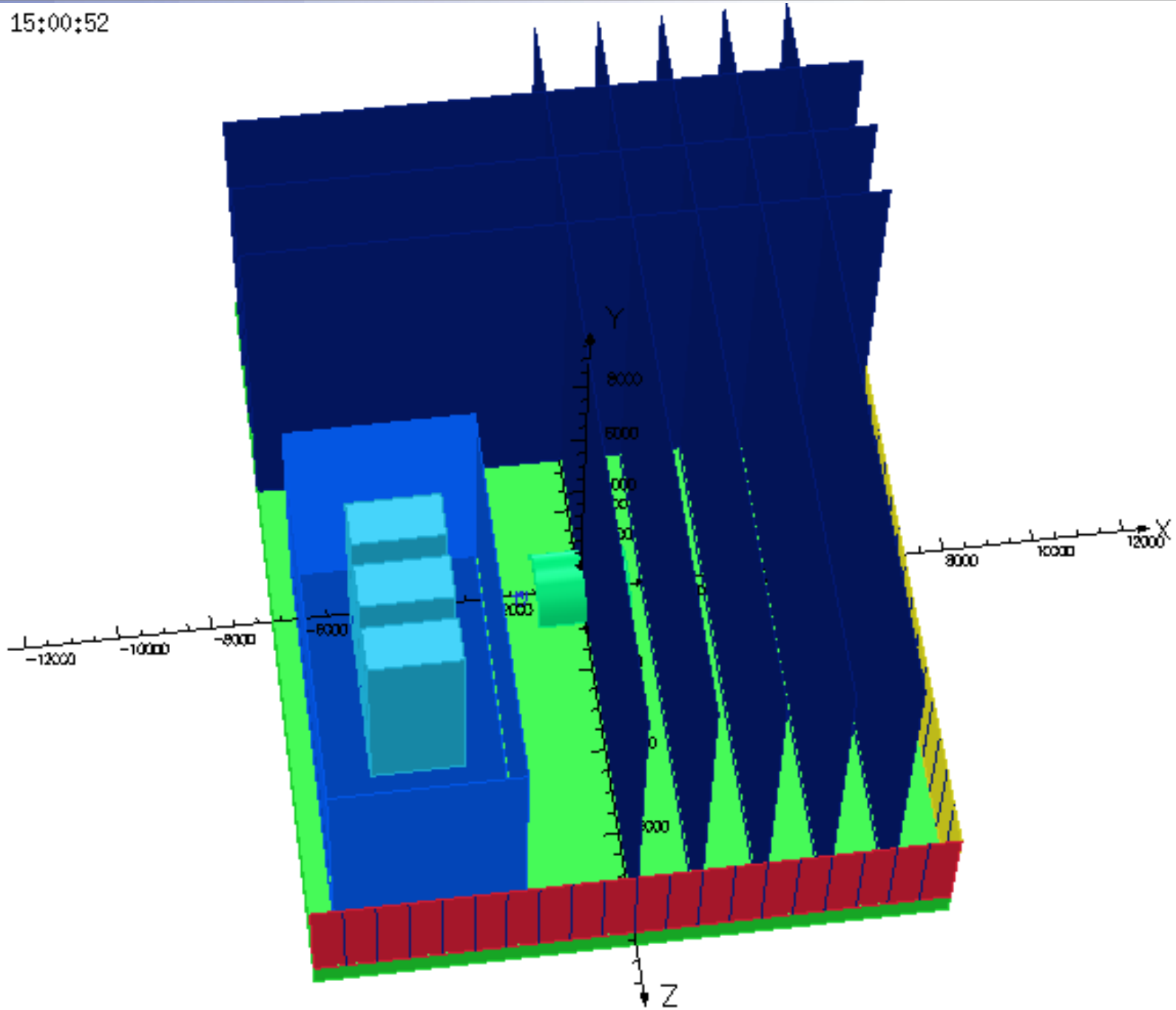
Field Point Local
 Coordinates
 Local = Global

FIELD EVALUATIONS

Line	LINE	2001	Carte
	(inte		sian
	gral)		
	x=0.0	y=80	z=-10
		0.0	000.0
			to
			1000
			0.0
Carte	CART	10x1	Carte
sian	ESIA	0	sian
	N		
	(inte		
	gral)		
	x=-80	y=-10	z=0.0
	00.0	00.0	
	to	to	
	1000	1000	
	0.0	0.0	

Opera

Compressors



Computing Specifications

- Laptop:
 - Mem = 3.6 GB
 - Processor = Intel® Core™ i5 CPU M 560 @ 2.67 GHz × 4
 - Available = 200GB
- Desktop:
 - Mem = 7.7 GB
 - Processor = Intel 17.3770 CPU @ 3.4 GHz × 8
 - Available = 400GB

Conclusions

- R9 Model with walls now in much better agreement with measurements and JCs Biot-Savart calculations.
- R9 OPERA model fields calculated in lines where measurements have been taken but every 10mm.
 - Sent to Celeste
- Compressors are now basically implemented in model though not fully ready or tested.
- Off to Vector Fields tomorrow which hopefully should help iron out the model a lot further.
- Haven't managed to perform Model Biot-Savart calculations for comparisons in OPERA yet, but it is on my 'to do' list' and I should think tomorrow should help.

R9 Coordinate System

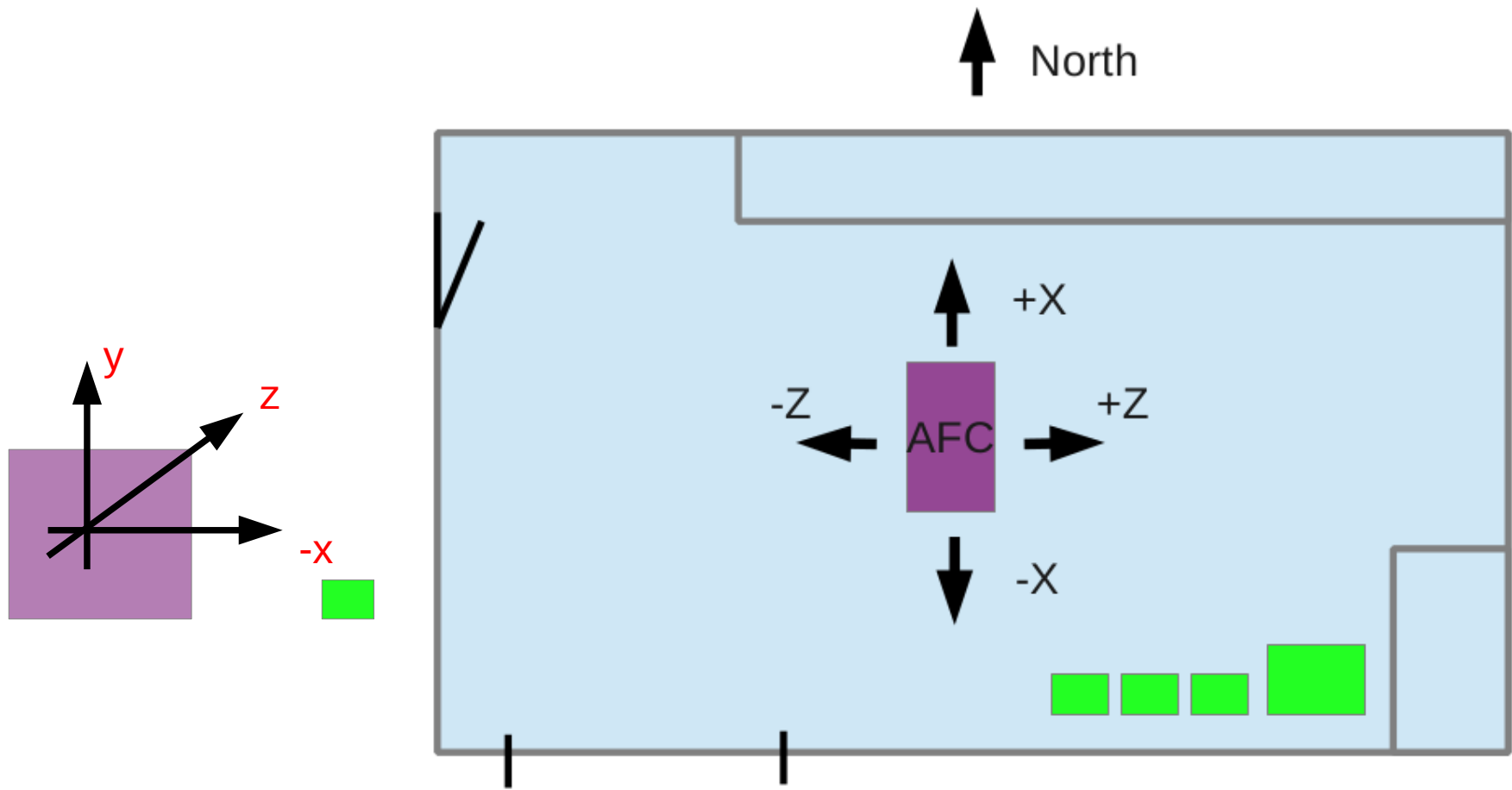


Figure: Rough schematic of the R9 hall. Green boxes are rack (large) compressors.