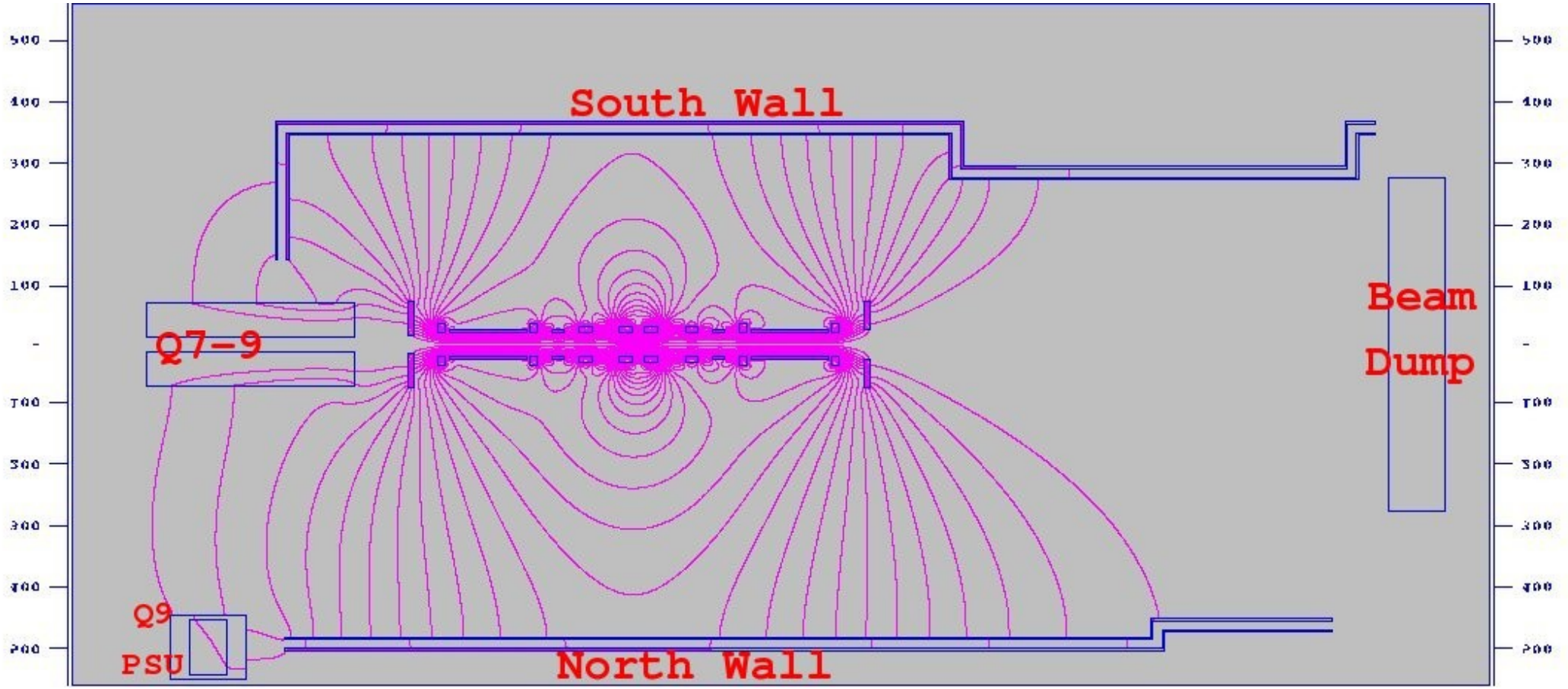
Can 2D modelling help the 3D effort?

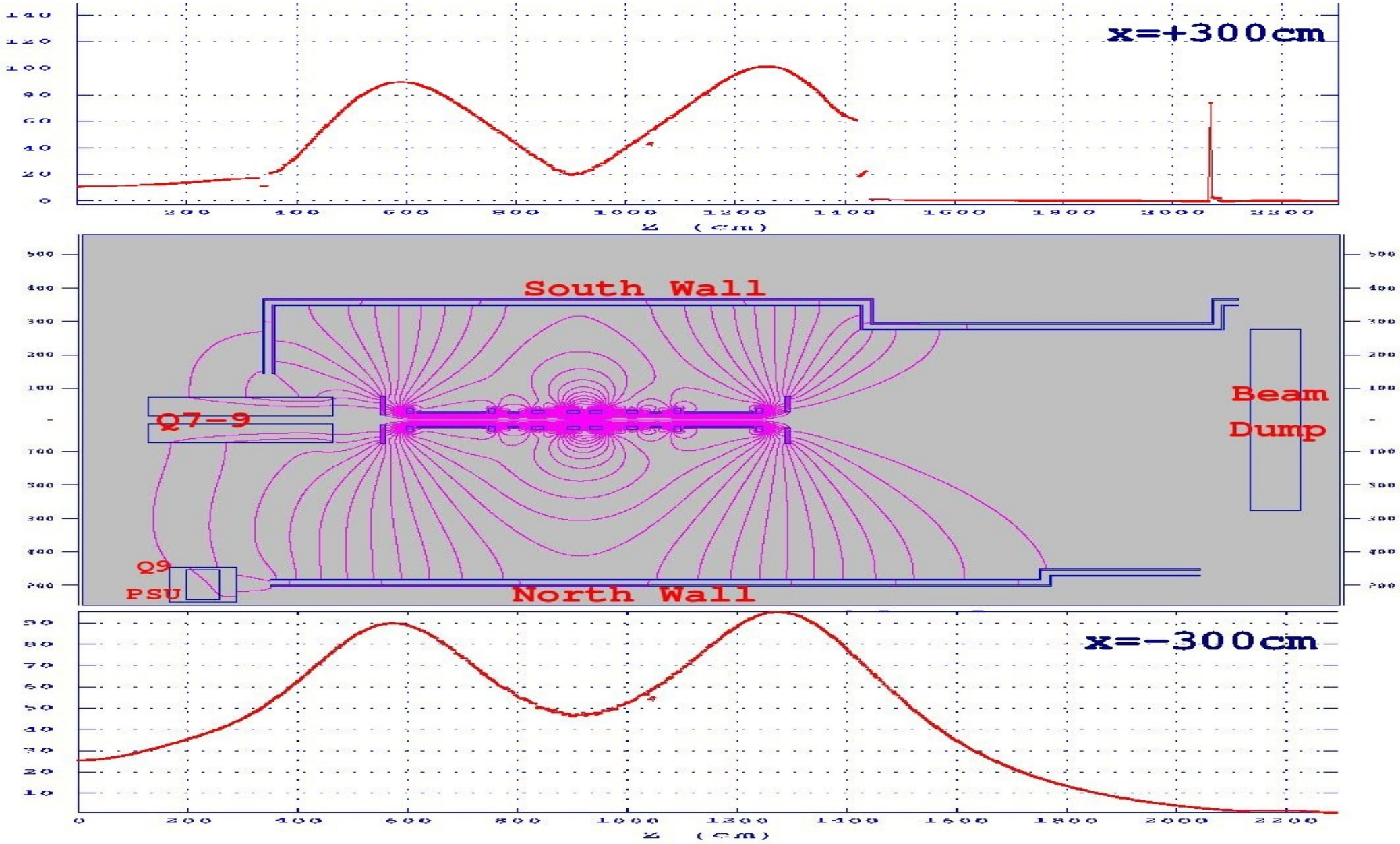
ILLINOIS INSTITUTE OF TECHNOLOGY

Pierrick Hanlet

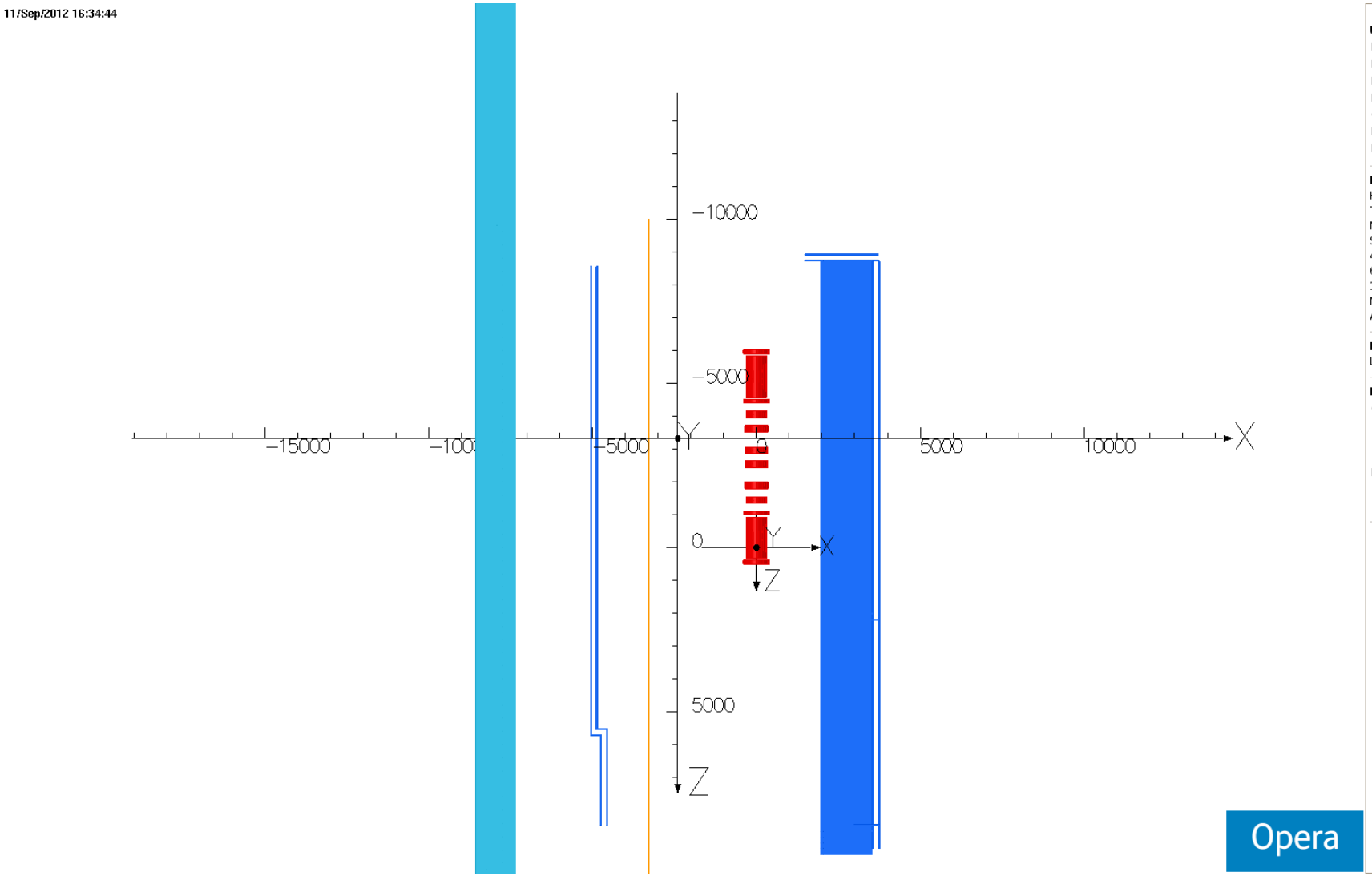
Step IV layout – p=240MeV/c base



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



Step IV layout – p=240MeV/c base 3D model



UNITS

Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm²
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

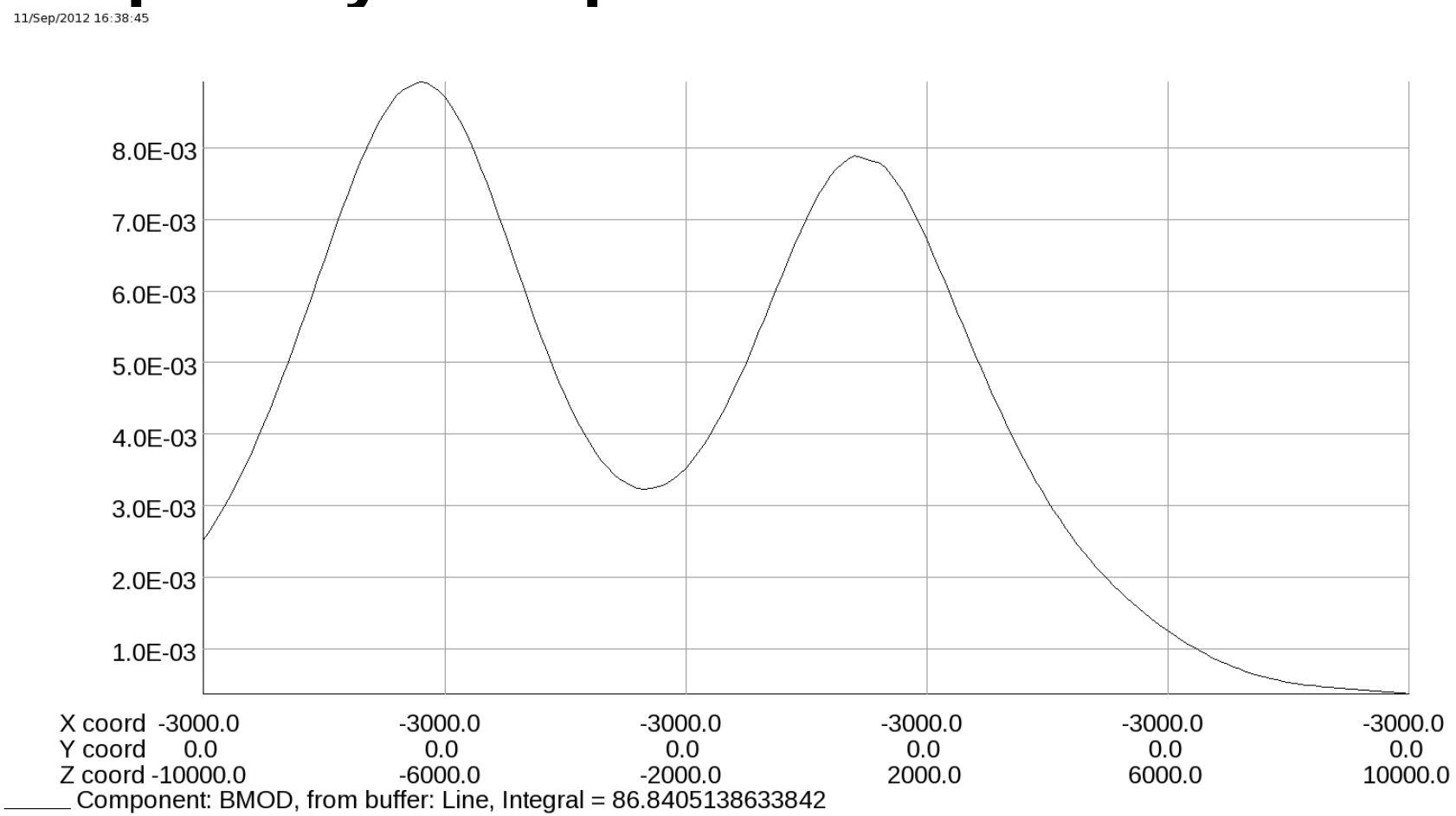
Field Point Local Coordinates

Local = Global

FIELD EVALUATIONS

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

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



UNITS

Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm²
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 (nodal)	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

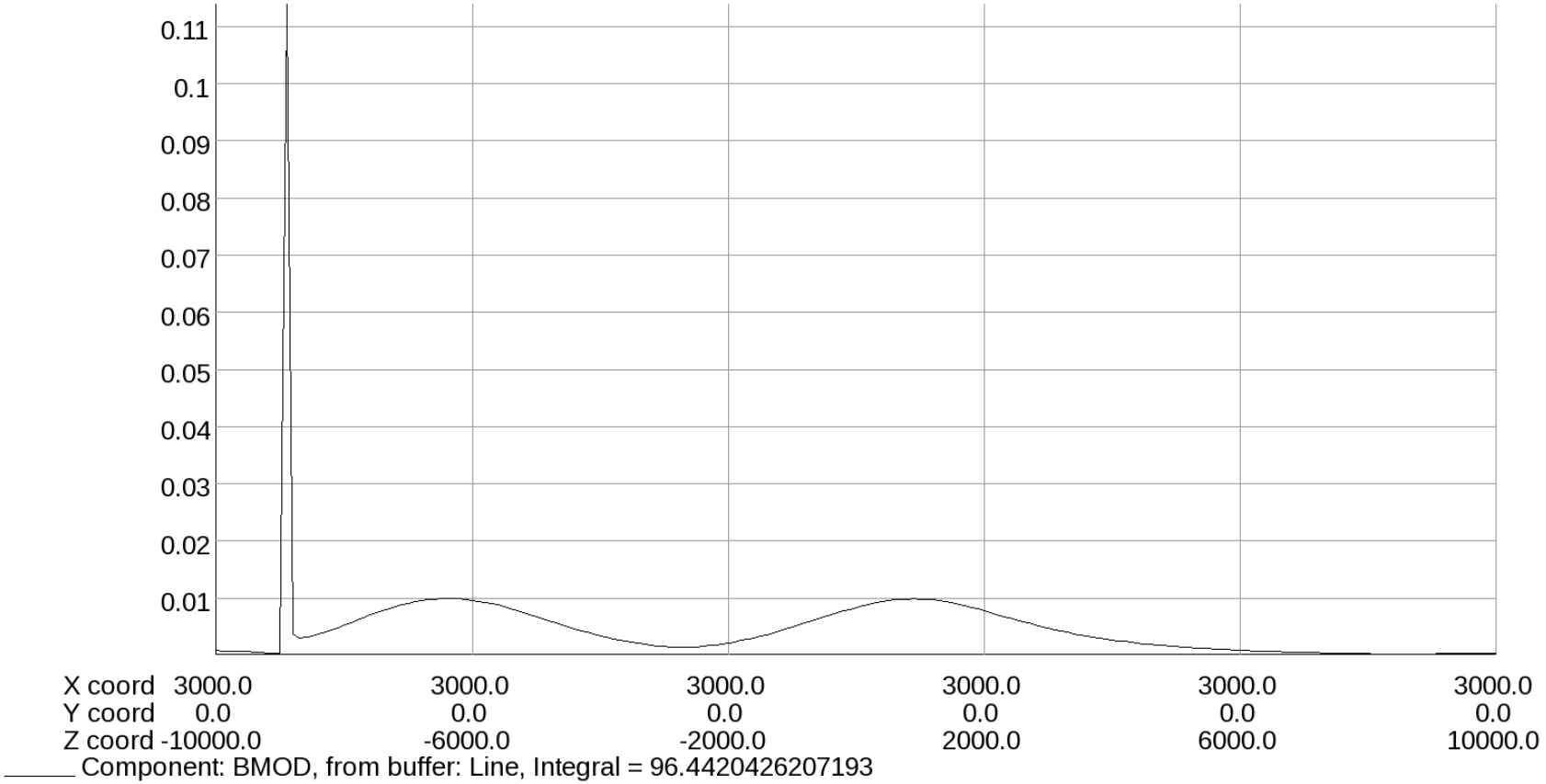
Opera

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



UNITS

Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm²
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

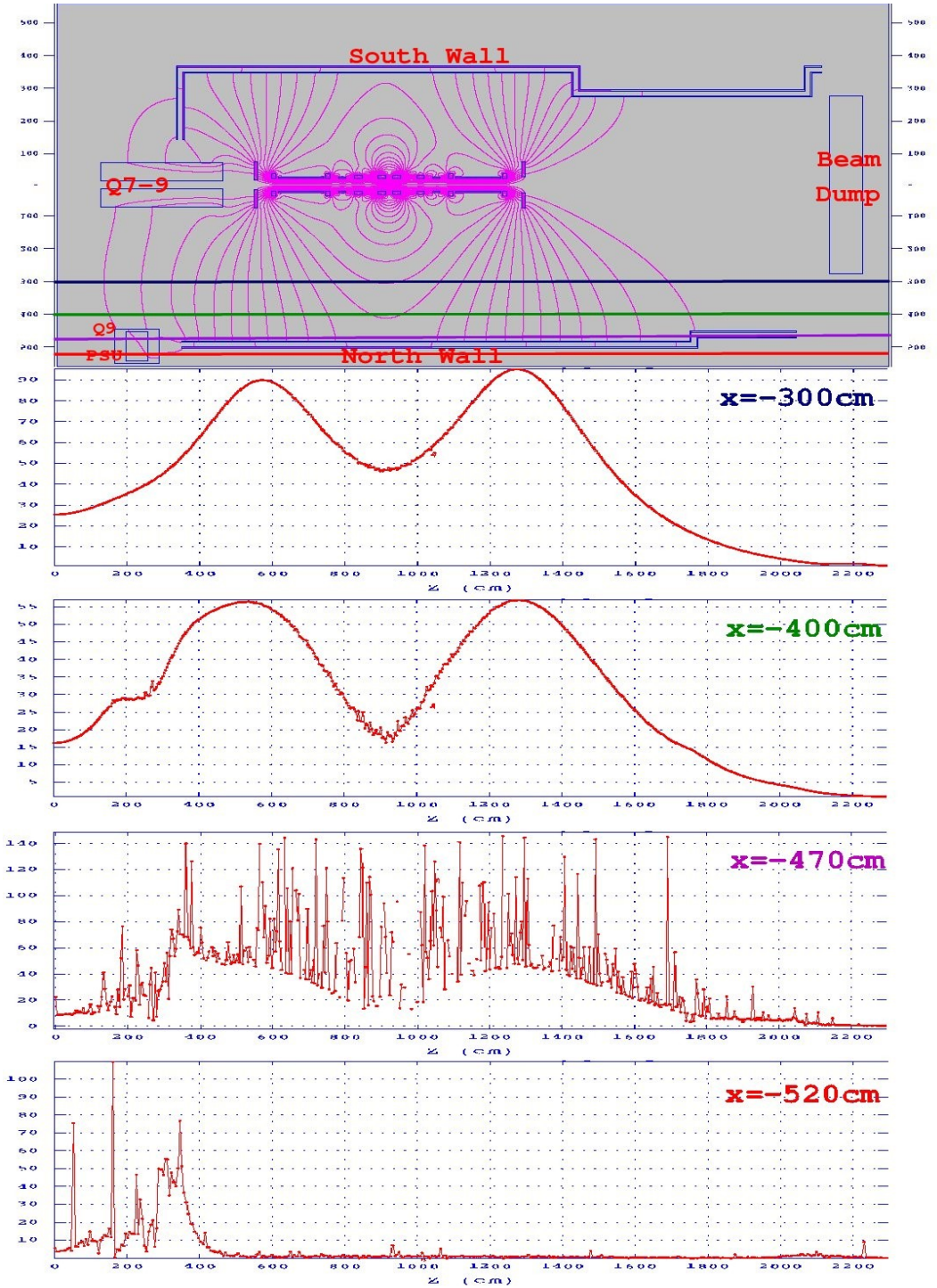
FIELD EVALUATIONS

Cartesian	CARTESIAN (nodal)	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

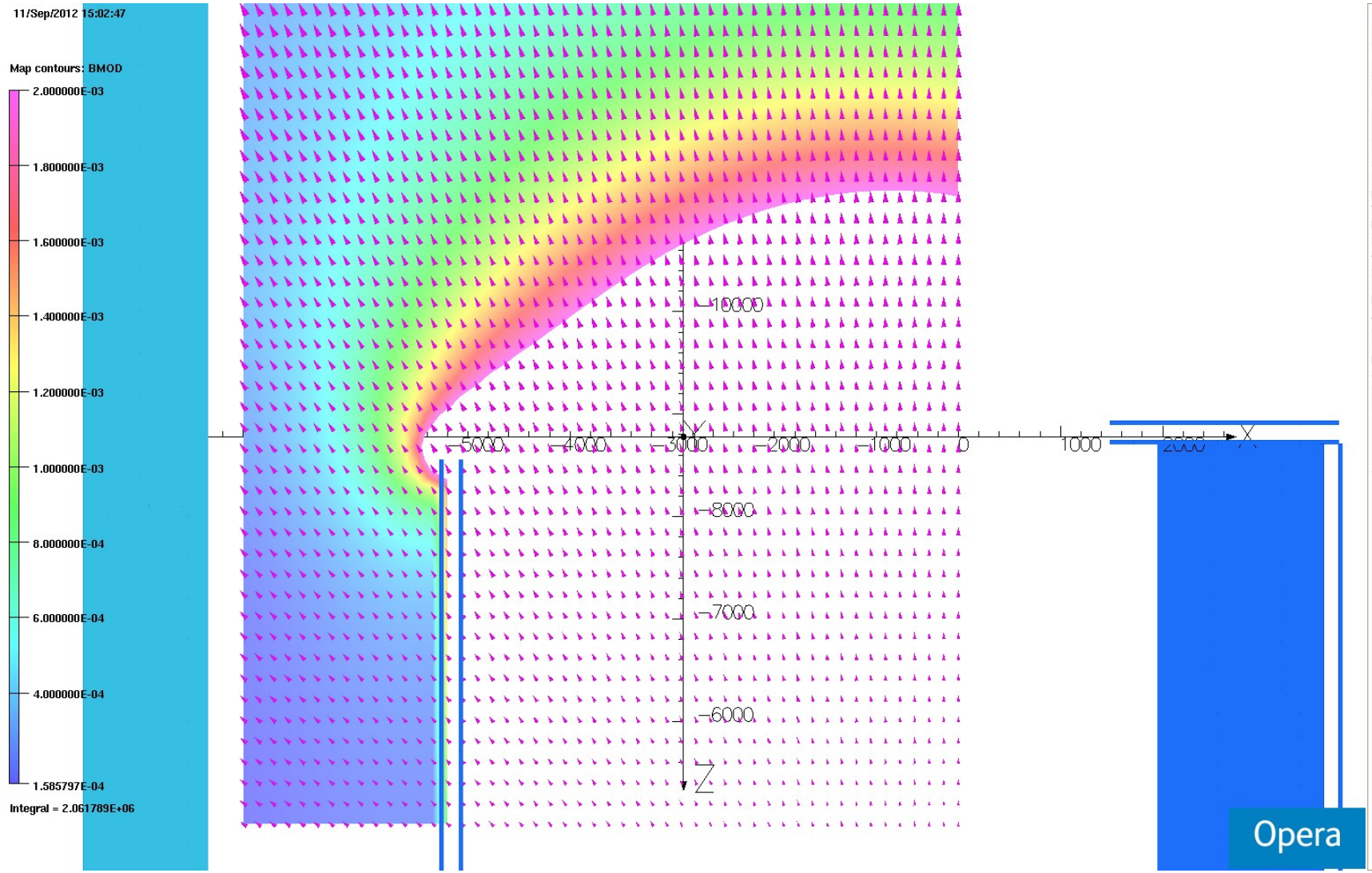
Opera

Not ready yet!

Step IV layout – p=240MeV/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/mm²
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

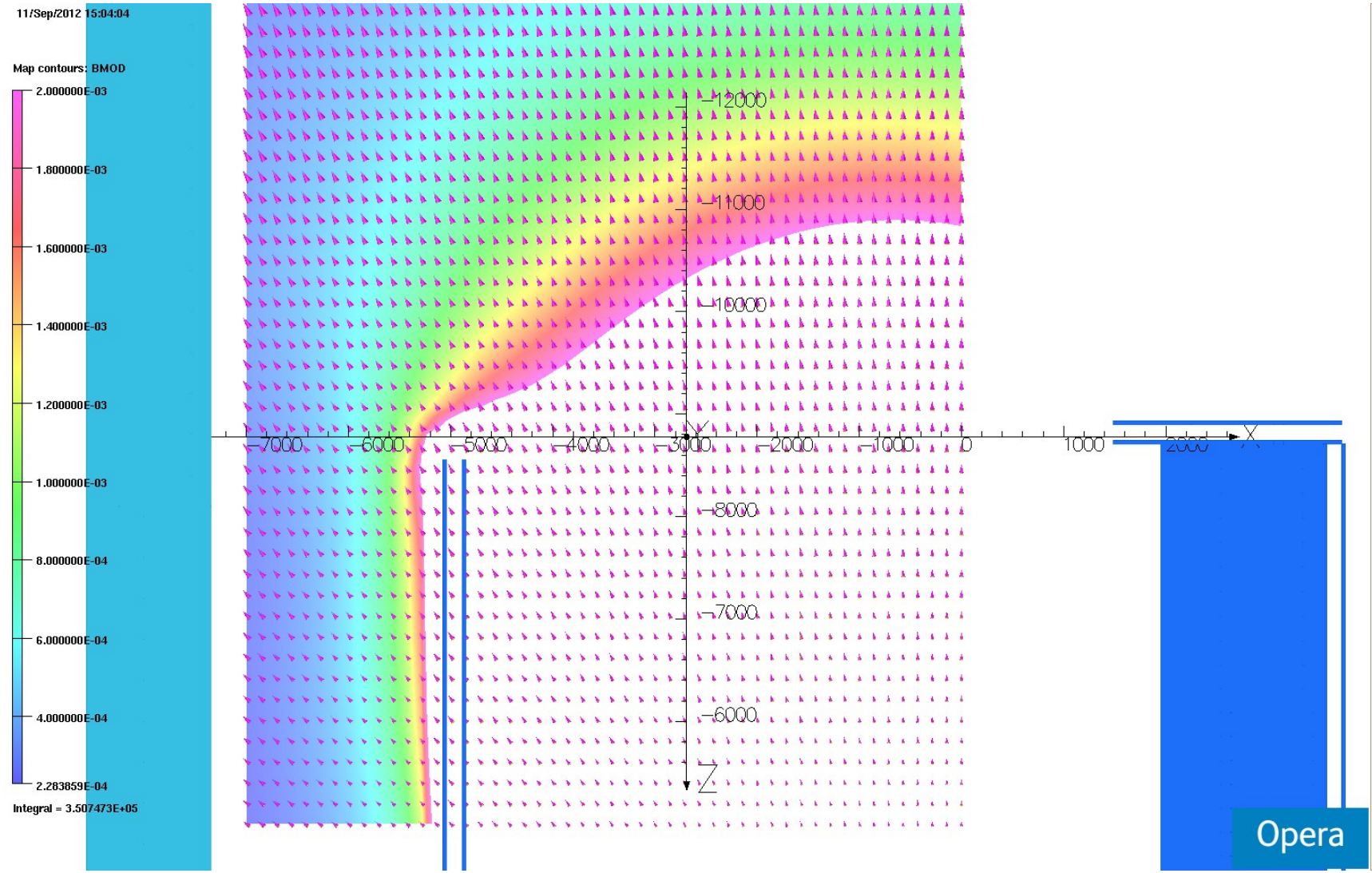
Field Point Local Coordinates

Local = Global

FIELD EVALUATIONS

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

Step IV layout – 3D at different y: floor



UNITS

Length	mm
Magn Flux Density	T
Magnetic Field	A/m
Magn Scalar Pot	A
Current Density	A/mm²
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

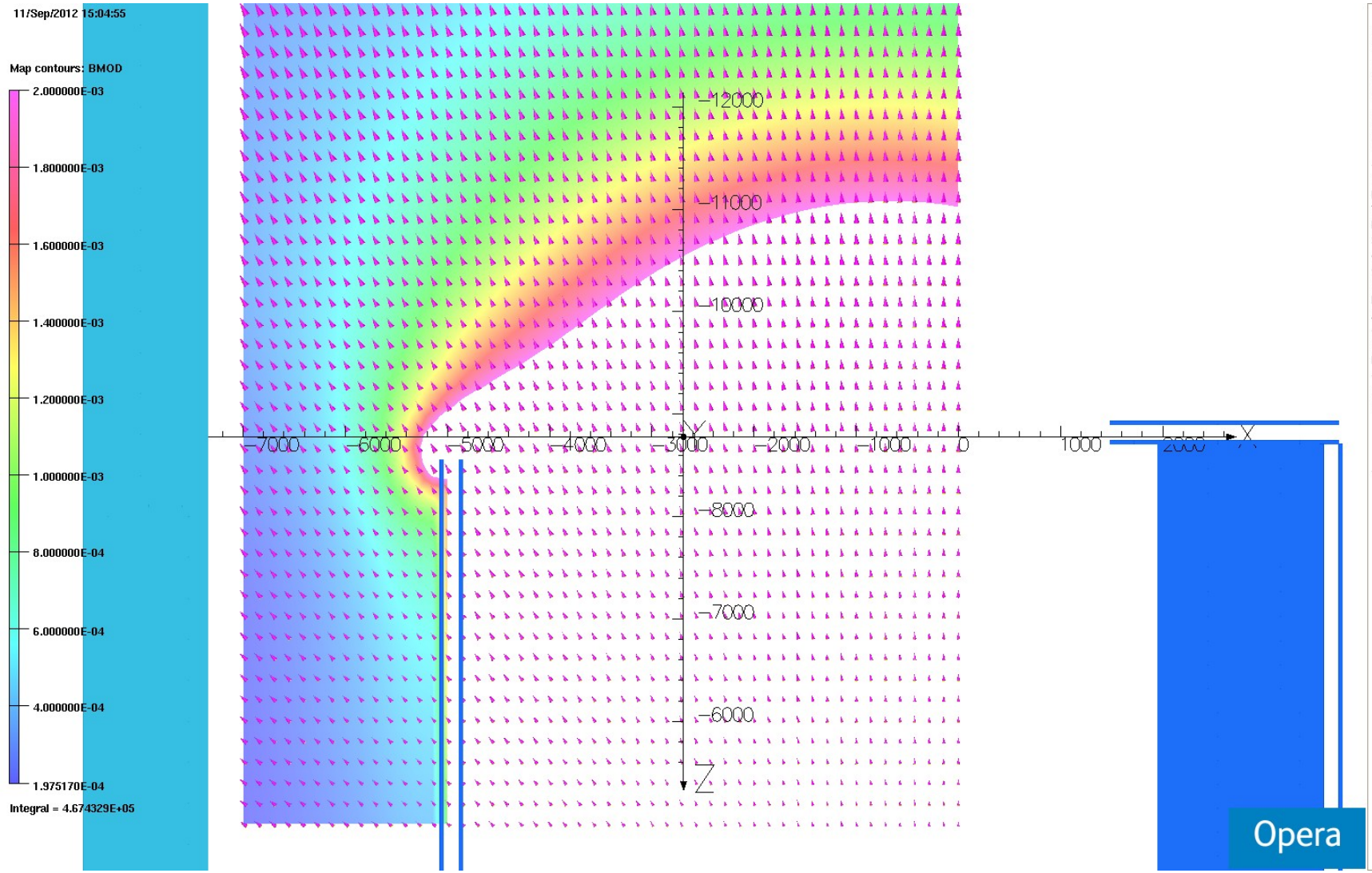
Field Point Local Coordinates

Local = Global

FIELD EVALUATIONS

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

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/mm²
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

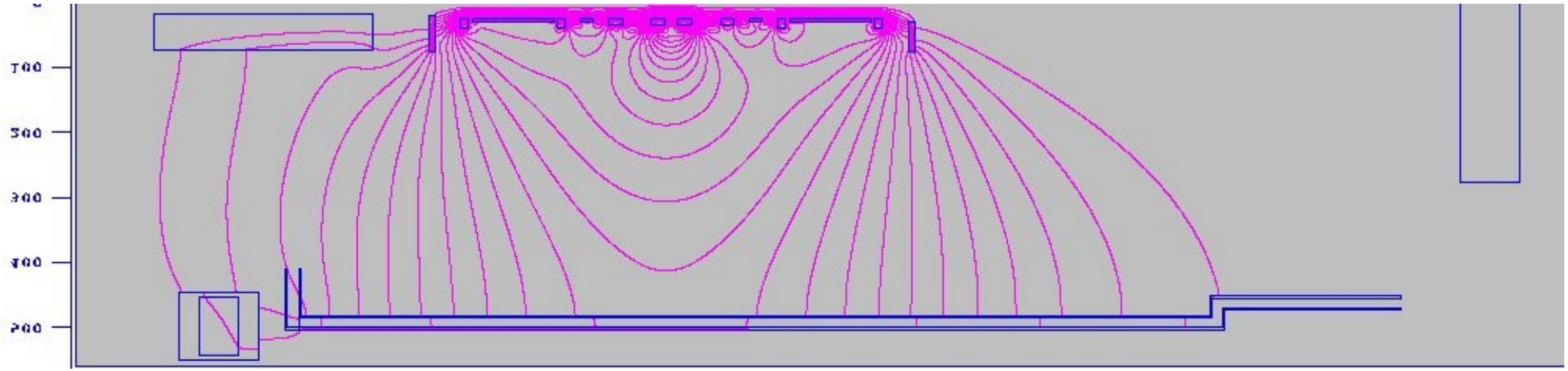
Field Point Local Coordinates

Local = Global

FIELD EVALUATIONS

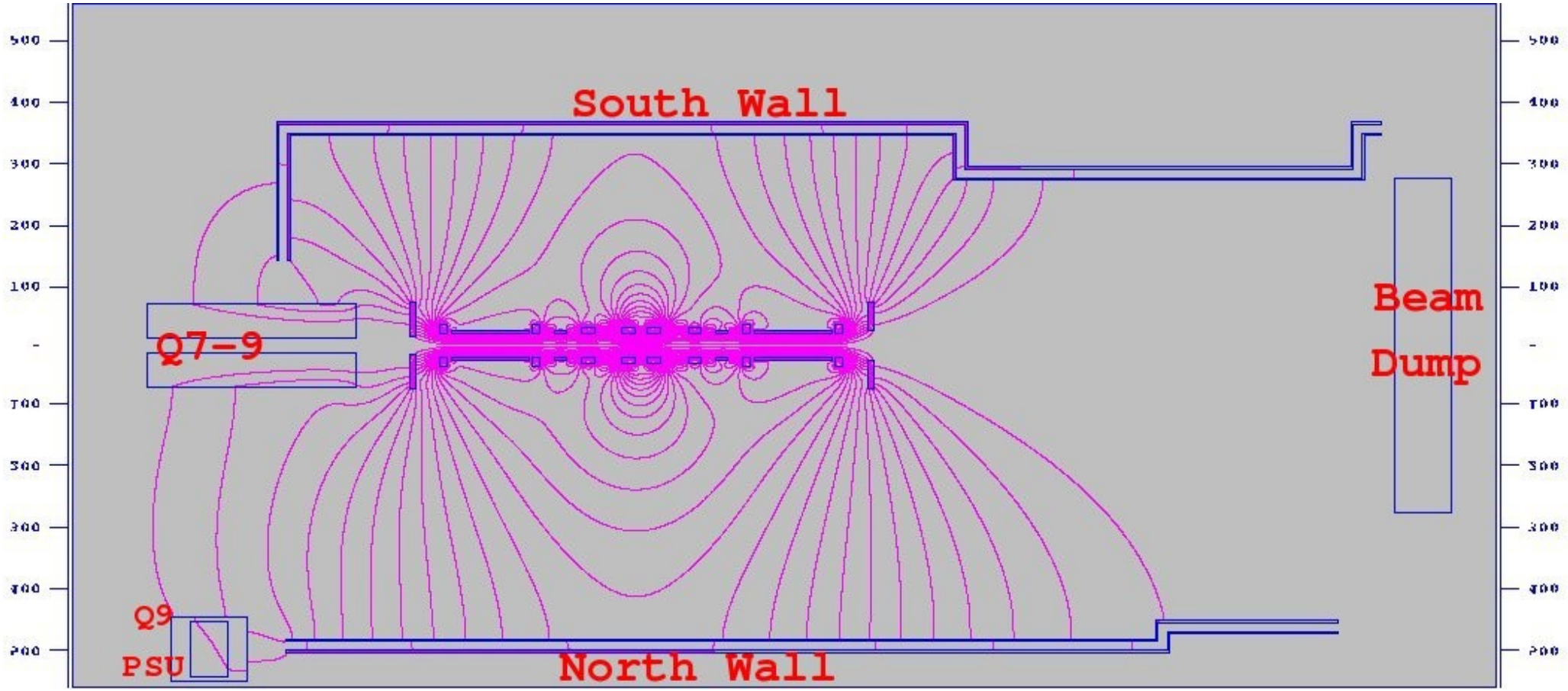
Cartesian	CARTESIAN (nodal)	50x50	Cartesian
	x=-7000.0 to -7.7716E-13	y=-1000.0	z=-15000.0 to -5000.0

Step IV layout – p=240MeV/c base



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

Step IV layout – p=240MeV/c base



Notes:

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

Step IV layout – p=240MeV/c base