

FCal
magnetic shielding
for crystals

Sasha Glamazdin

Kharkov Institute of Physics and Technology

New FCal Design

New FCal design:

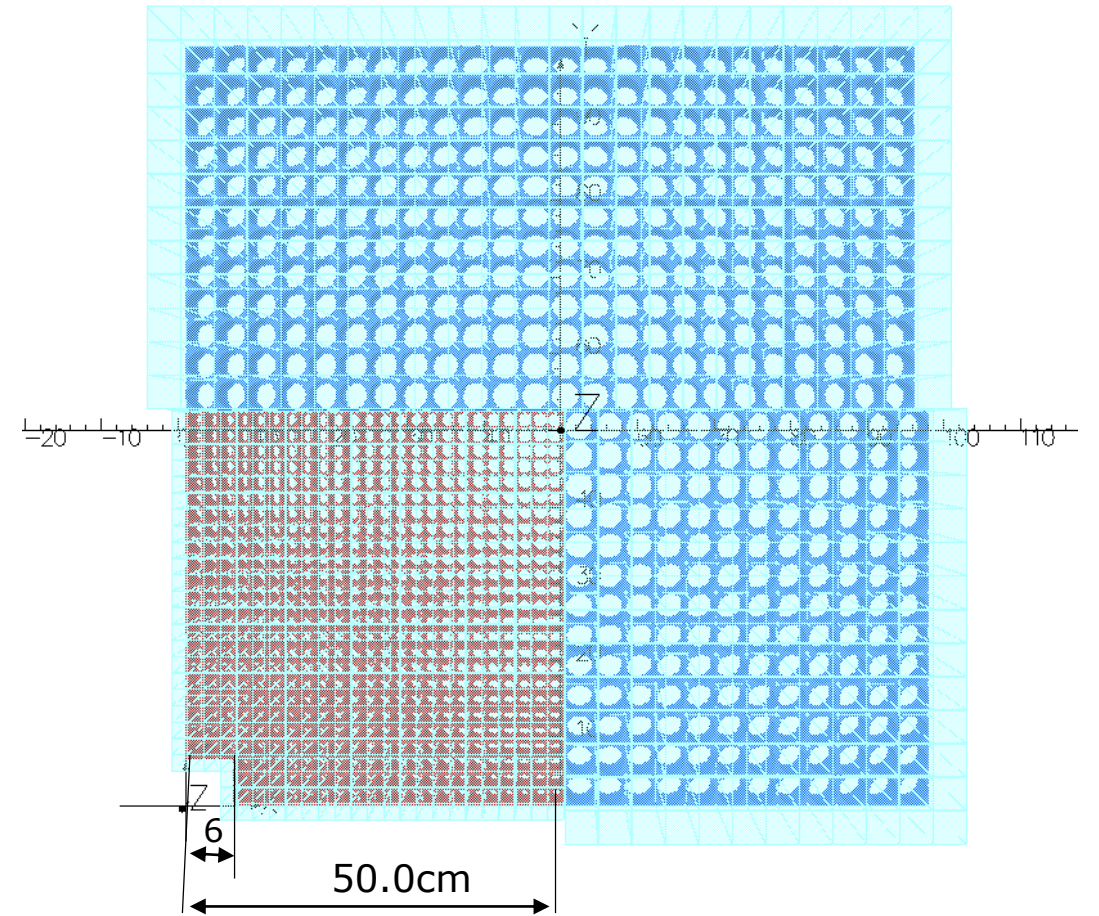
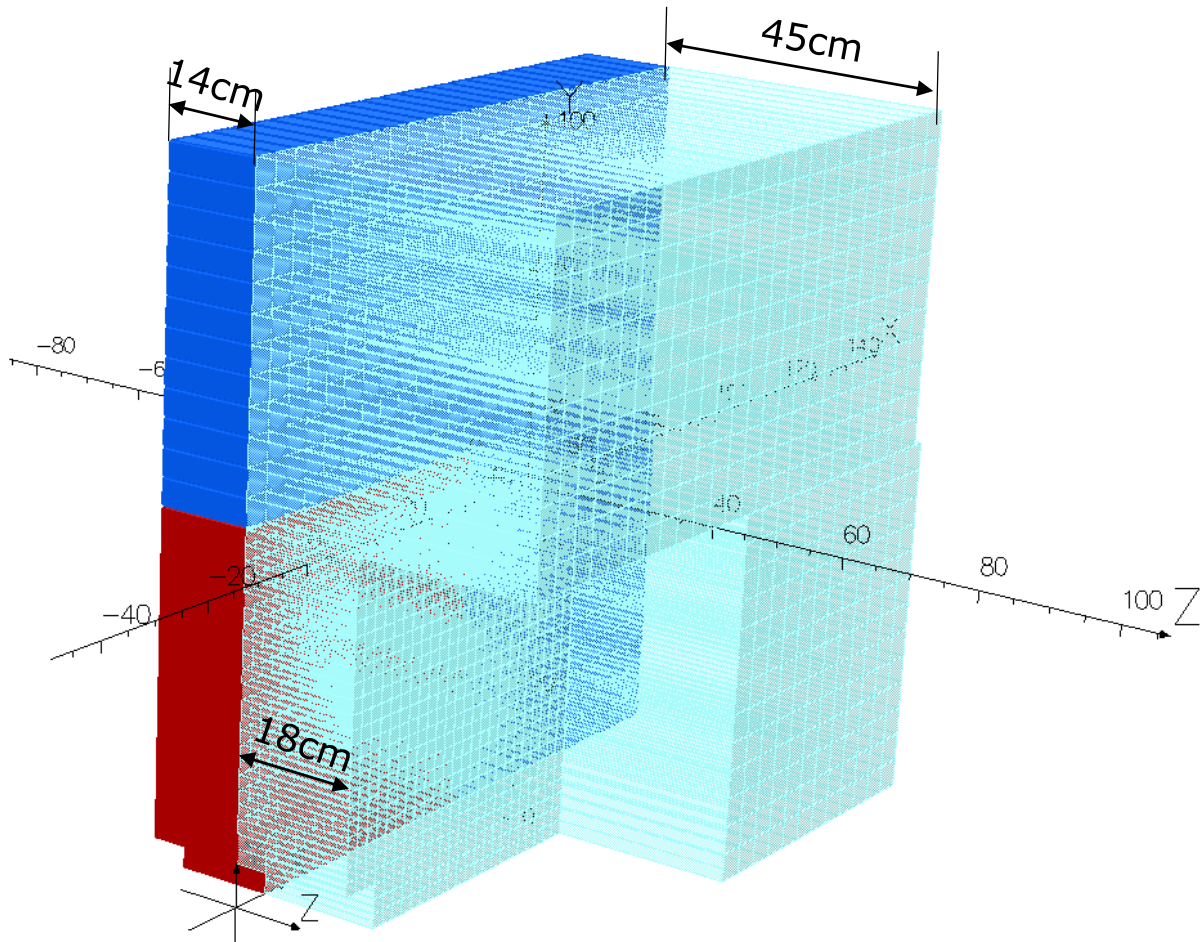
- *Insert crystals to the central part of FCal (aka HCal)*
- "crystals" part is 1*1m*
Crystal size: 2.05×2.05×18cm

Goal of this job:

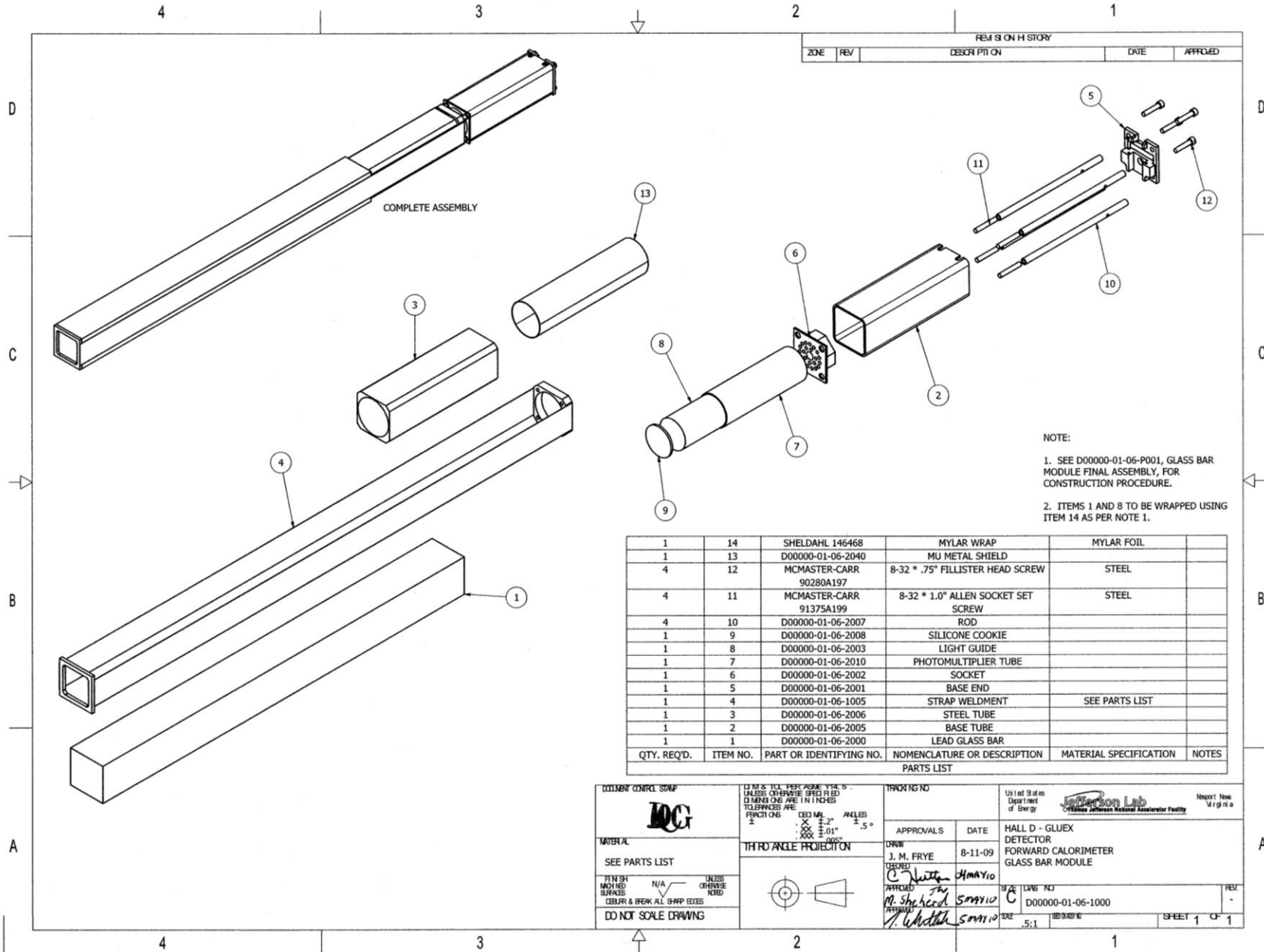
- *Design magnetic shielding for the crystal part of FCal*
- *Minimization of price and manpower*

Magnetic field in the Hall is 60 Oe along Z

New FCal Design



Design of Shielding for FCal Lead Glass



REVISION HISTORY			
ZONE	REV	DESCRIPTION	DATE

NOTE:
 1. SEE D00000-01-06-P001, GLASS BAR MODULE FINAL ASSEMBLY, FOR CONSTRUCTION PROCEDURE.
 2. ITEMS 1 AND 8 TO BE WRAPPED USING ITEM 14 AS PER NOTE 1.

QTY. REQ'D.	ITEM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	NOTES
	14	SHELD AHL 146468	MYLAR WRAP	MYLAR FOIL	
	13	D00000-01-06-2040	MU METAL SHIELD		
	12	MCMAS TER-CARR 90280A197	8-32 * .75" FILLISTER HEAD SCREW	STEEL	
	11	MCMAS TER-CARR 91375A199	8-32 * 1.0" ALLEN SOCKET SET SCREW	STEEL	
	10	D00000-01-06-2007	ROD		
	9	D00000-01-06-2008	SILICONE COOKIE		
	8	D00000-01-06-2003	LIGHT GUIDE		
	7	D00000-01-06-2010	PHOTOMULTIPLIER TUBE		
	6	D00000-01-06-2002	SOCKET		
	5	D00000-01-06-2001	BASE END		
	4	D00000-01-06-1005	STRAP WELDMENT	SEE PARTS LIST	
	3	D00000-01-06-2006	STEEL TUBE		
	2	D00000-01-06-2005	BASE TUBE		
	1	D00000-01-06-2000	LEAD GLASS BAR		

DOCUMENT CONTROL STAMP MATERIAL SEE PARTS LIST FINISH: N/A UNLESS OTHERWISE NOTED SURFACES & BREAK ALL SHARP EDGES DO NOT SCALE DRAWING	DIMENSIONS: UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMAL ANGLES $\pm .01$ $\pm .005$ $\pm .5^\circ$ THRU ANGLE PROJECTION 	TRACKING NO. APPROVALS J. M. FRYE DATE: 8-11-09 APPROVED: <i>C. Hutton</i> APPROVED: <i>M. Sheehan</i> APPROVED: <i>A. W. Smith</i>	Unit of States Department of Energy Jefferson Lab Thomas Jefferson National Accelerator Facility Report No. W-99-01
			HALL D - GLUEX DETECTOR FORWARD CALORIMETER GLASS BAR MODULE

Design-1 of Shielding for FCal Crystals

11/Dec/2017 10:02:08

Map contours: H

1.126122E+00

1.125000E+00

1.120000E+00

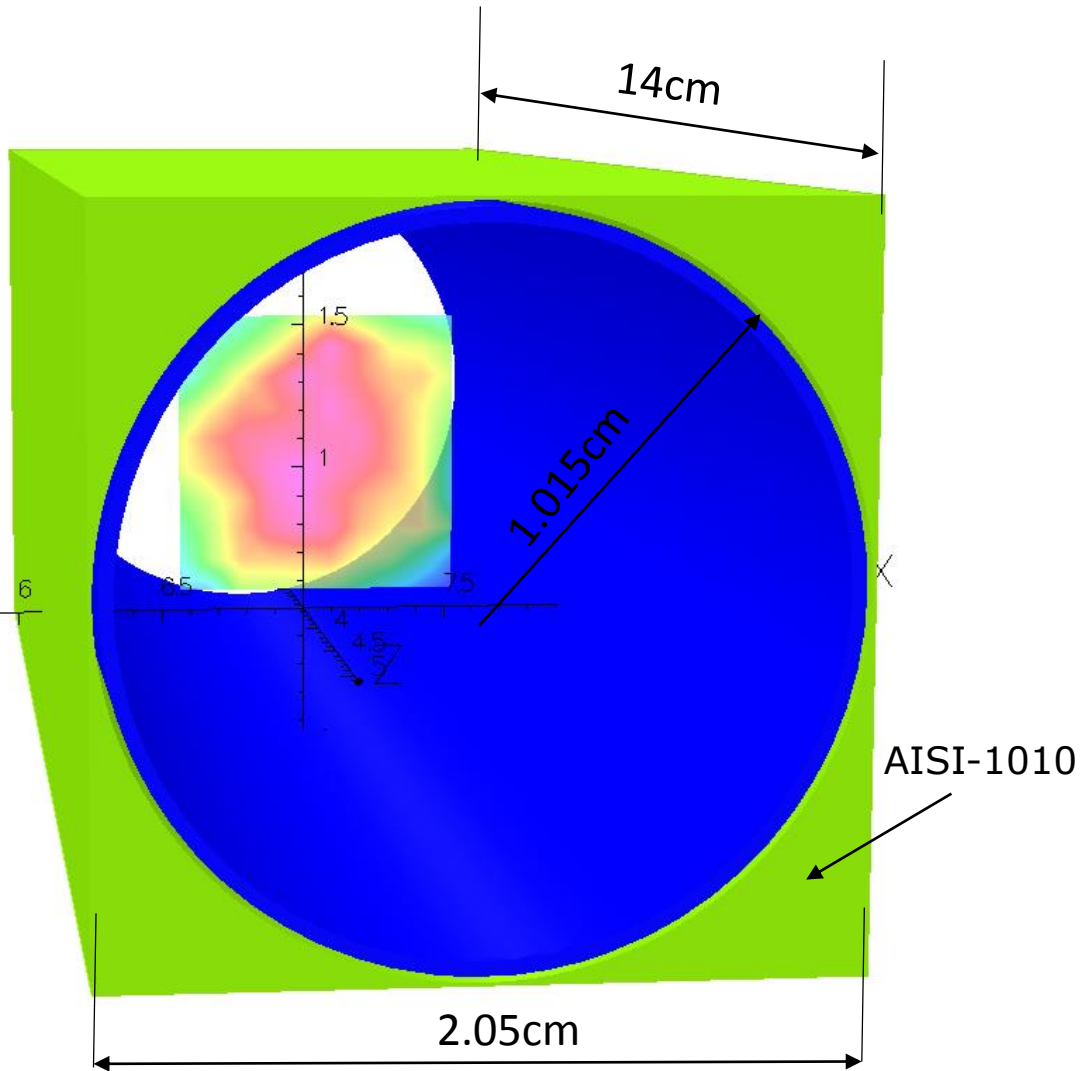
1.115000E+00

1.110000E+00

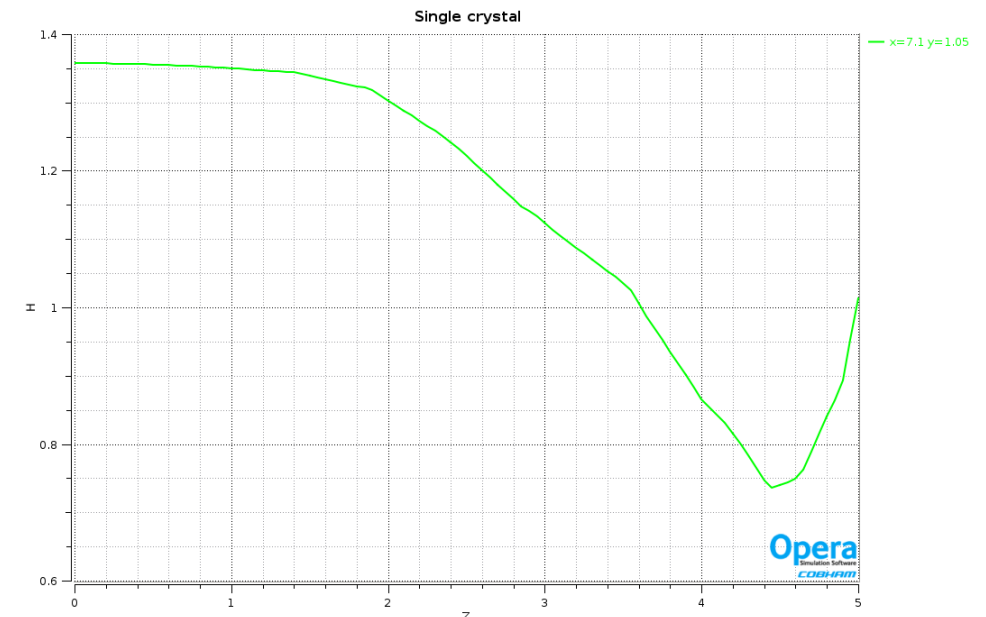
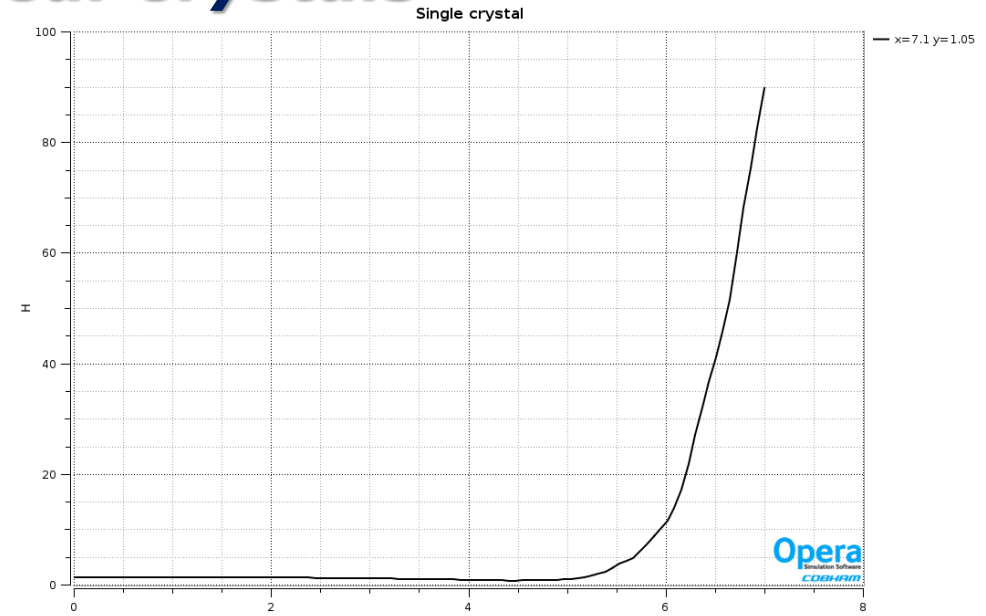
1.105000E+00

1.100221E+00

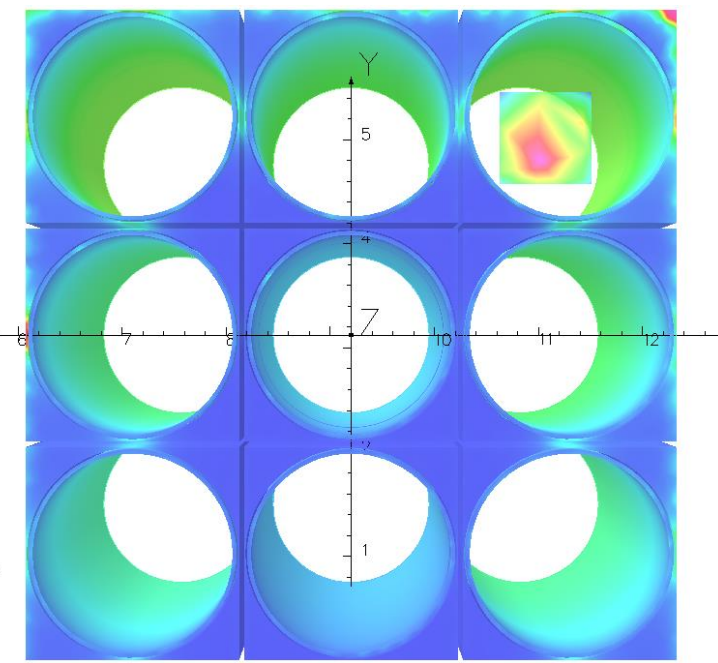
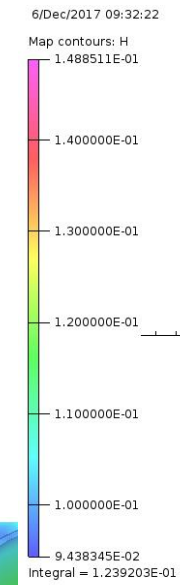
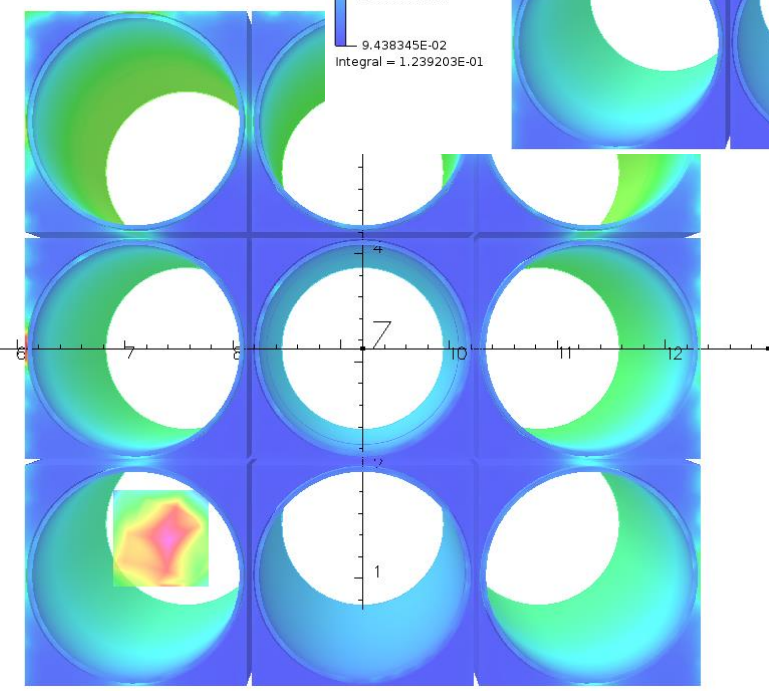
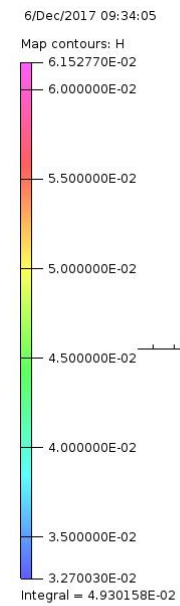
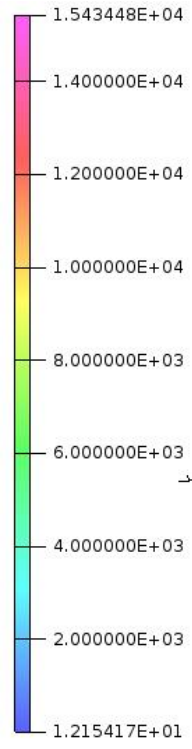
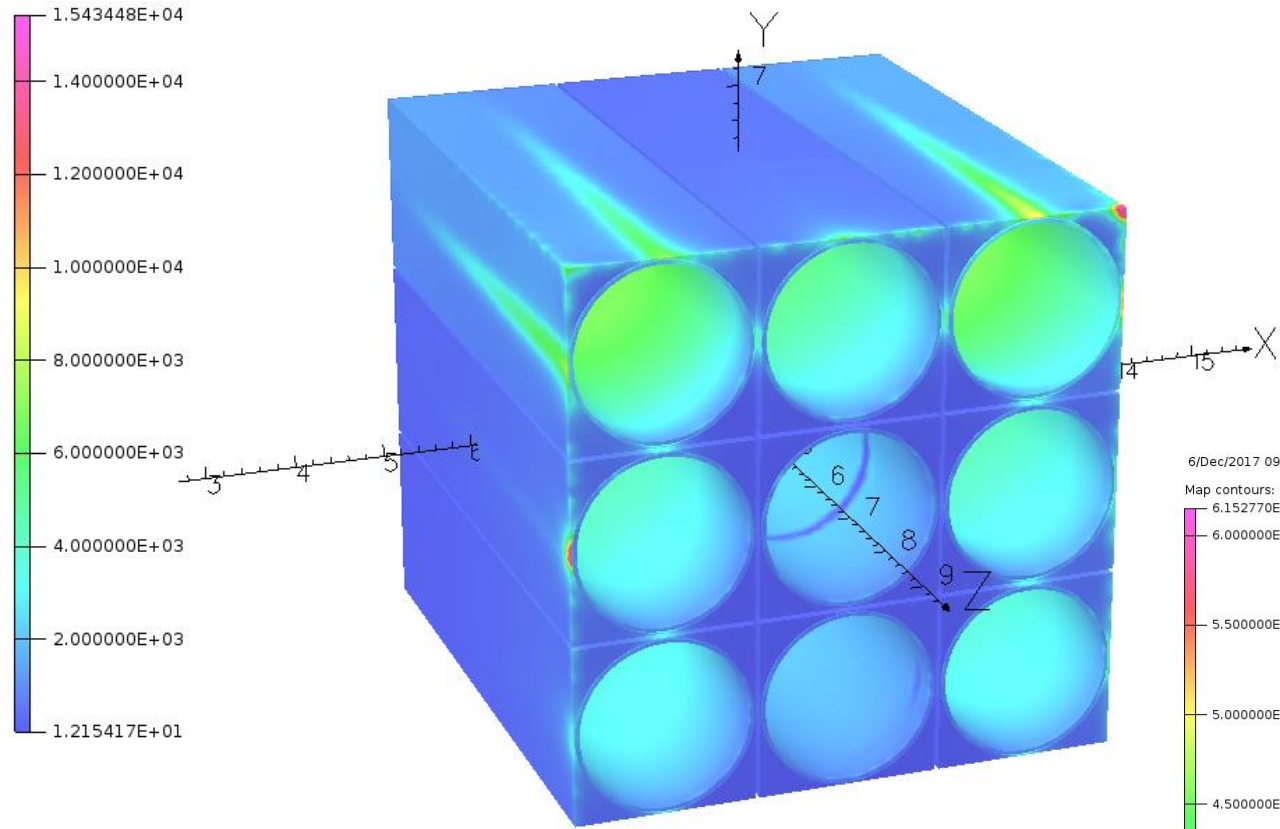
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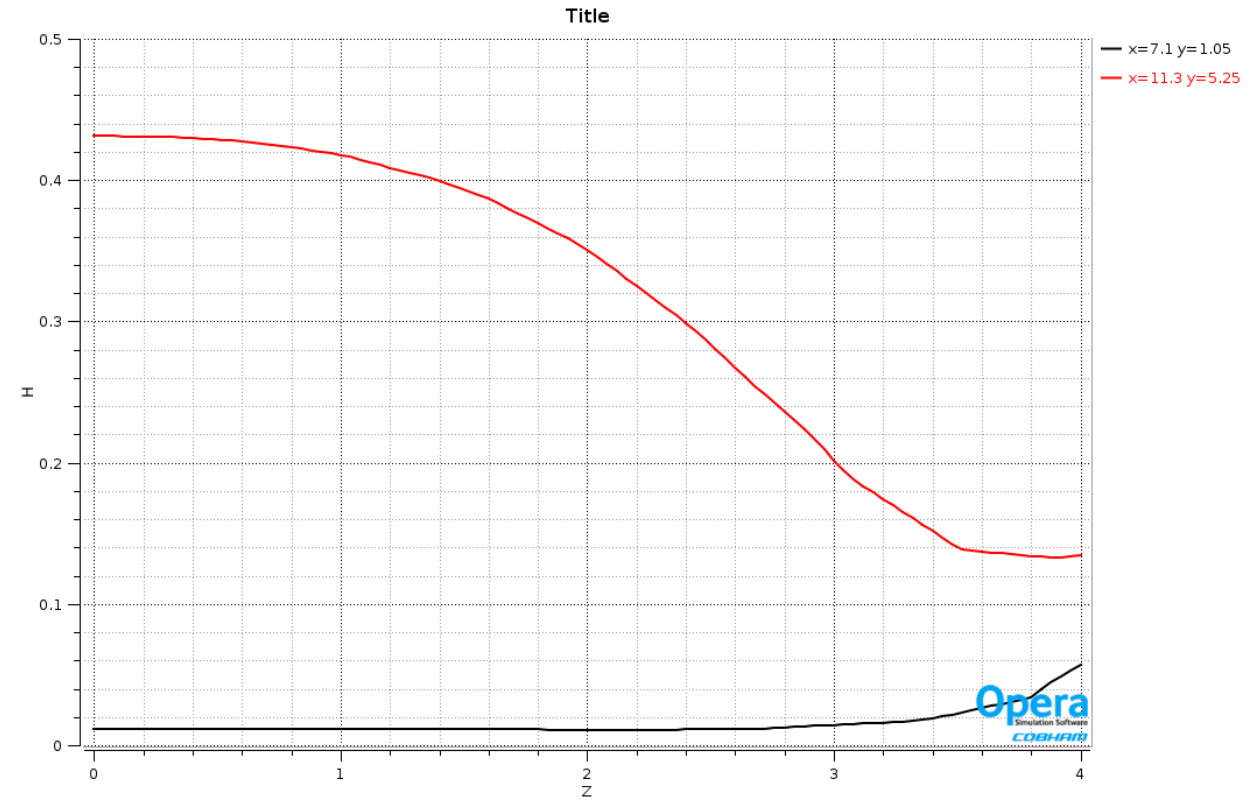
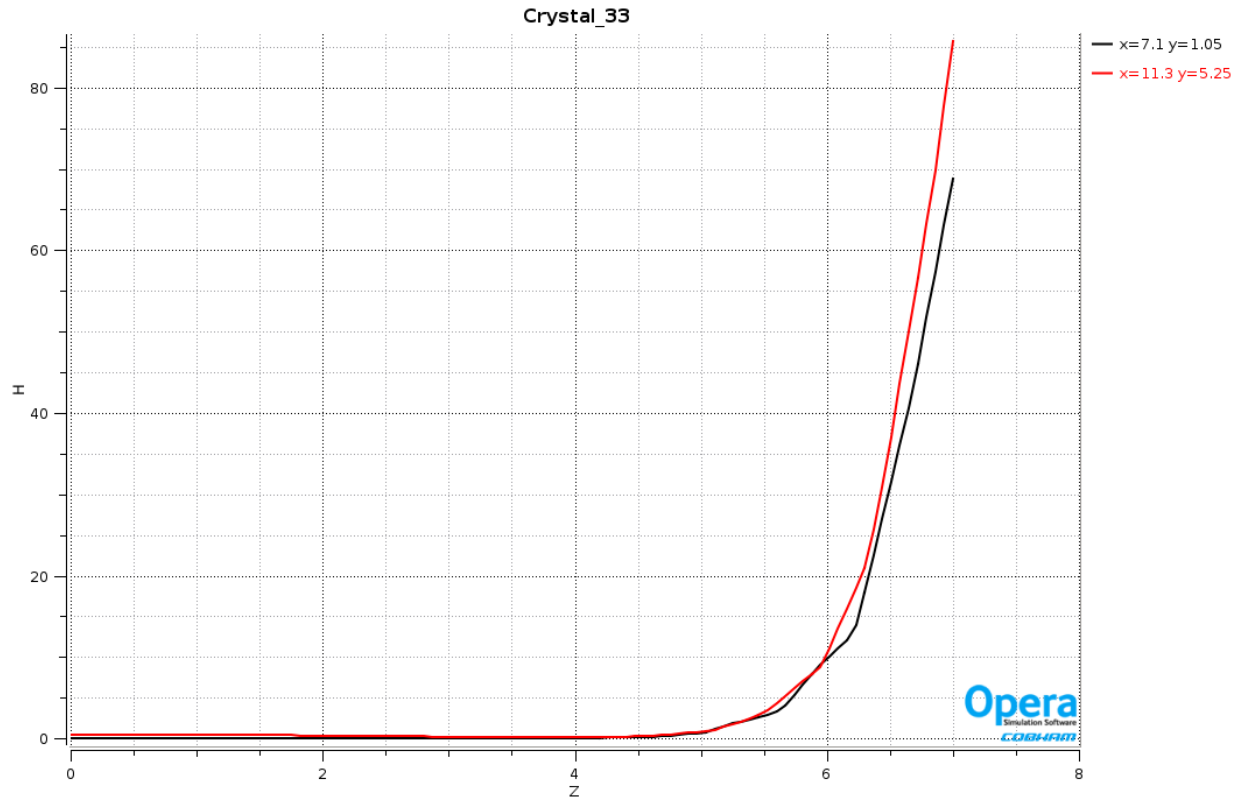
Shielding pipe: material – co-netic
 $R_{in}=0.96\text{cm}$ $R_{out}=0.996\text{cm}$
 Length=14cm



Matrix 3x3

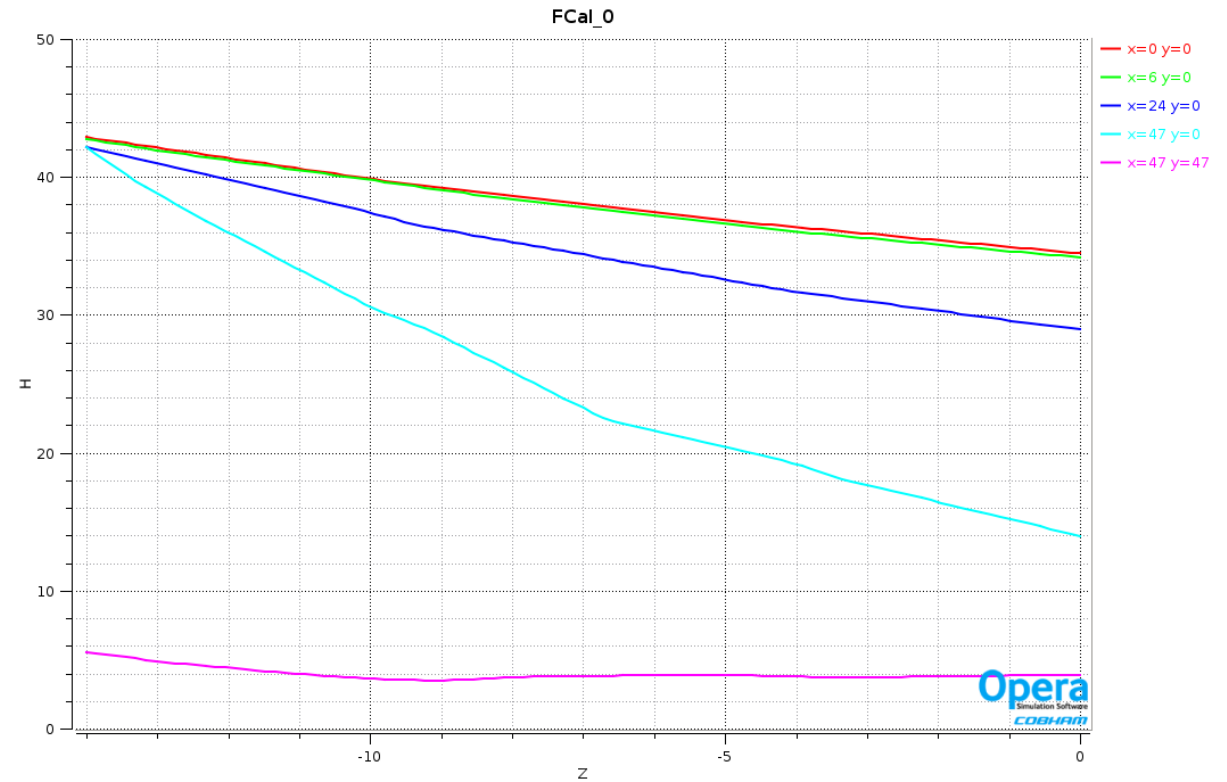
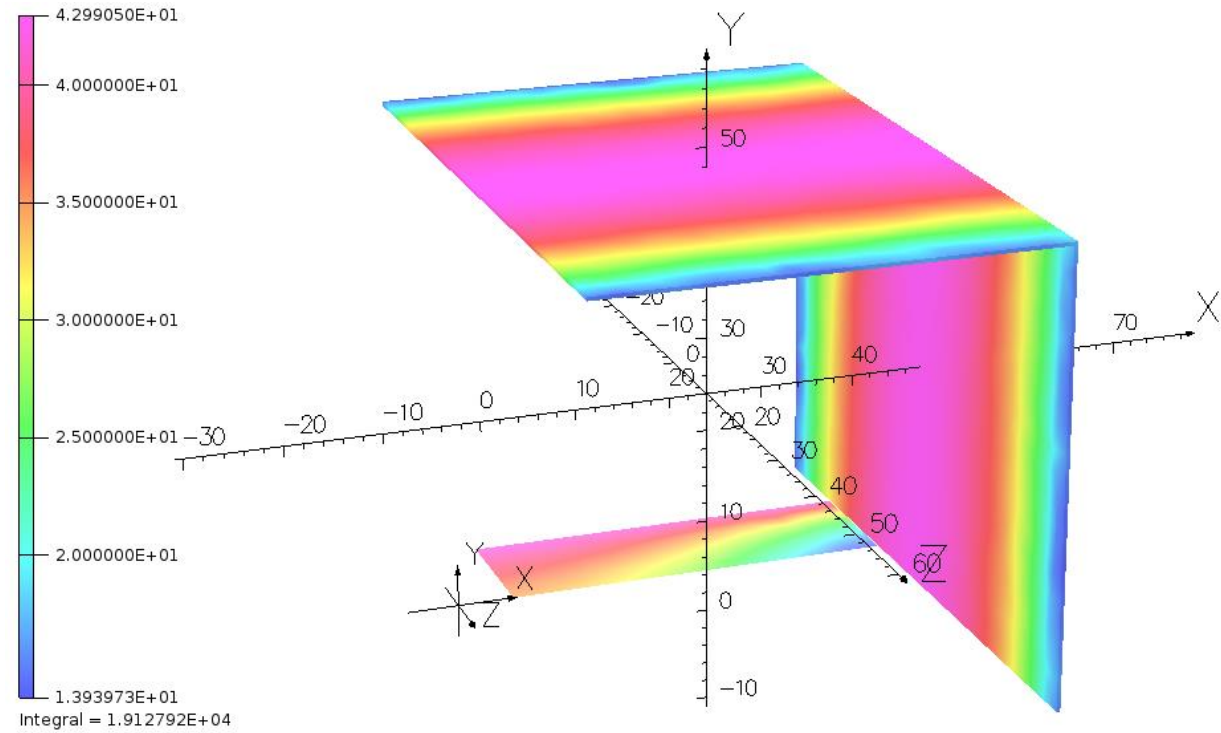


Matrix 3x3



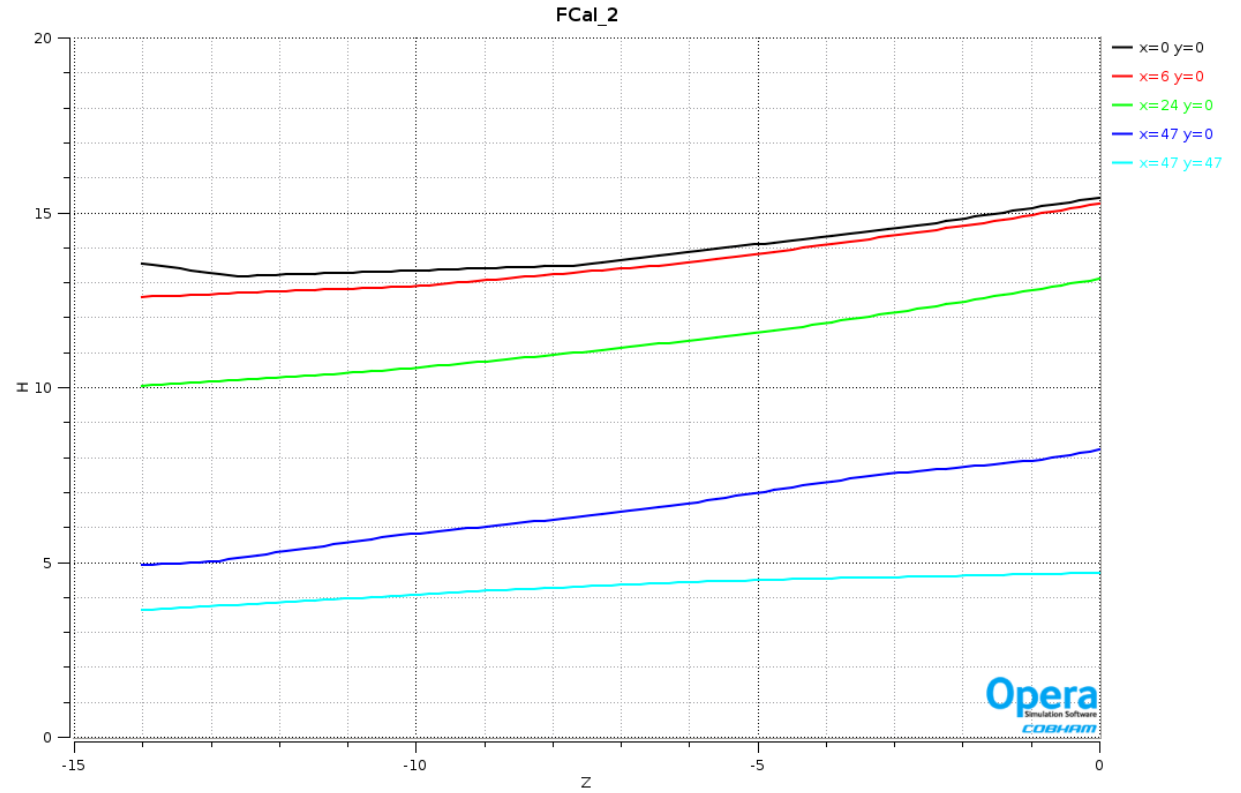
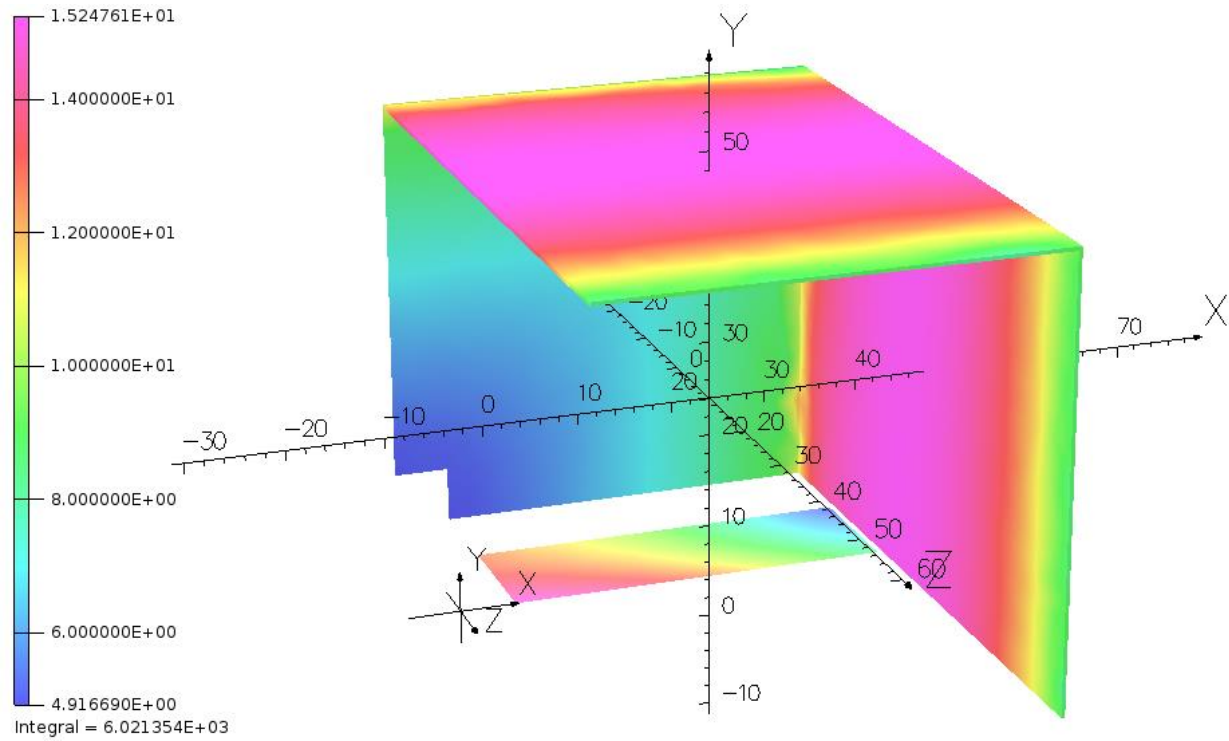
Step 1

AISI-1010 magnetic steel 4mm thickness, +45cm \leftrightarrow -25cm



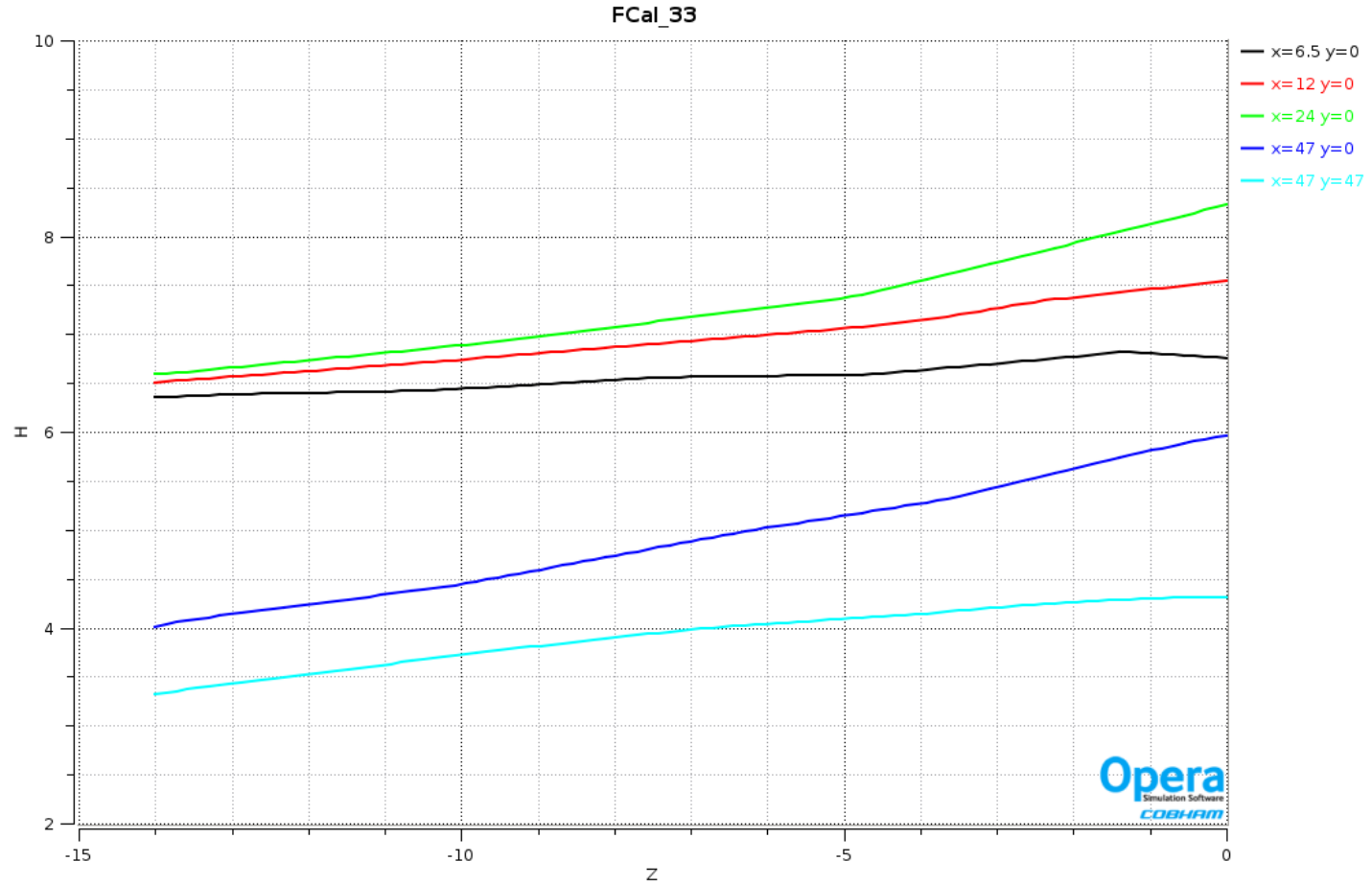
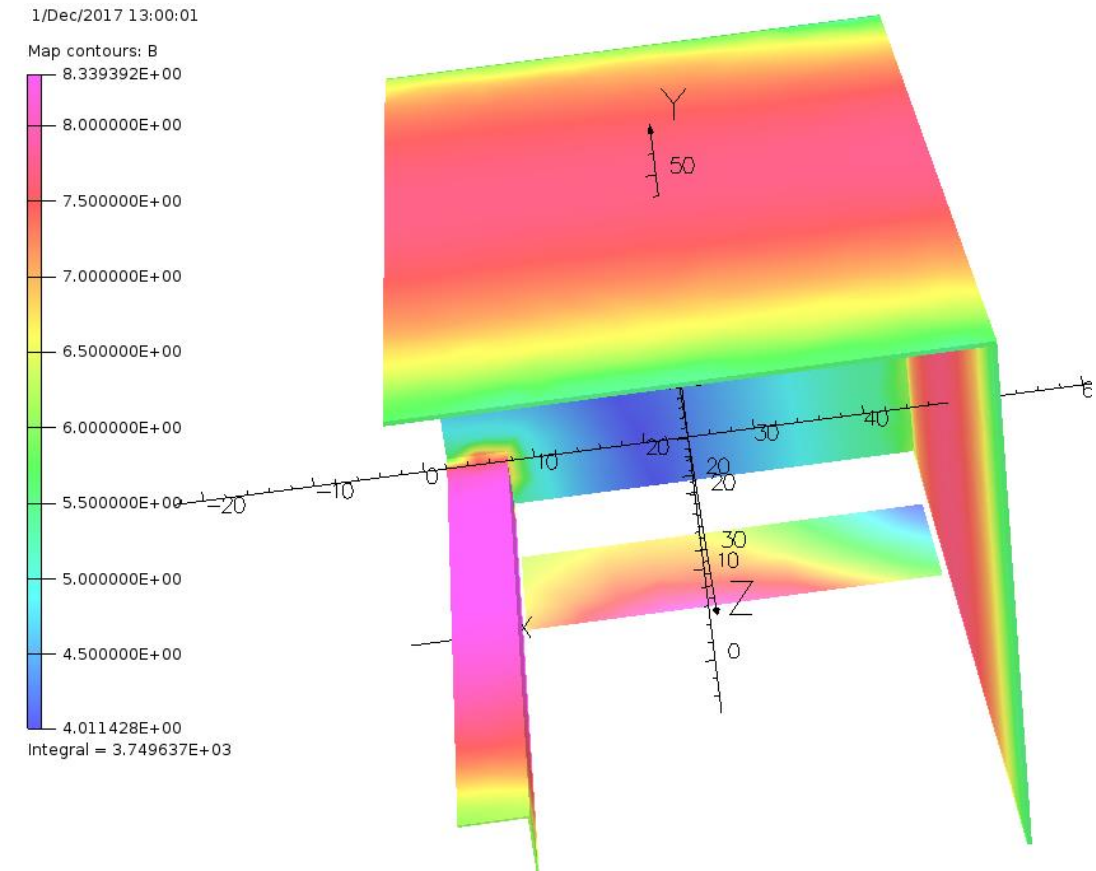
Step 2

AISI-1010 Back side plate 1cm thickness



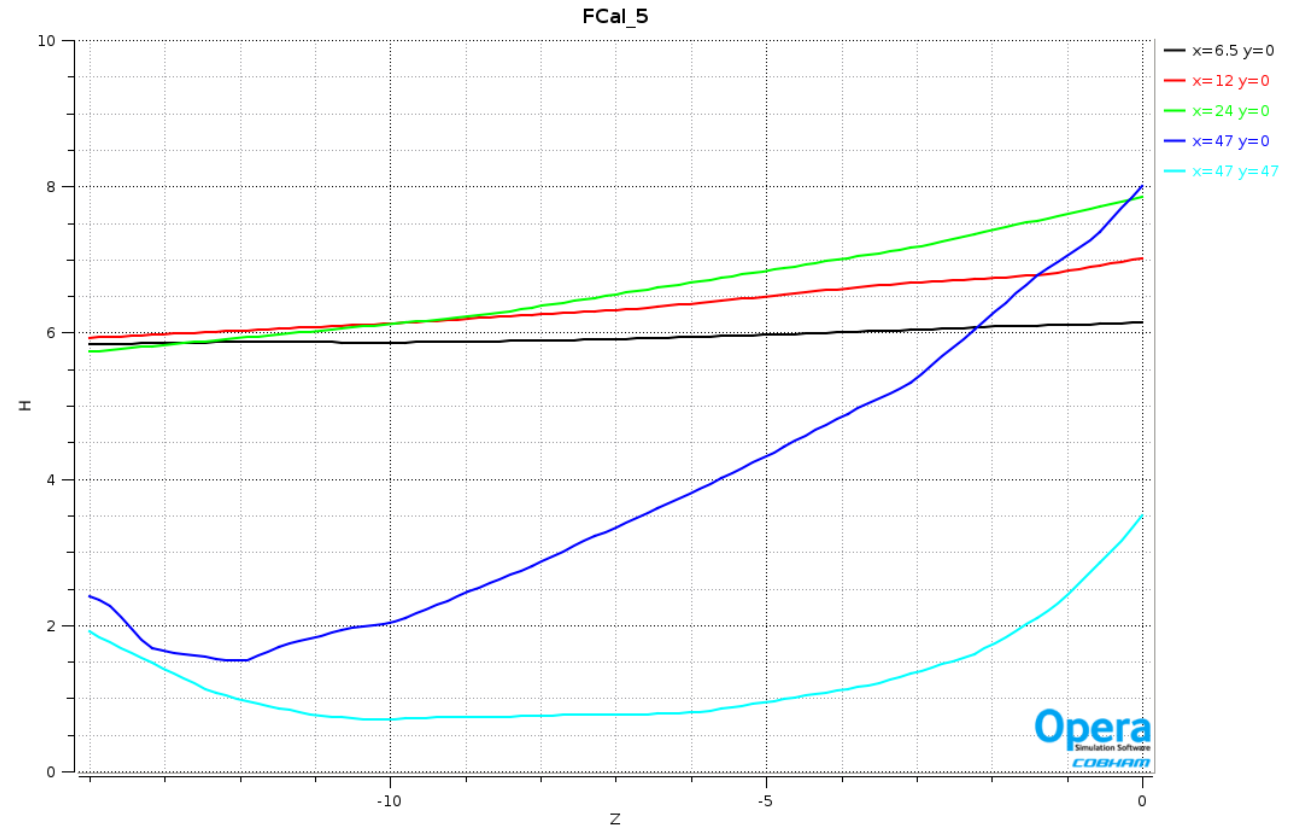
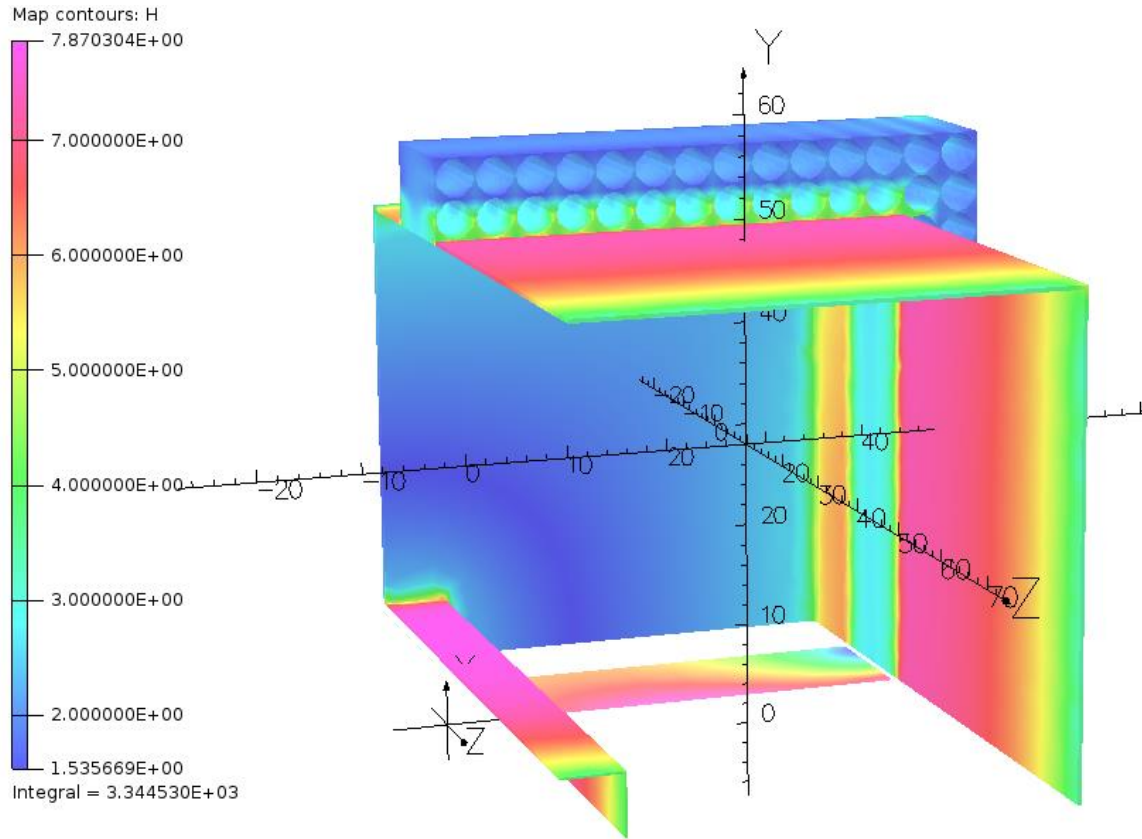
Step 3

AISI-1010 shielding of beam pipe (5mm thickness)

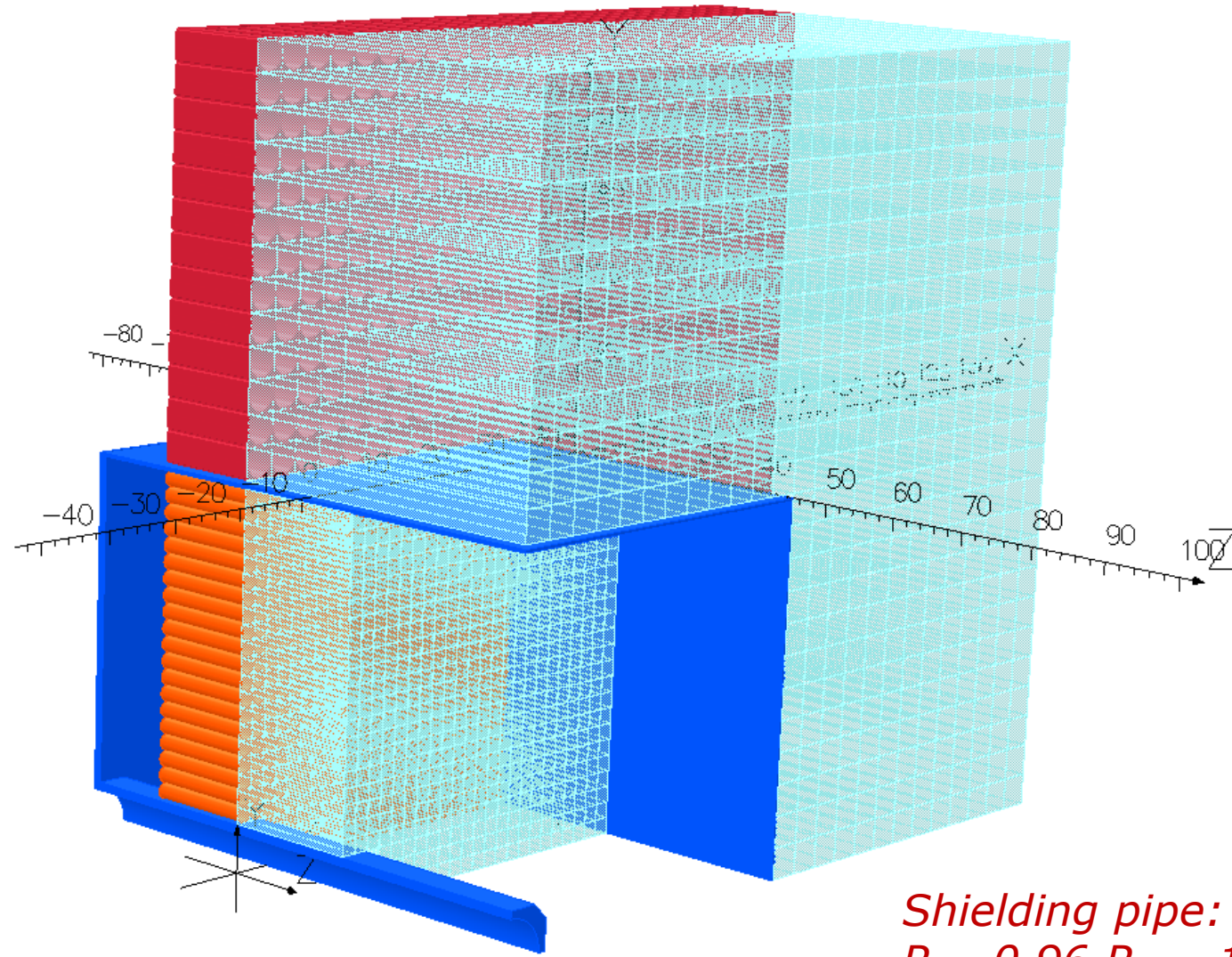


Step 4

Two layers of LG PMT's shielding



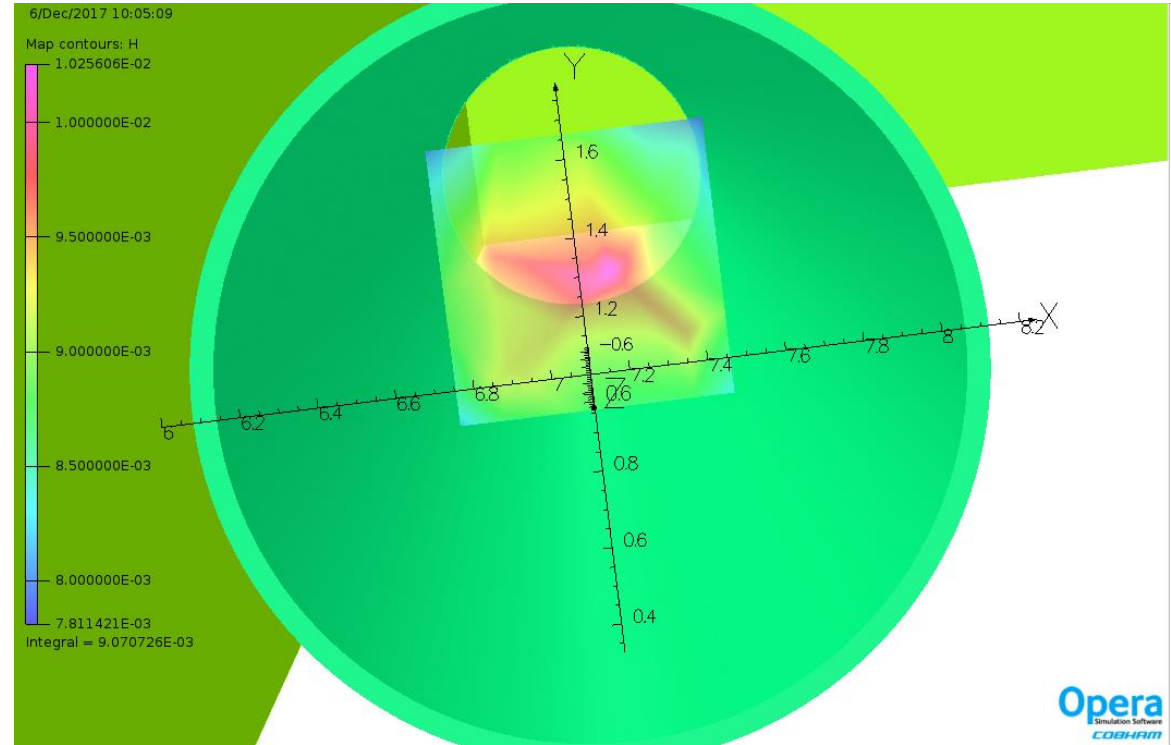
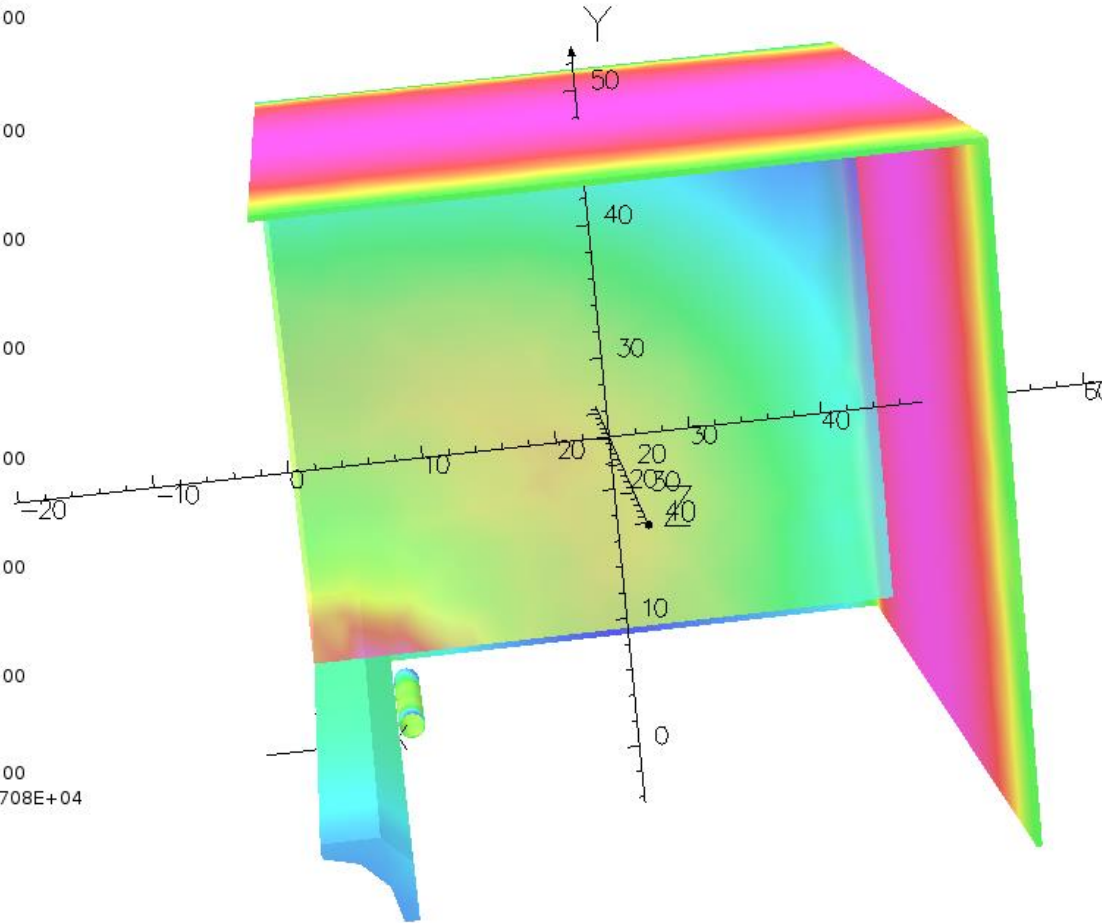
Design-2



*Shielding pipe: material – co-netic
 $R_{in}=0.96$ $R_{out}=1.01$ cm
Length=14cm*

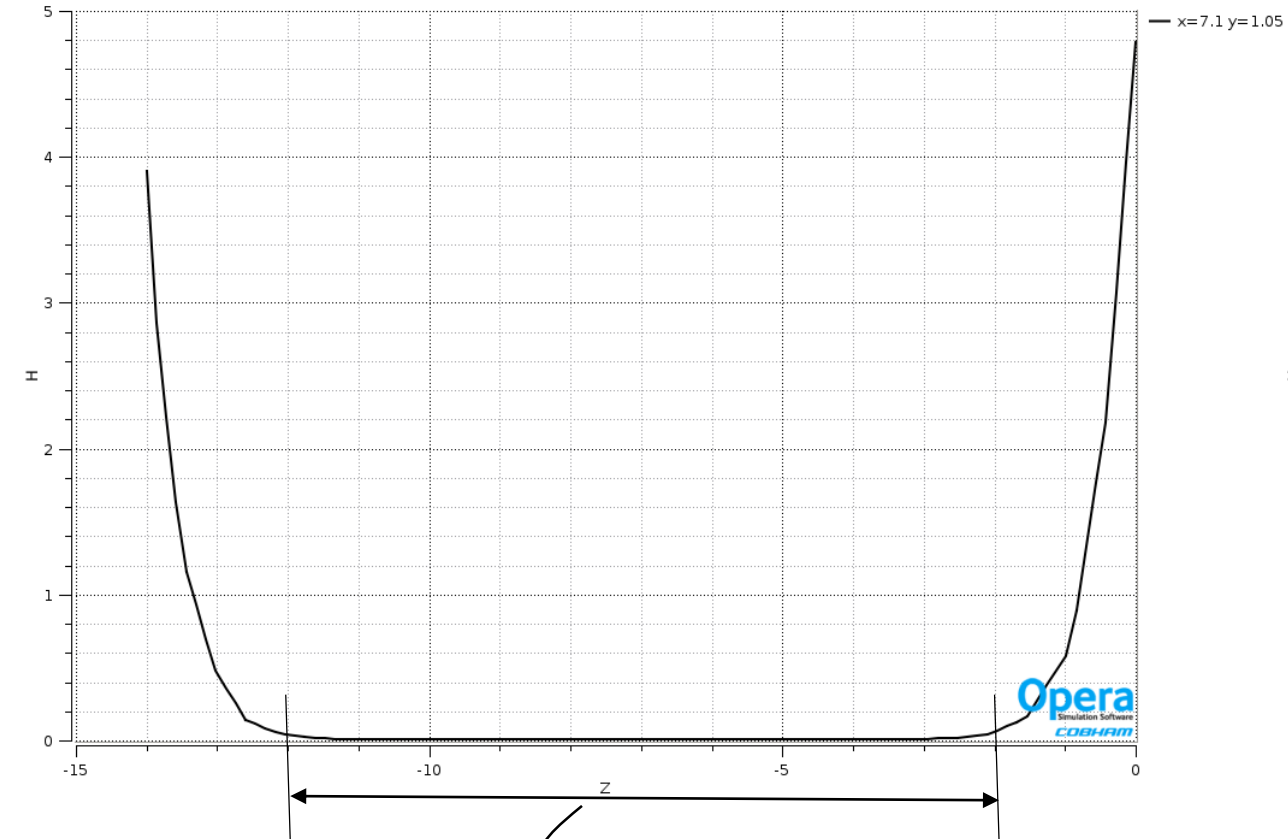
Design-2

Map contours: H
7.517061E+00
7.000000E+00
6.500000E+00
6.000000E+00
5.500000E+00
5.000000E+00
4.500000E+00
4.058589E+00
Integral = 1.009708E+04

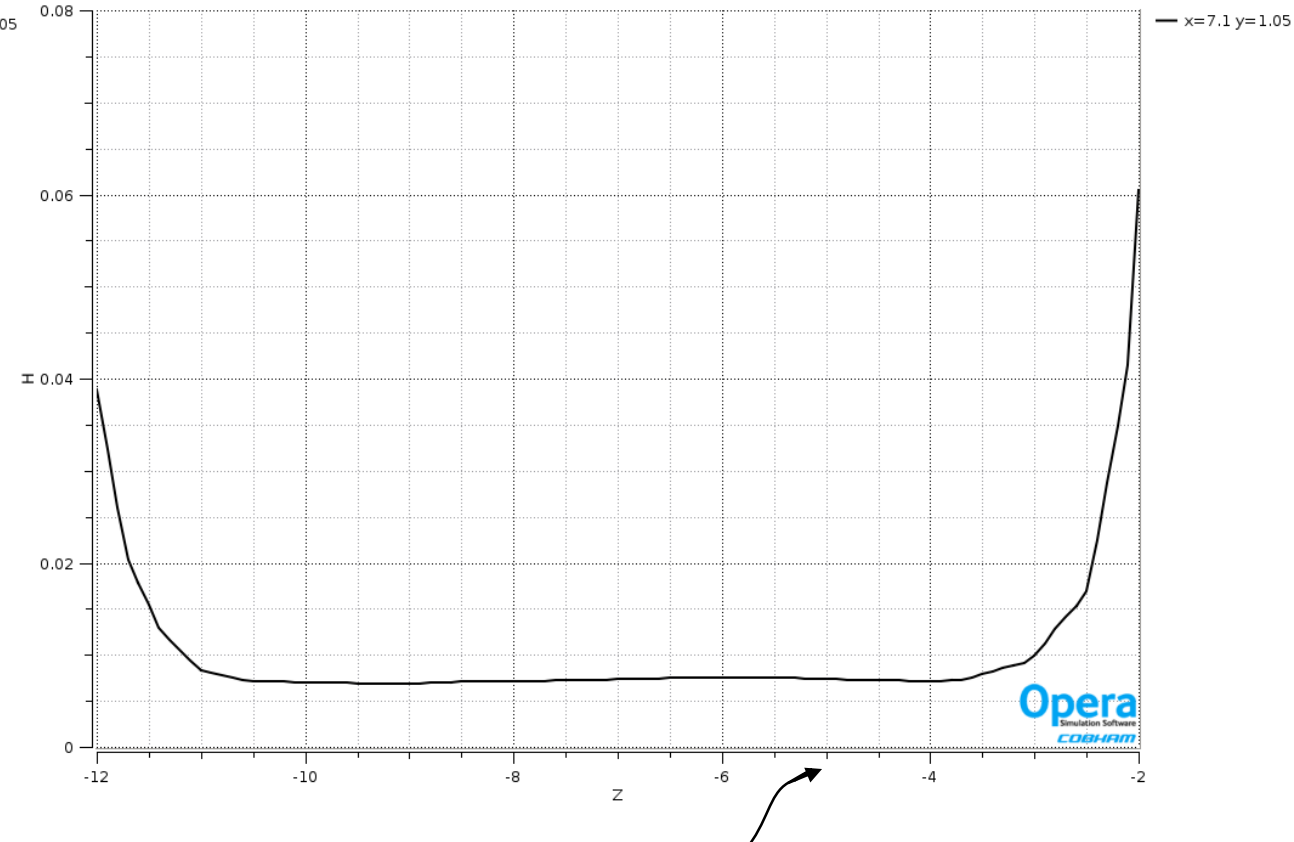


Design-2

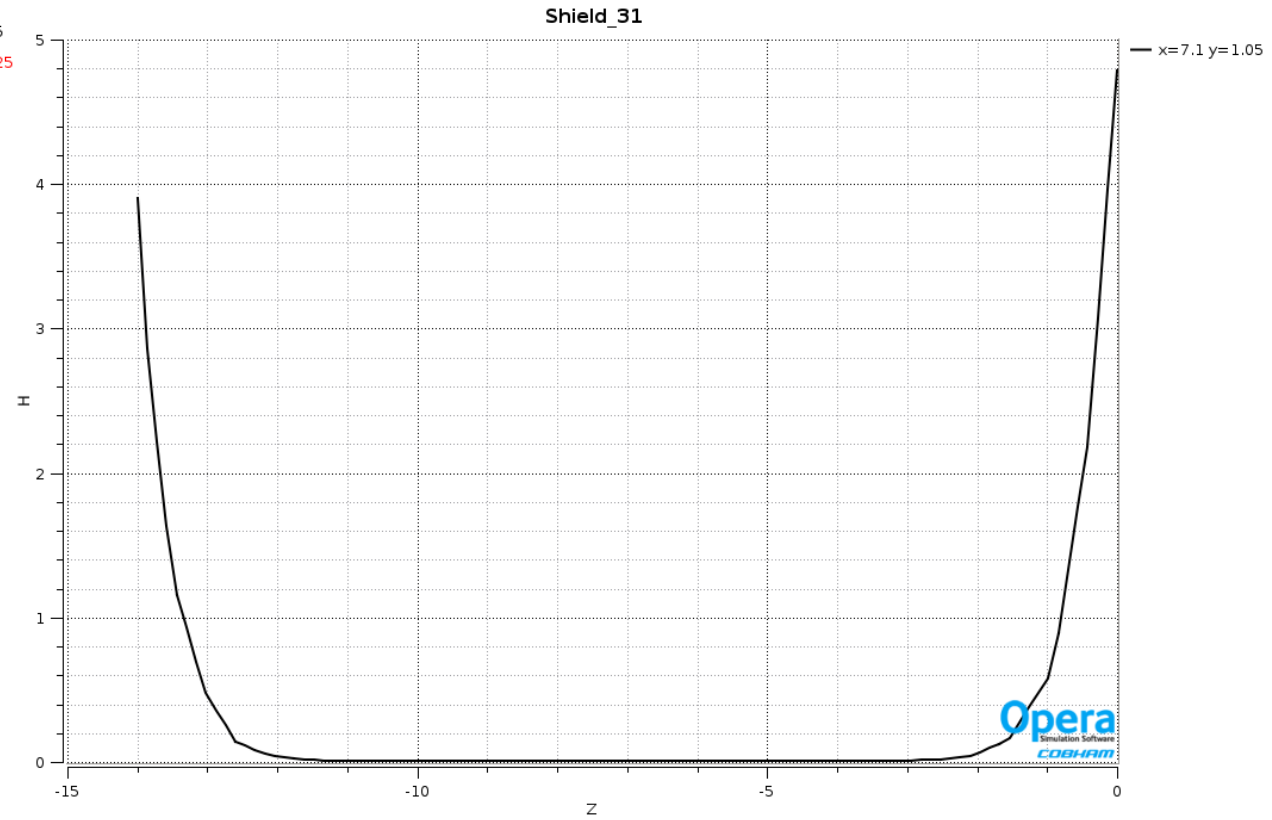
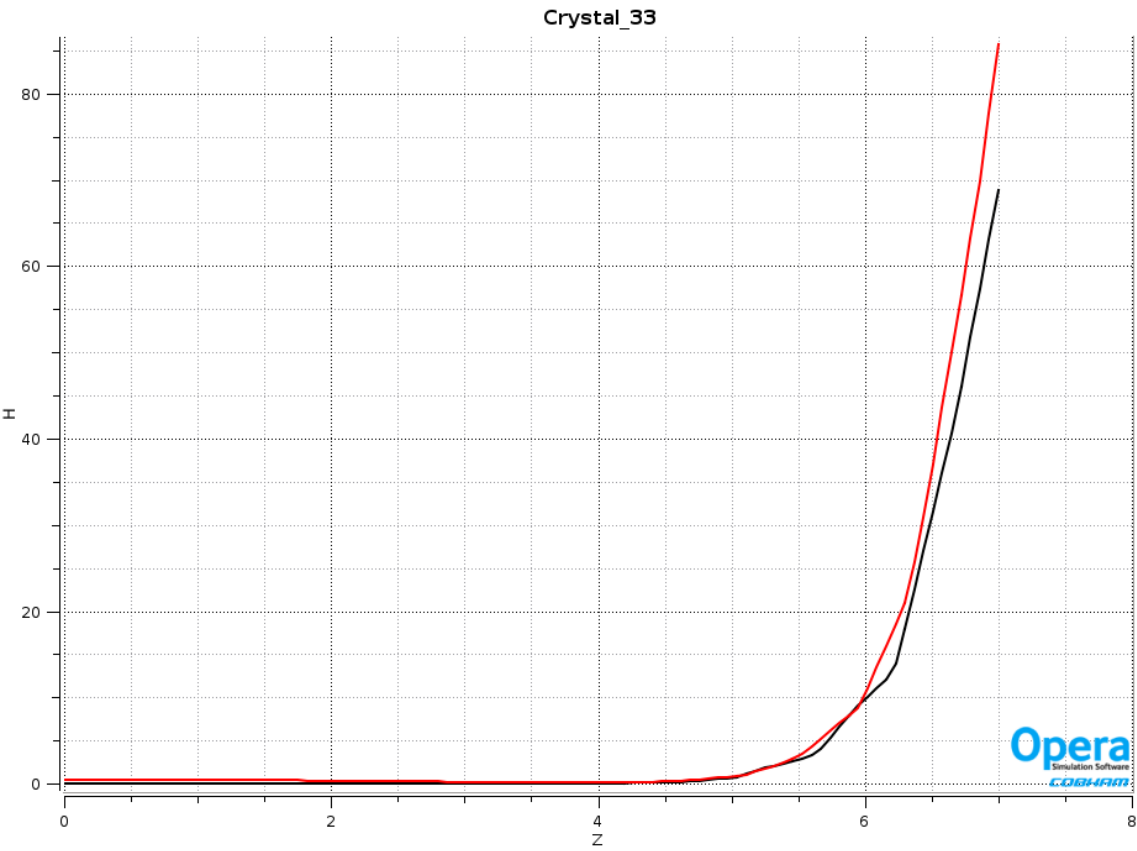
Shield_31



Shield_31



Comparison of Design-1 and Design-2



To Be Done

- *Field 80 Oe and 100 Oe*
- *Wall thickness 4mm -> 2mm -> 1mm*
- *Back side wall 25cm -> 45cm*
- *Multiple μ -shield pipes in different regions*
- *Else ...?*