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Shielding the Weiner PSU

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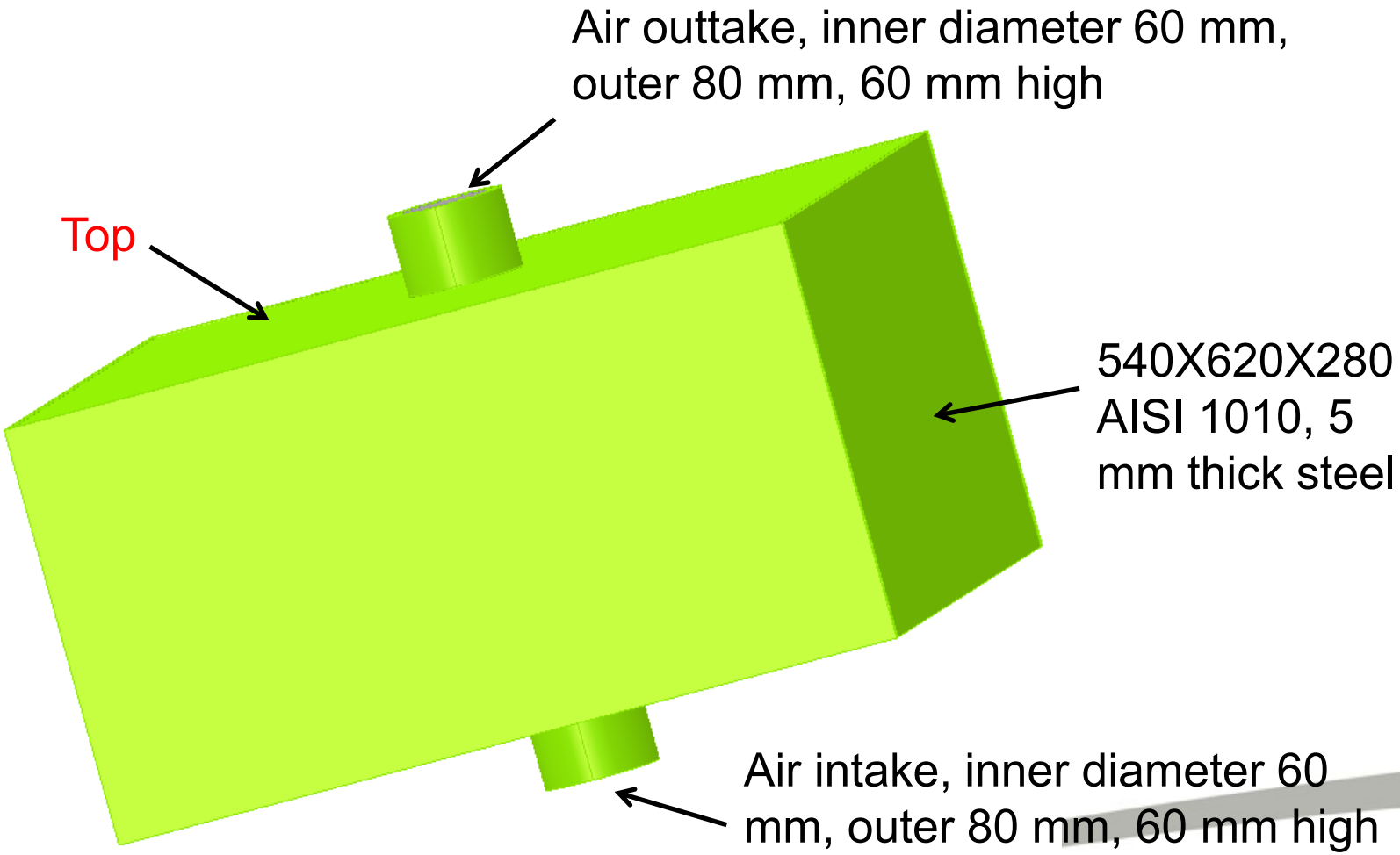
Concept



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Design considerations

The air in/outtakes serve several purposes:

- additional shielding of the “hole” areas, as will be shown
- access for cabling (4+1 sets of cables needed)
- Bottom-to-top air circulation
- Possibility to install additional fans in a well-shielded area (1-3mT). Supplying air from a compressor should also be an option.

Heat generation inside the box seems to be high 400W-1200W.

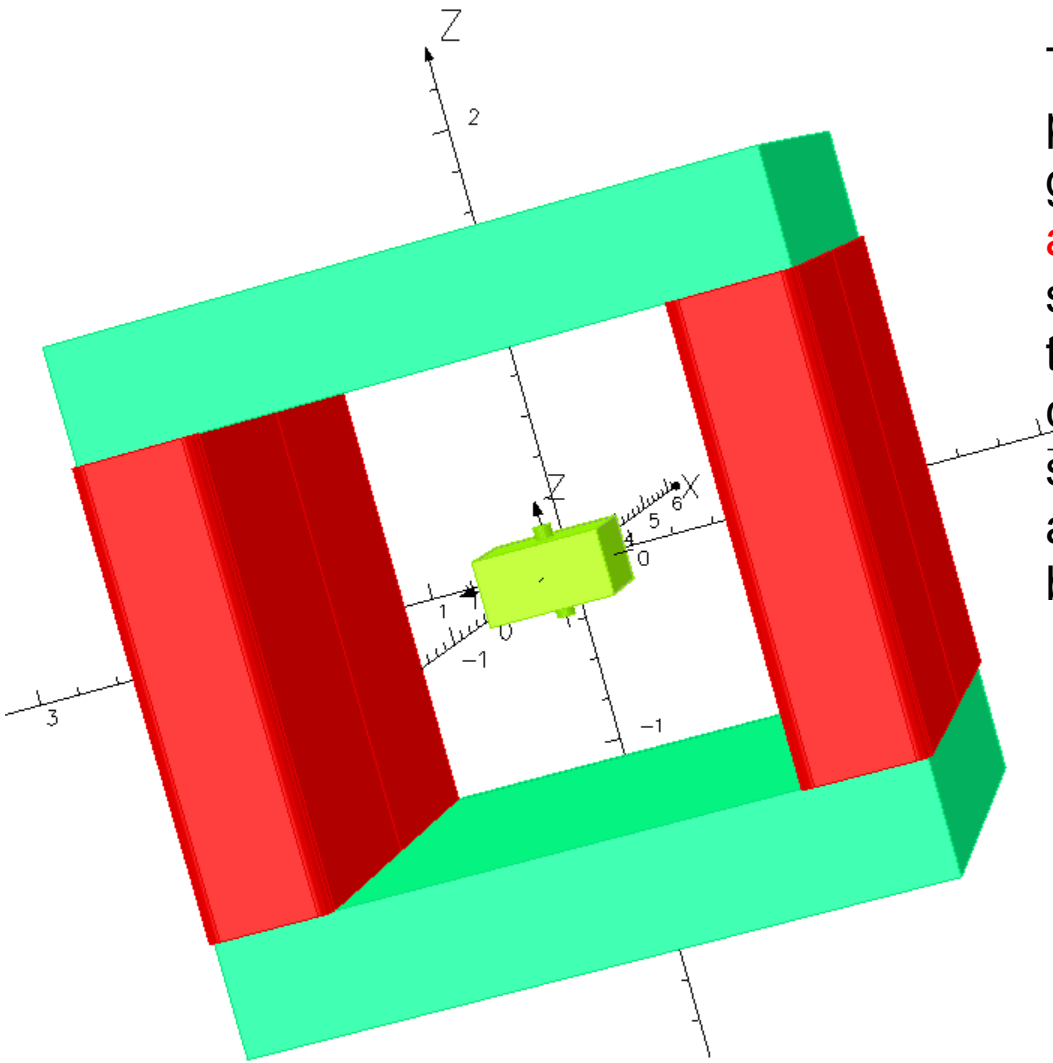
The position of the air in/outtake pair does not need to be in the centre (chosen for symmetry). A second pair could be a added, if needed.

There is a 50 mm distance between the PSU walls and the shield in each direction.

Seems to work magnetically but needs to be assessed by mechanical and electrical engineers. Access to the PSU is needed.

May not fit in a standard rack

Method



The shield is placed between the poles of a window-frame magnet generating uniform field pointing along Z of 30 mT strength. The shield has been rotated around its three main axes and in each configuration the field in the shielded region has been assessed. The PSU is believed to be able to tolerate 25 mT.

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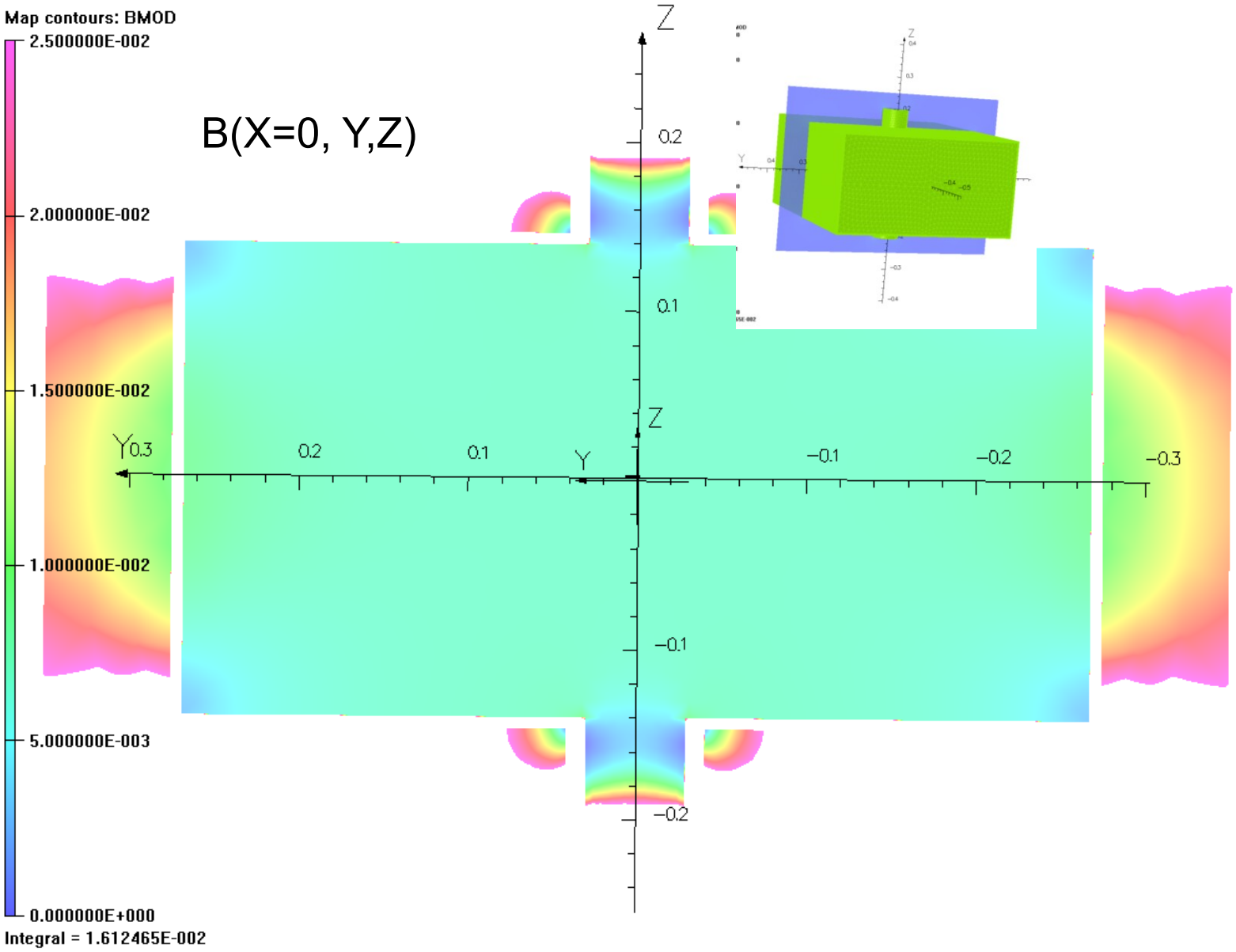
External field parallel to the air in/outtake axis



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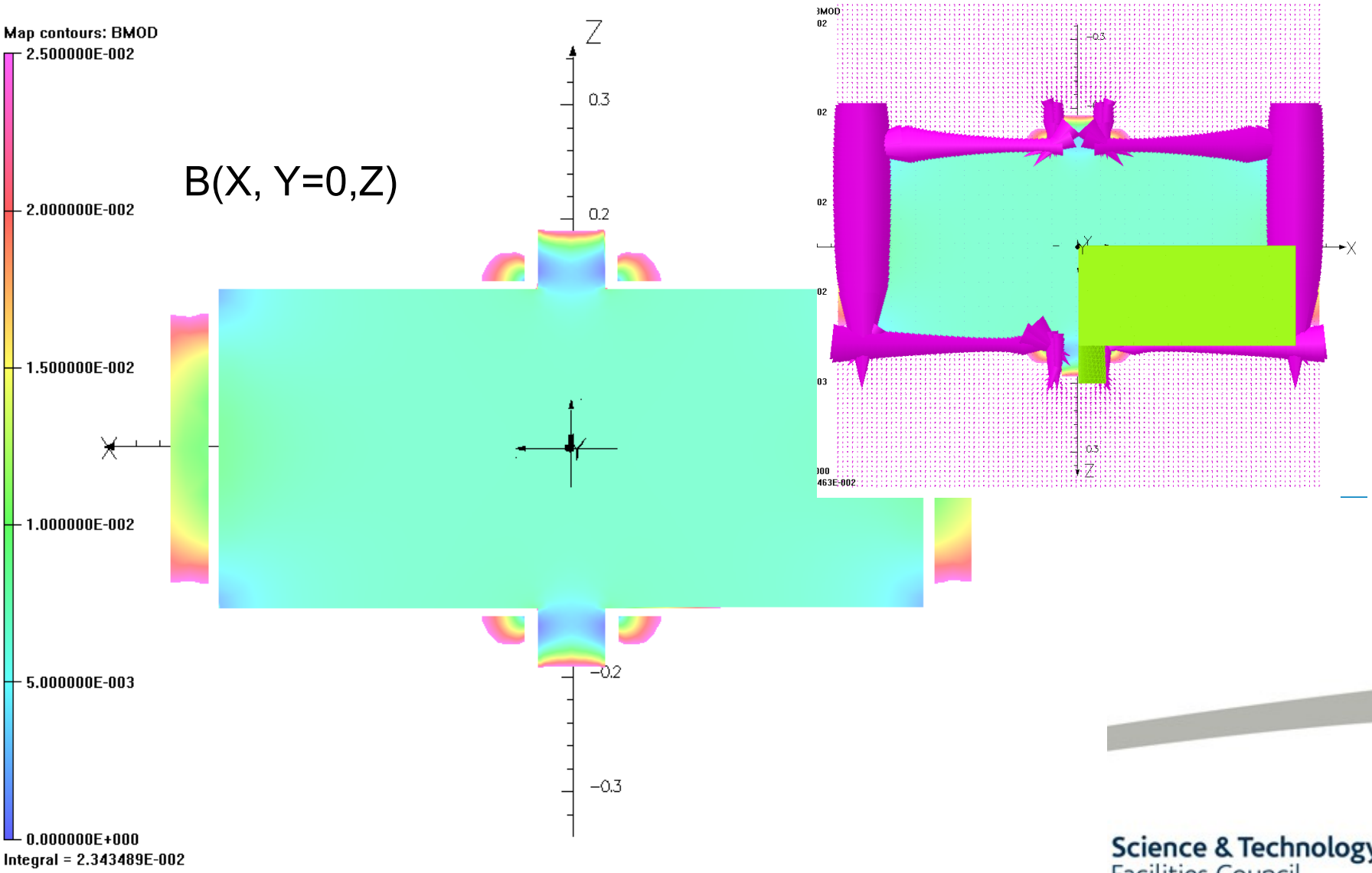
External field parallel to the air in/outtake axis II



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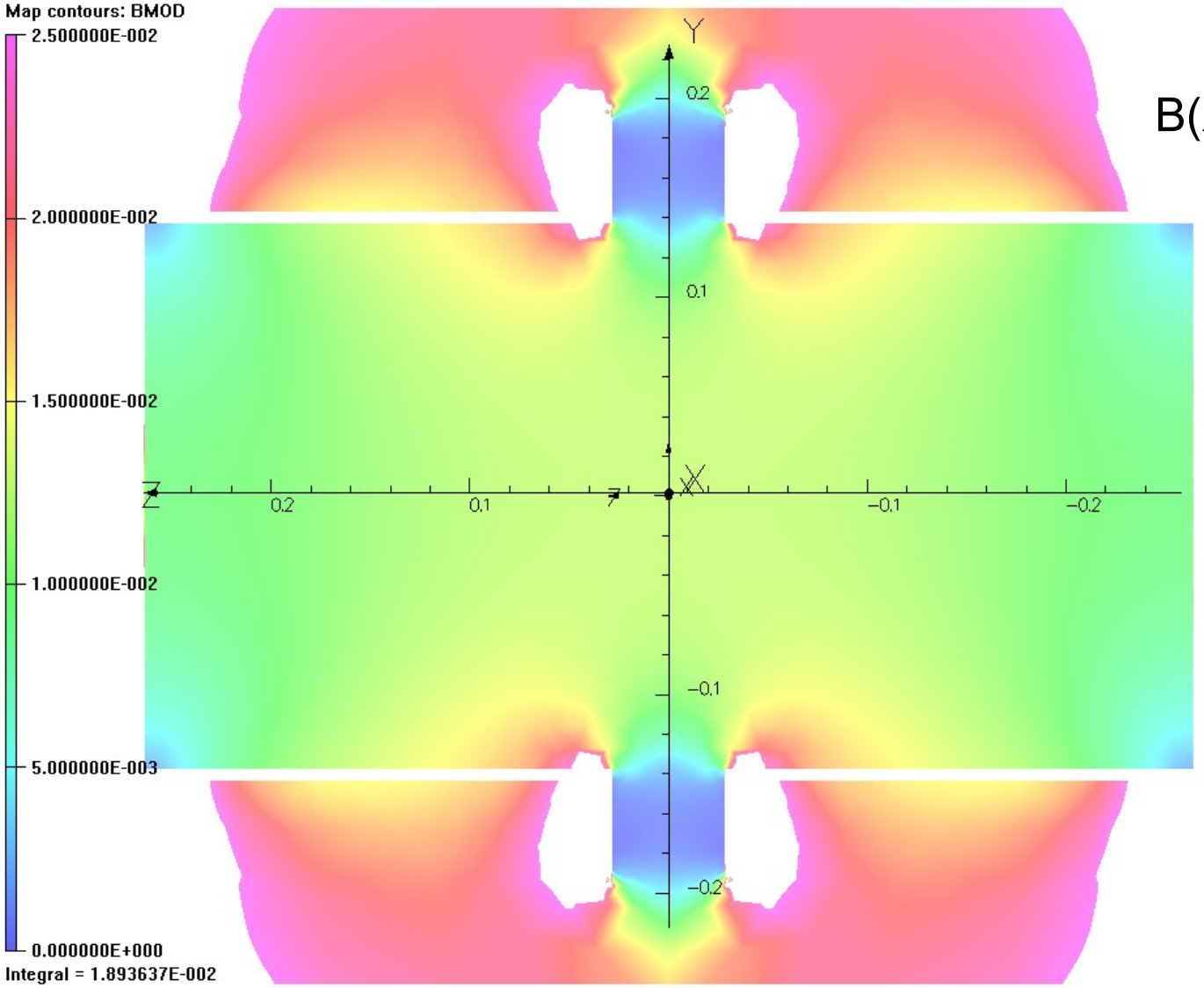
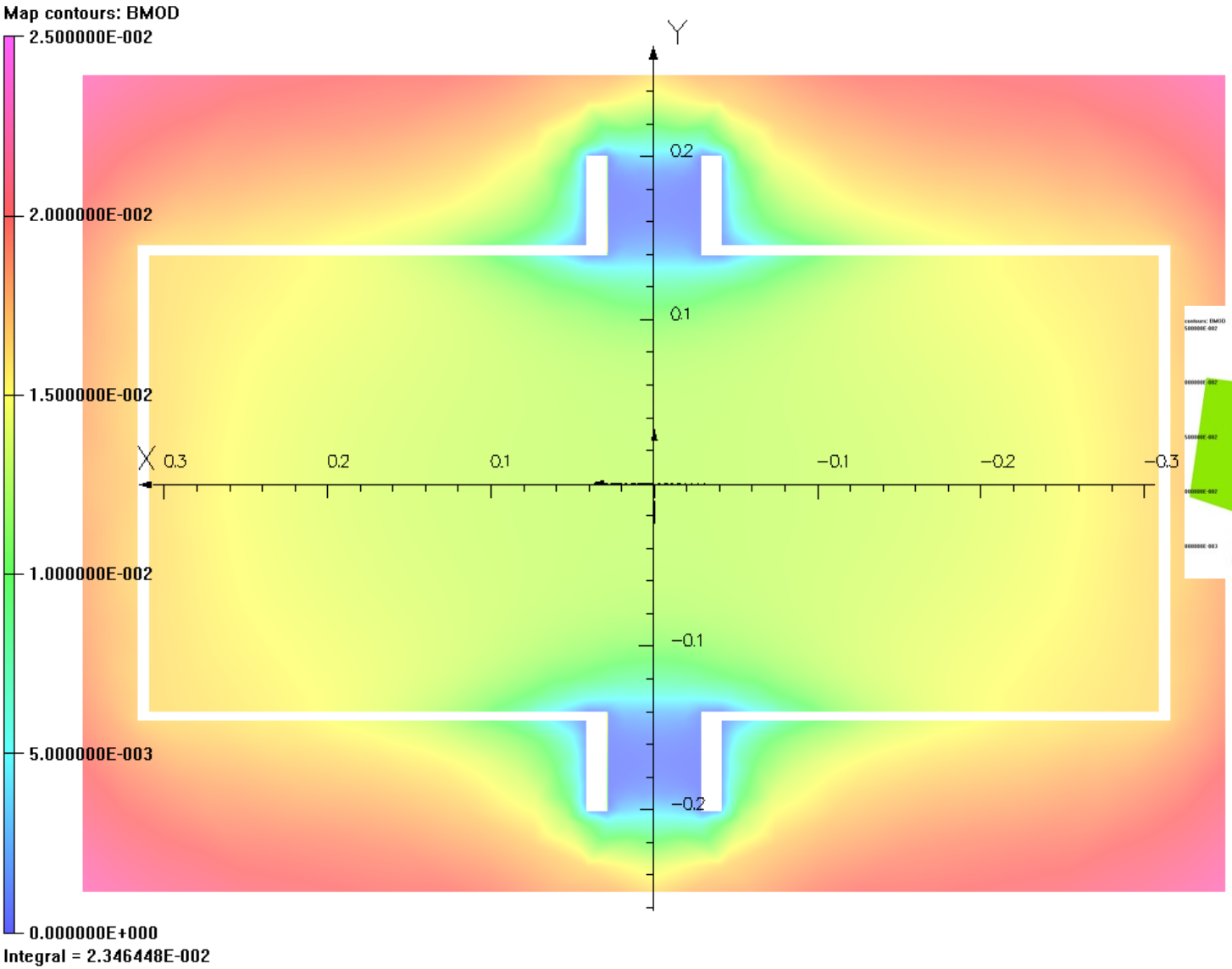
External field perpendicular to the air in/outtake axis

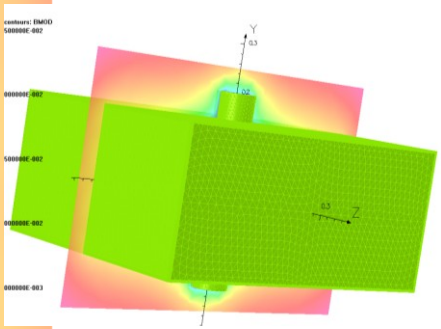


B(X=0, Y,Z)

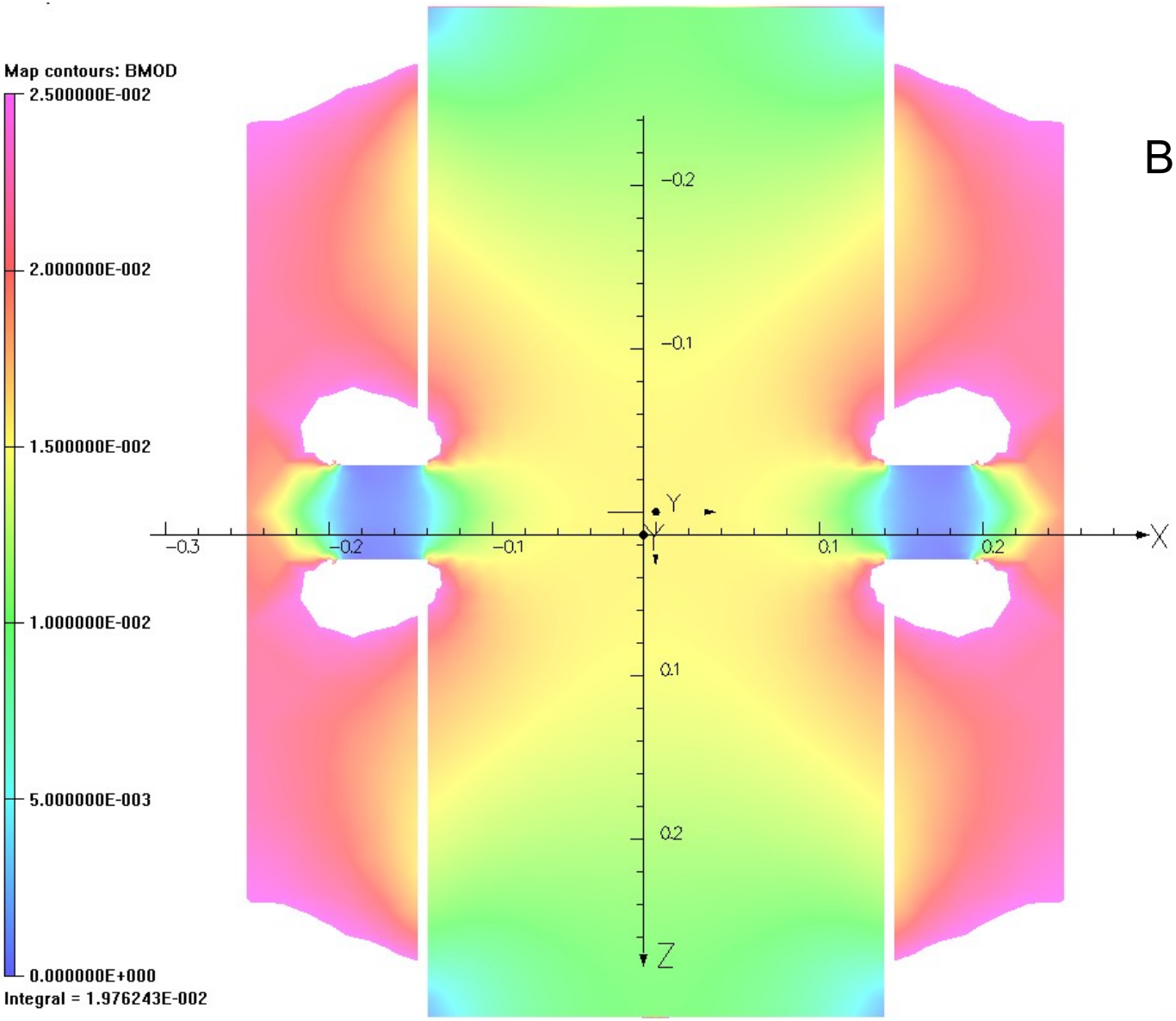
External field perpendicular to the air in/outtake axis II



B(X, Y,Z=0)



External field perpendicular to the air in/outtake axis III



B(X, Y=0,Z)

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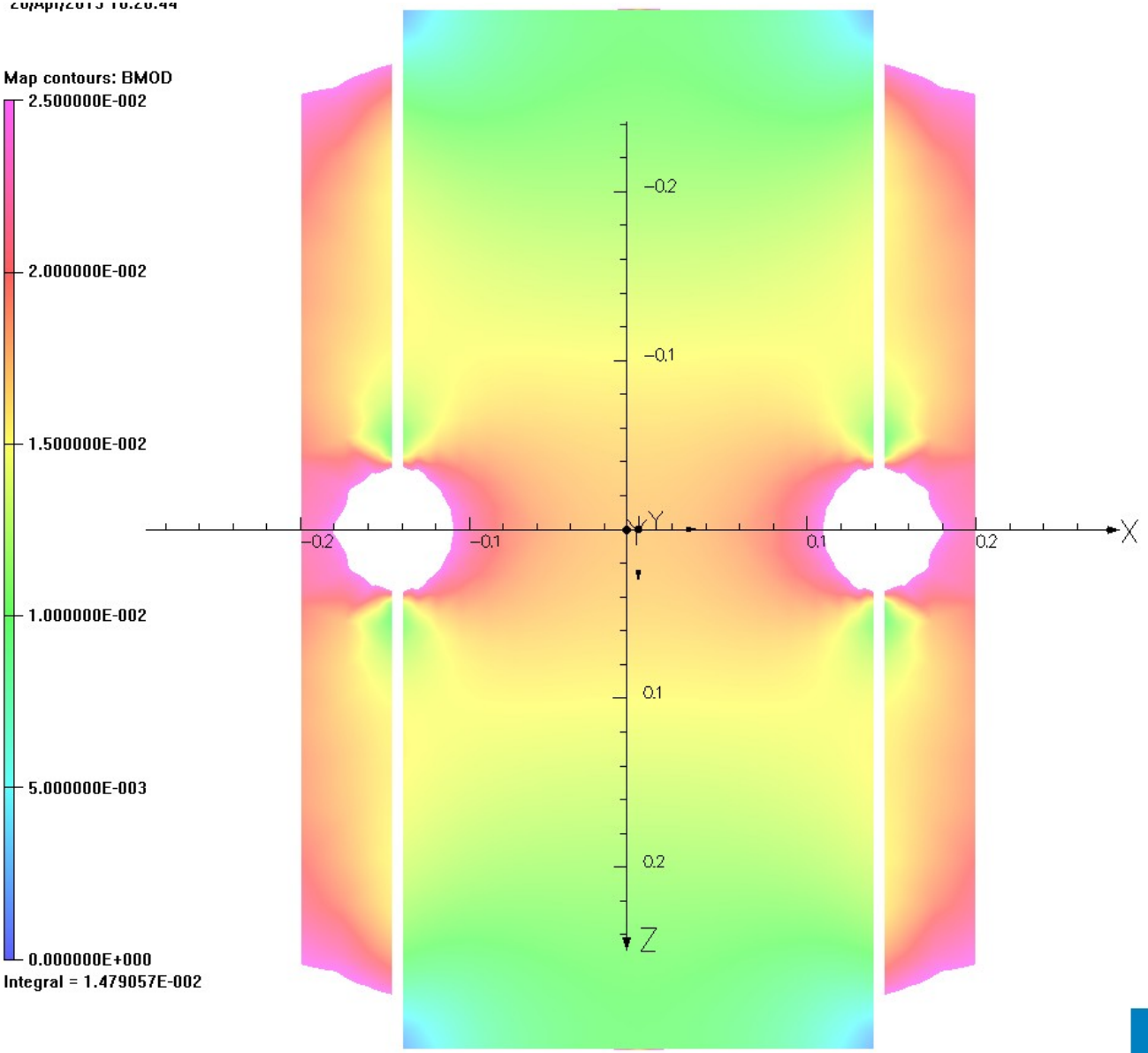
External field perpendicular to the air in/outtake axis IV



B(X, Y=0,Z)

The same as on the previous slide but the two "chimneys" have been removed

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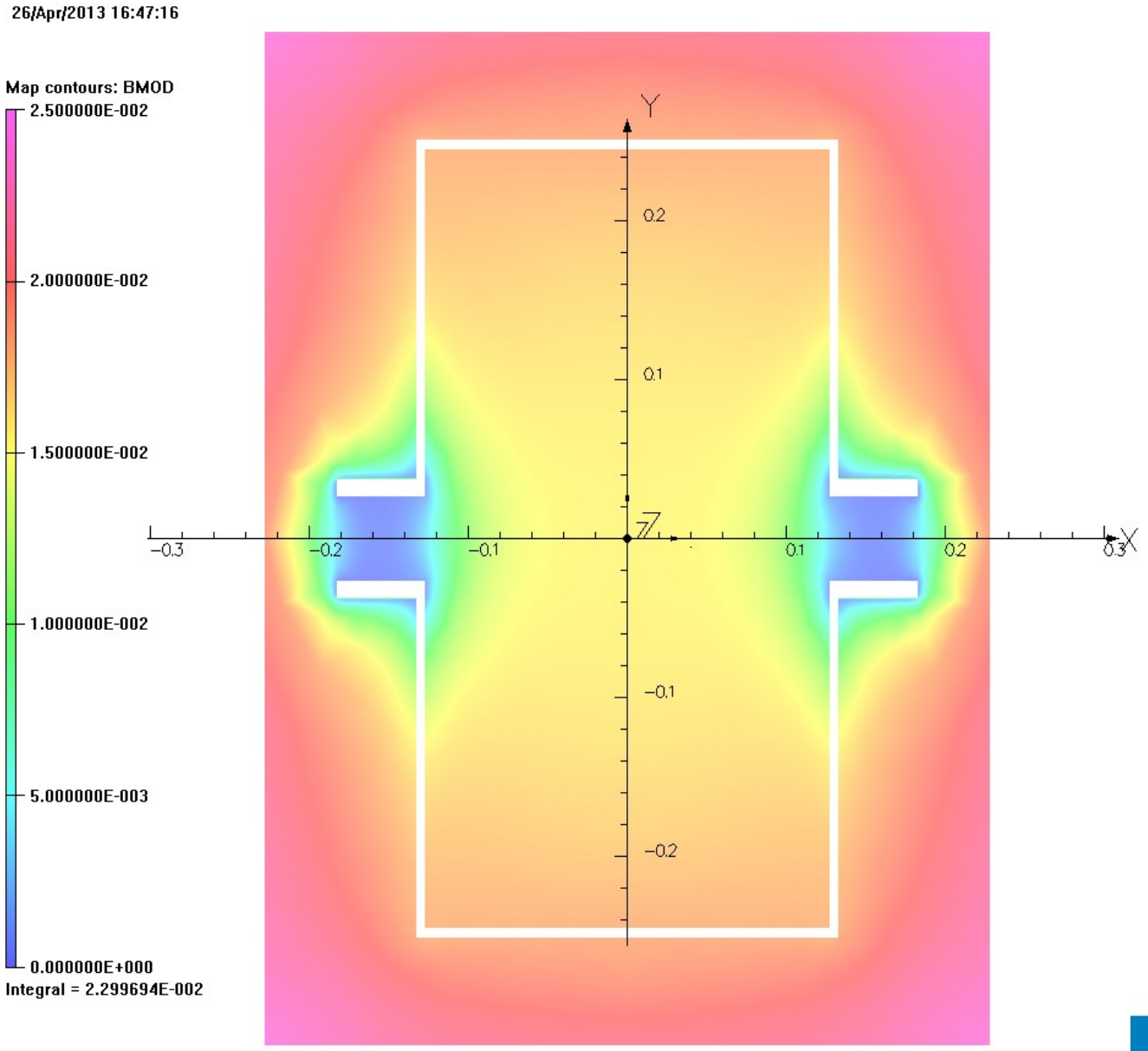
External field perpendicular to the air in/outtake axis V



B(X, Y,Z=0)

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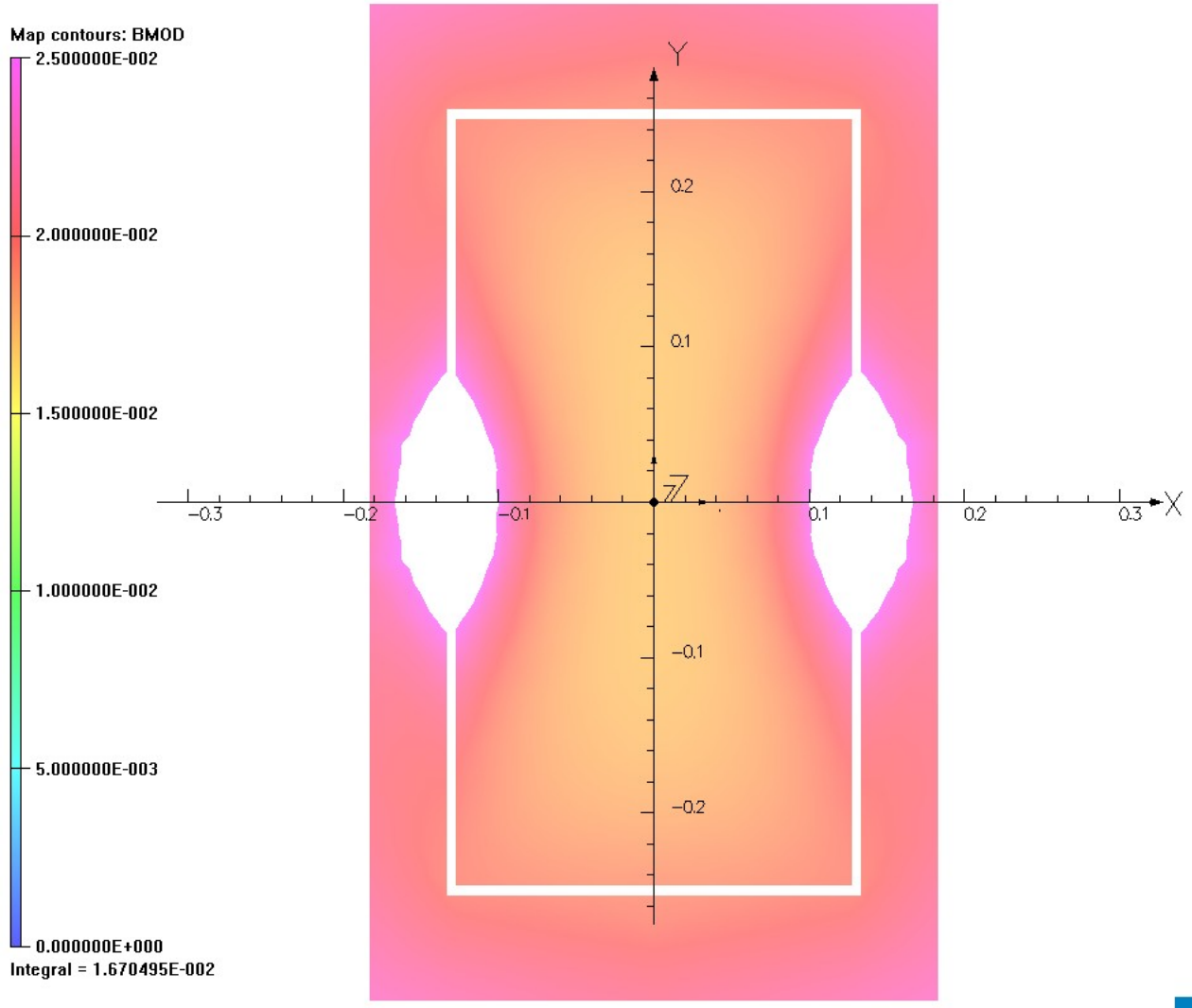
External field perpendicular to the air in/outtake axis VI



B(X, Y,Z=0)

The same as on the previous slide but the two “chimneys” have been removed

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Summary

Three orientations of the proposed structure with respect to the external field have been considered.

With an external field of >30 mT the field inside the shielded area is well below the target value of 25 mT. Seems to work. Better shielding can be achieved with thicker walls.

A thermal analysis is needed as the heat generated by the PSU could be quite high!

An easy access to the unit without compromising the shielding properties is needed.

A very useful discussion with John and Ian from DL Technology Department is gratefully acknowledged.

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