PAUL SCHERRER INSTITUT

PSI

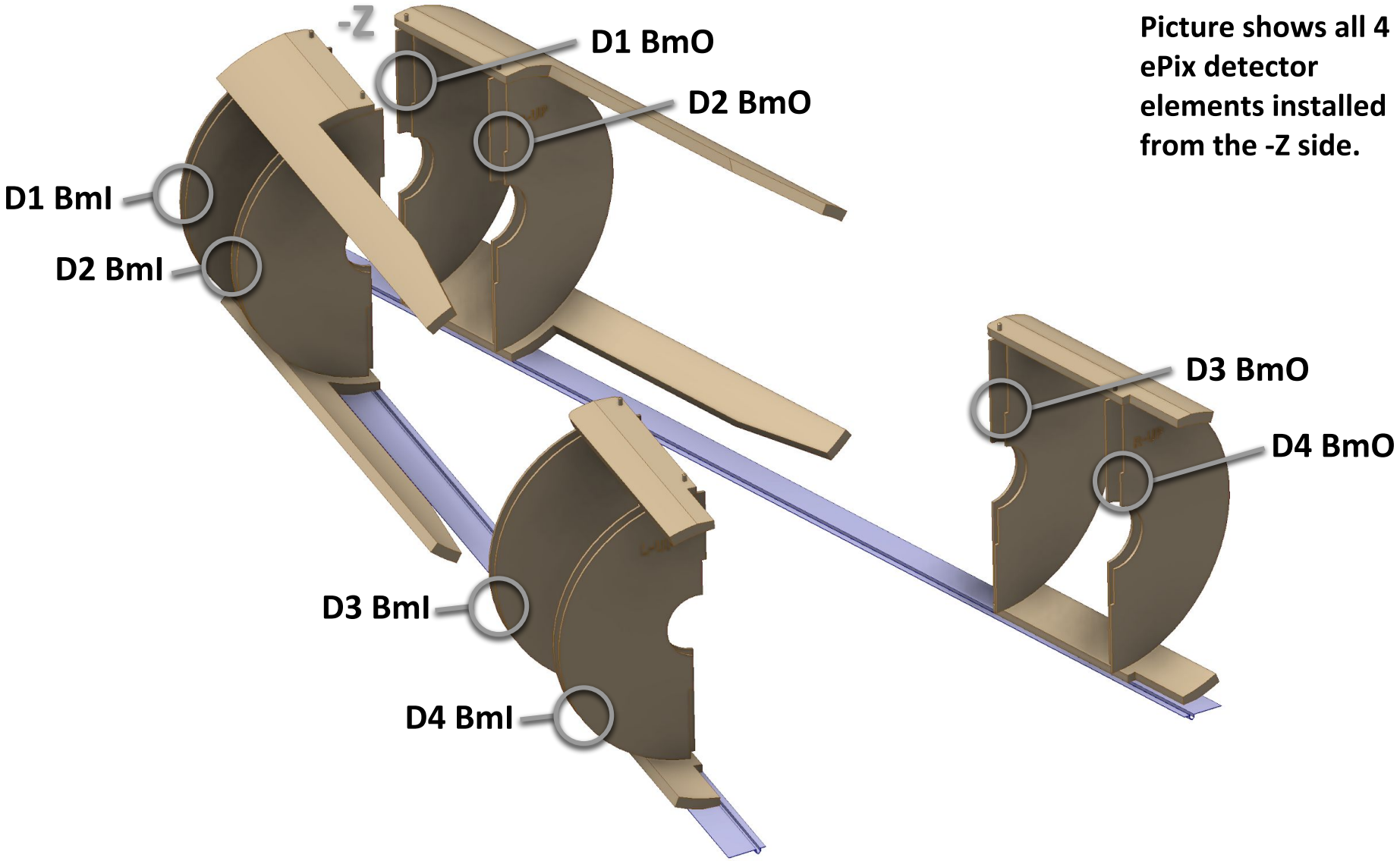
Silvan Streuli :: Paul Scherrer Institut

ePix Mechanics

Villigen PSI - June - 2018

CMS

Nomenclature of ePix -Z Side



Picture shows all 4 ePix detector elements installed from the -Z side.

Nomenclature of ePix Individual D (Half Disk)

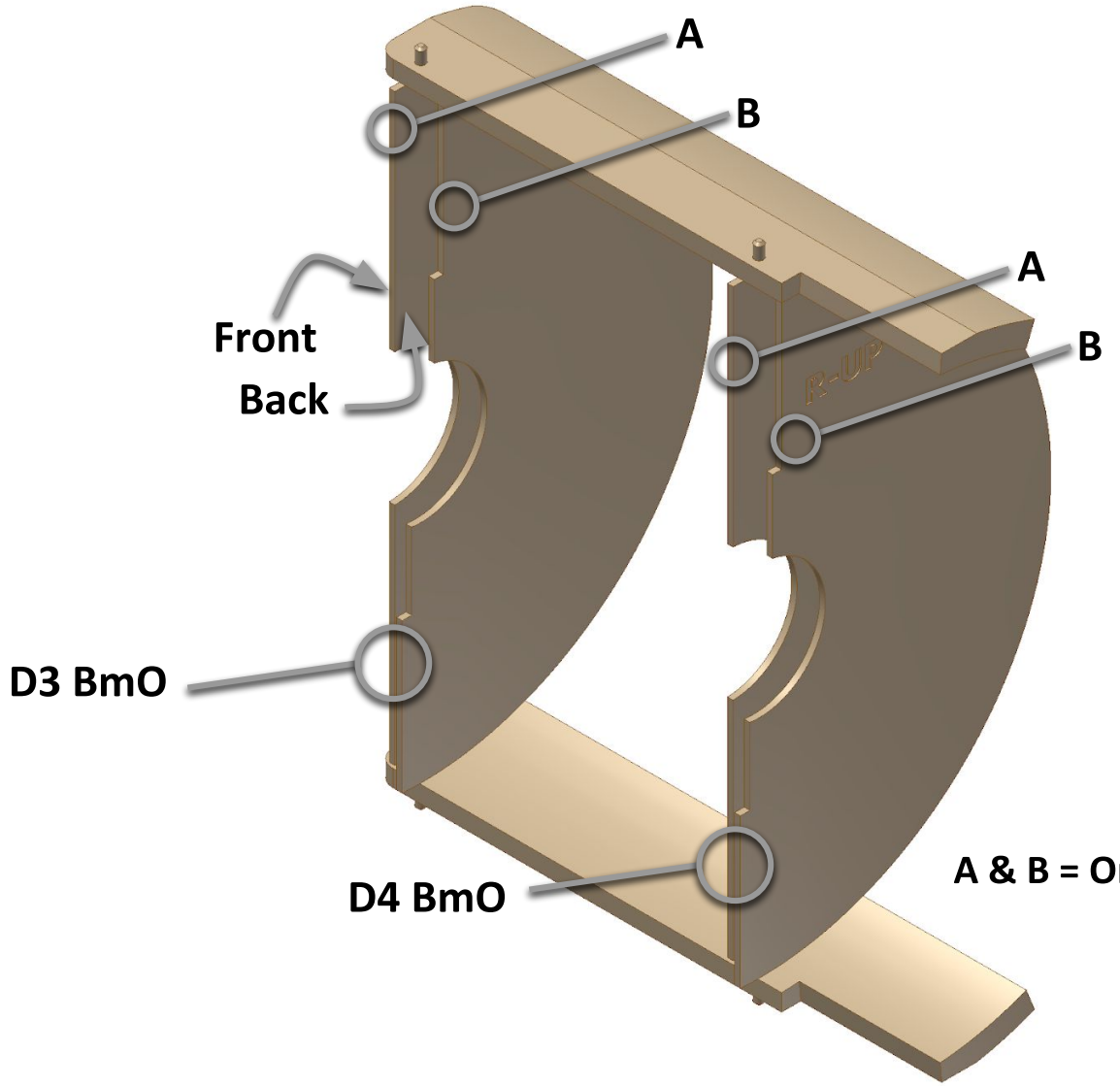


Illustration shows one ePix detector element with the corresponding designations of the half disks.

Full Disk

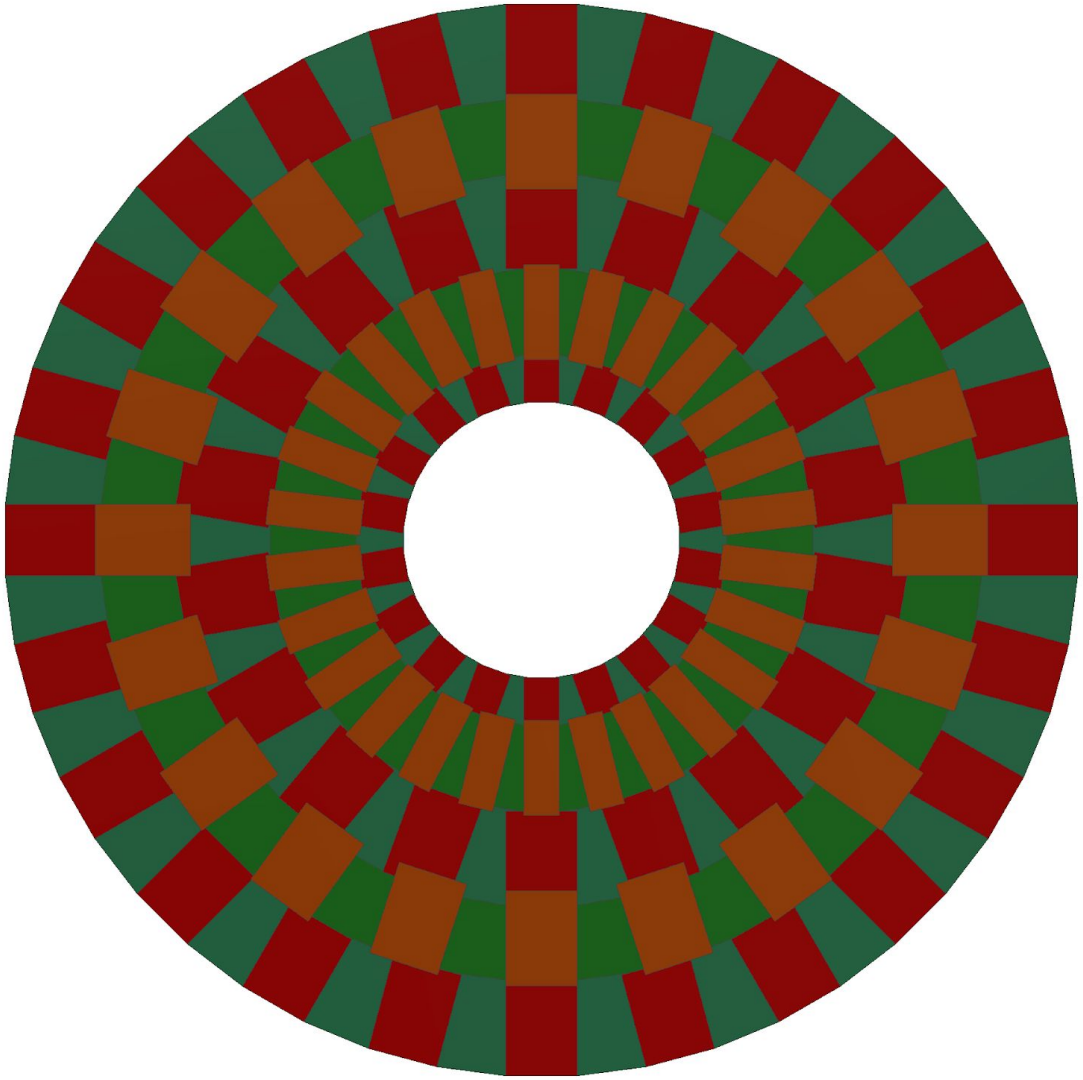
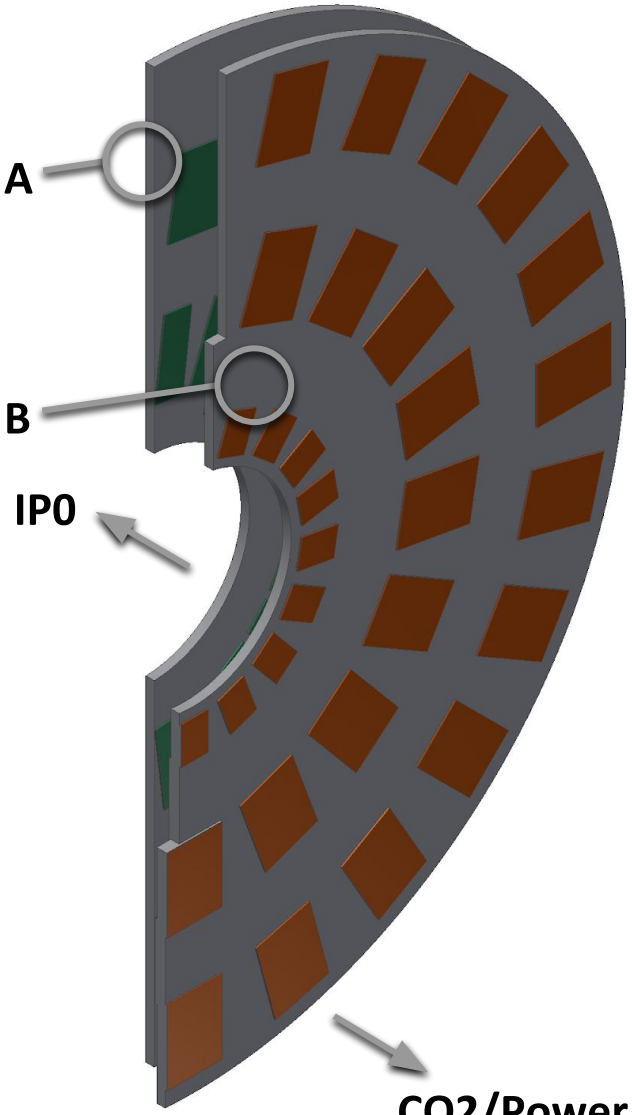
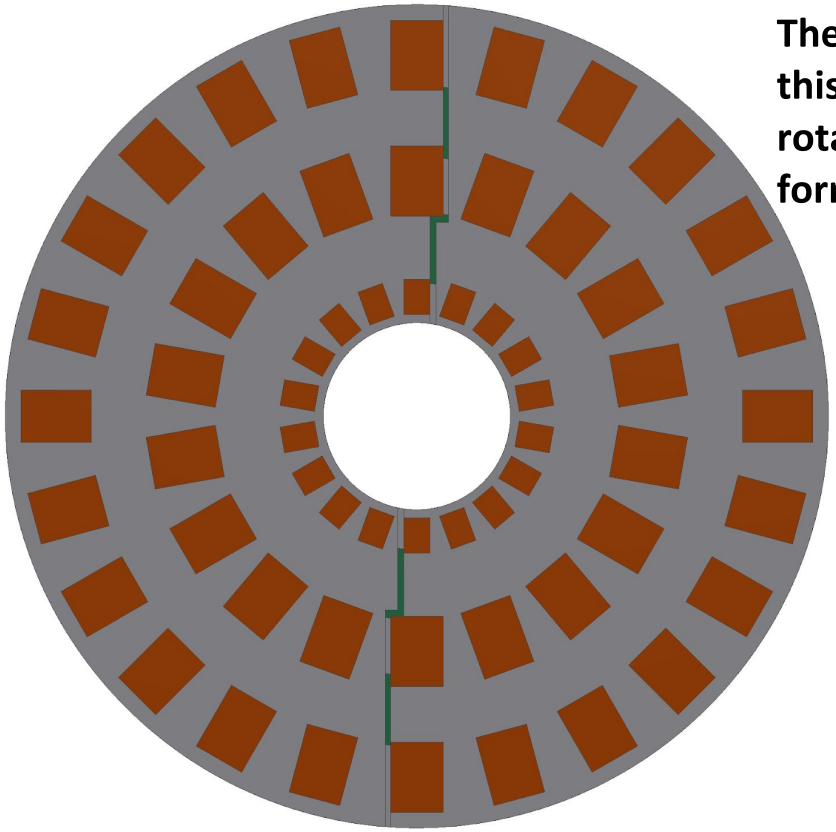


Image shows full disk. Sensor arrangement optimized by Lea C.

Layer	Radii mm	Sensor size mm^2	No. of sensors
1	75	22 x 16.4	36
2	106	44.2 x 16.4	52
3	148	44.2 x 33	36
4	185	44.2 x 33	40
5	227	44.2 x 33	48

One D (Half Disk) Layout fits all Positions





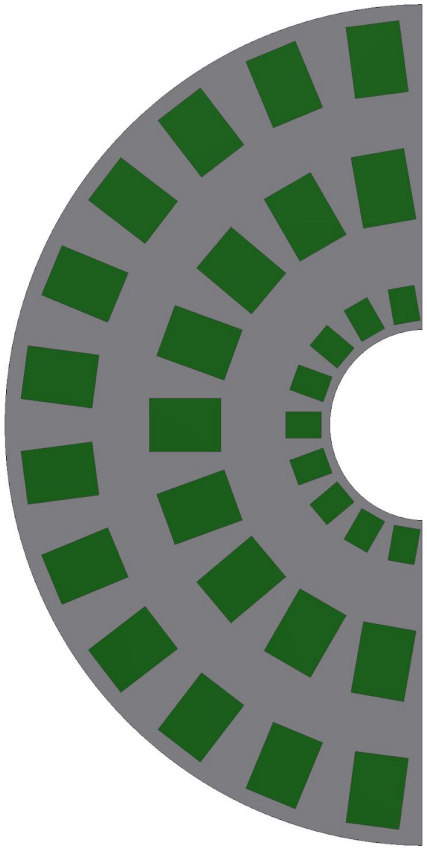
Full disk

Only one D layout is required for all disk positions on the ePix.

The counterpart of this D needs to be rotated by 180° to form a full disk.

Layout Element A

Front



Back

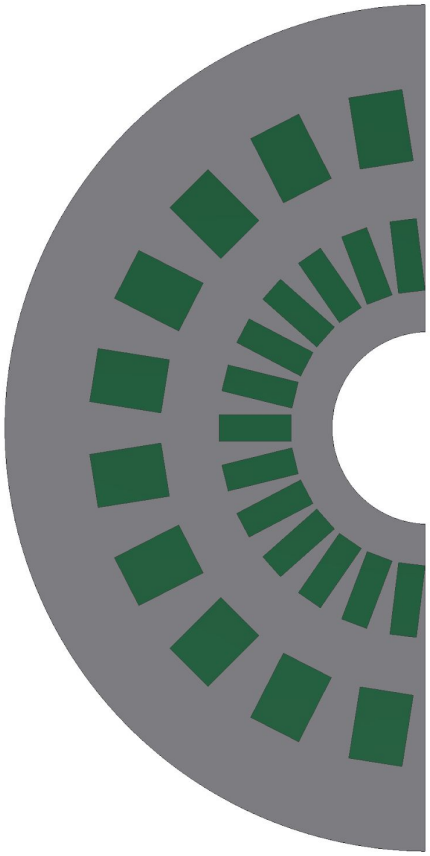
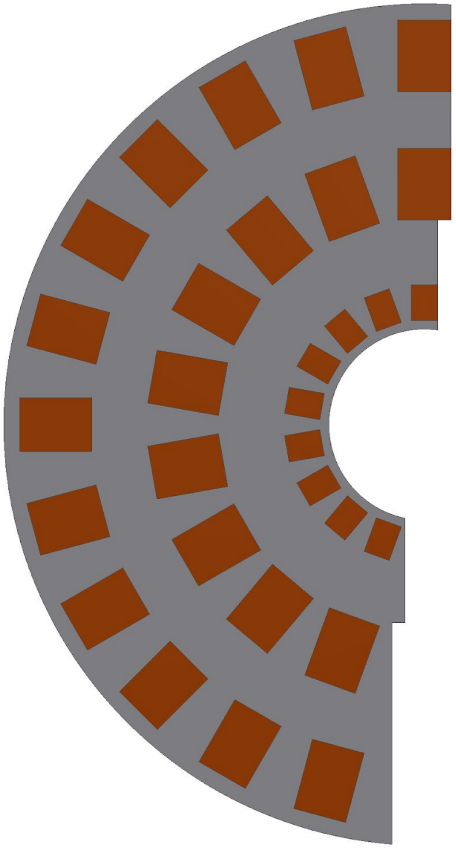


Image shows the double-sided sensor module arrangement on element A.

Note:
Layout A & B share the same number of sensor modules → same thermal load on layout A & B, same number of power-/signal cables & CO2 tubes

Layout Element B

Front



Back

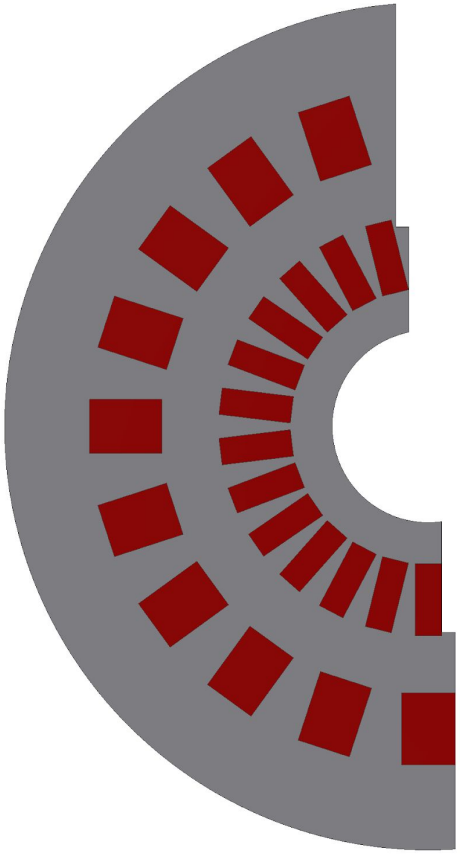
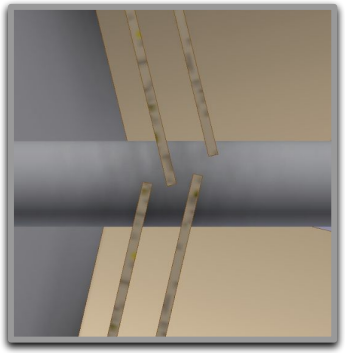


Image shows the double-sided sensor module arrangement on element B.

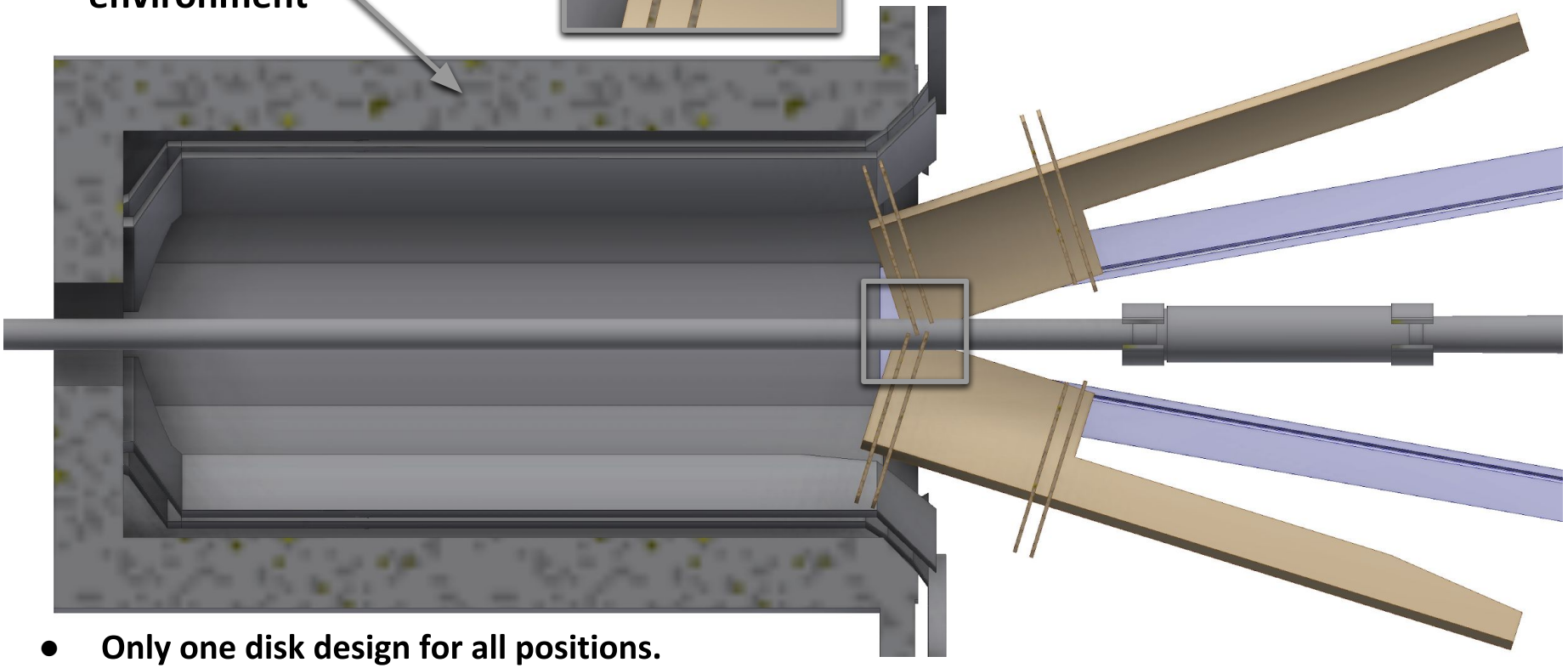
Note:
Layout A & B share the same number of sensor modules → same thermal load on layout A & B, same number of power-/signal cables & CO2 tubes

Closing of Disks D1 & D2 BmI/BmO



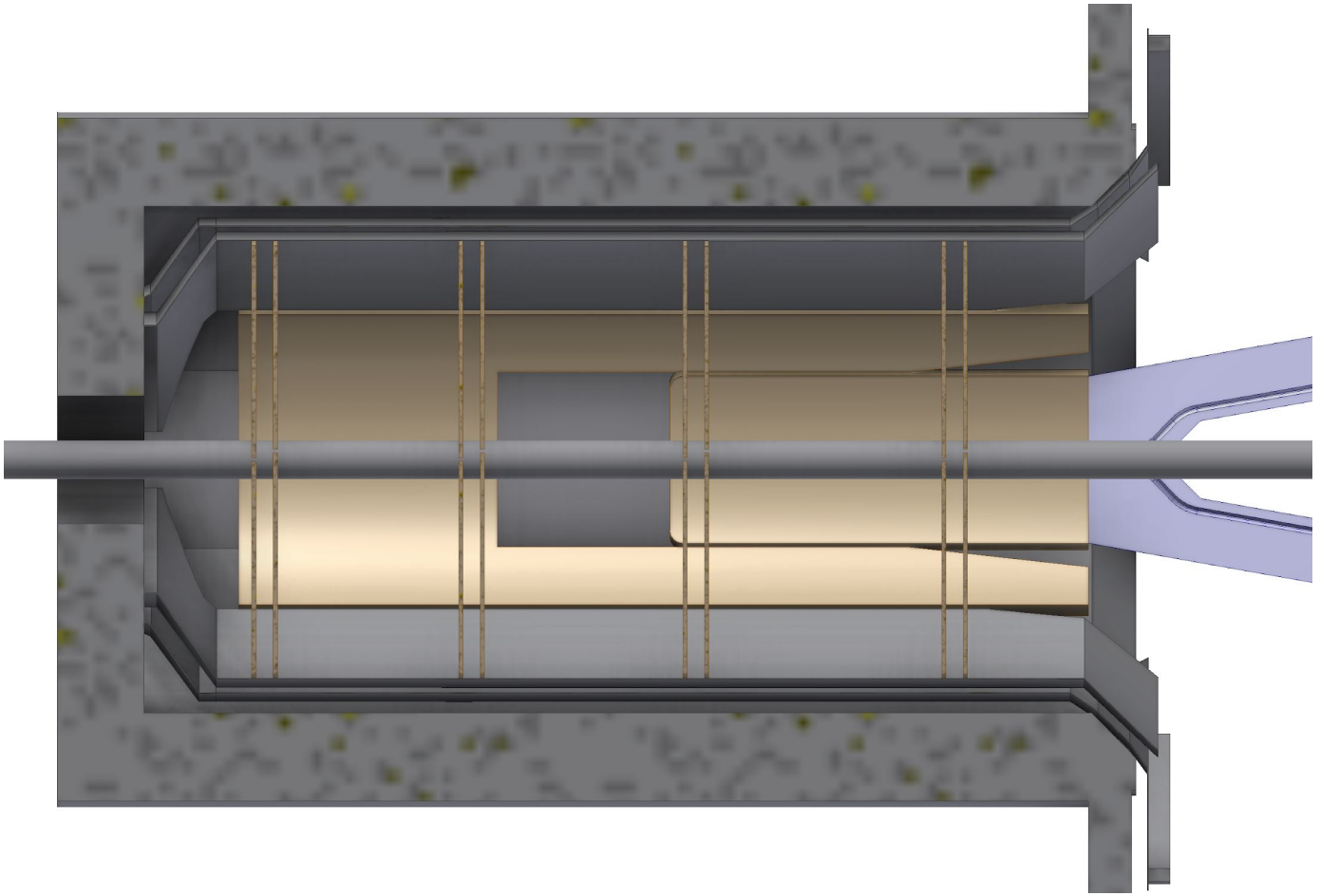
Given installation environment

Due to the design of the disks, a "zipper style" installation is necessary.



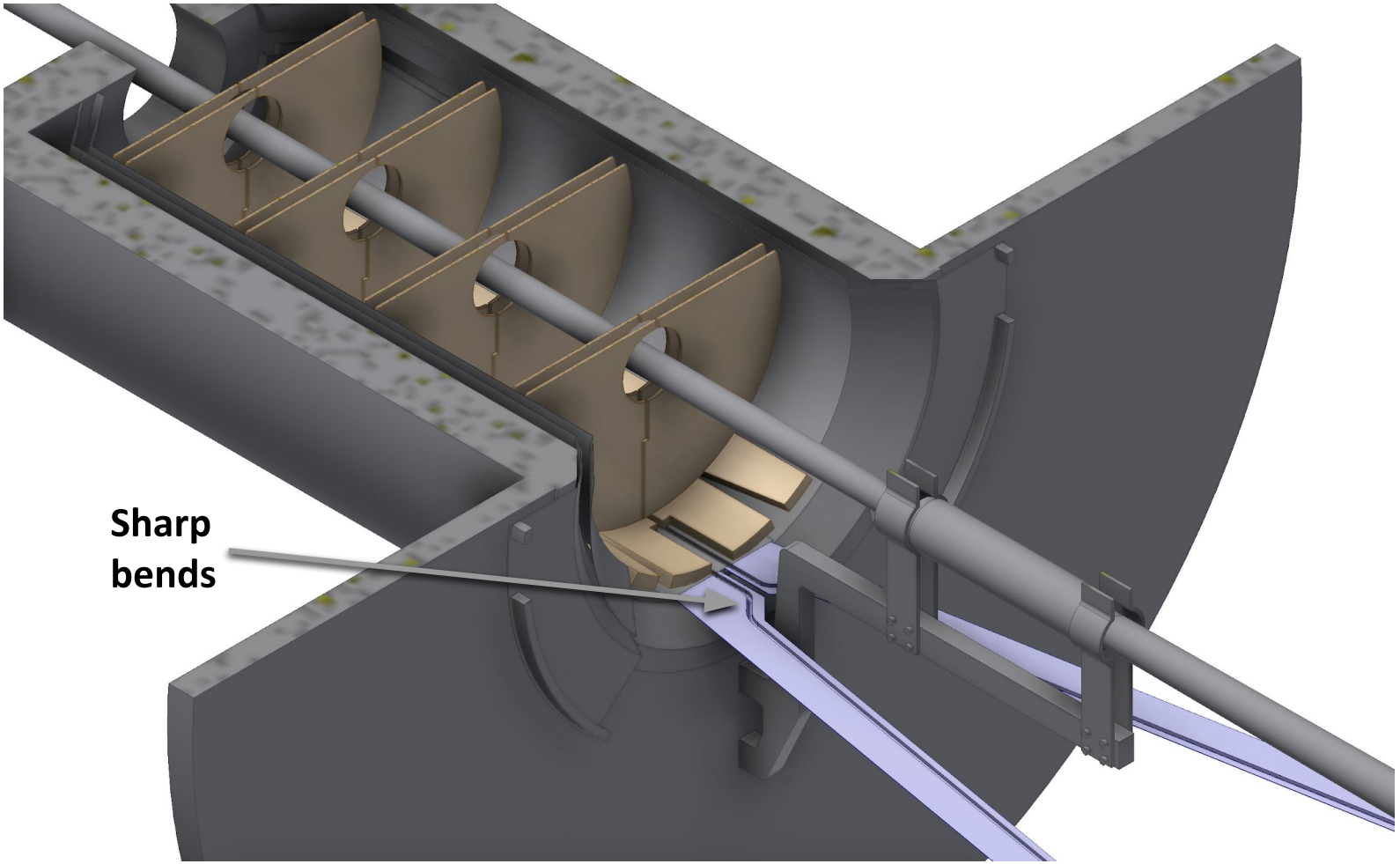
- Only one disk design for all positions.
- Disks D1&D2 BmO/BmI must be installed synchronously (+/- 5mm along the z axis).

ePix Completely Installed



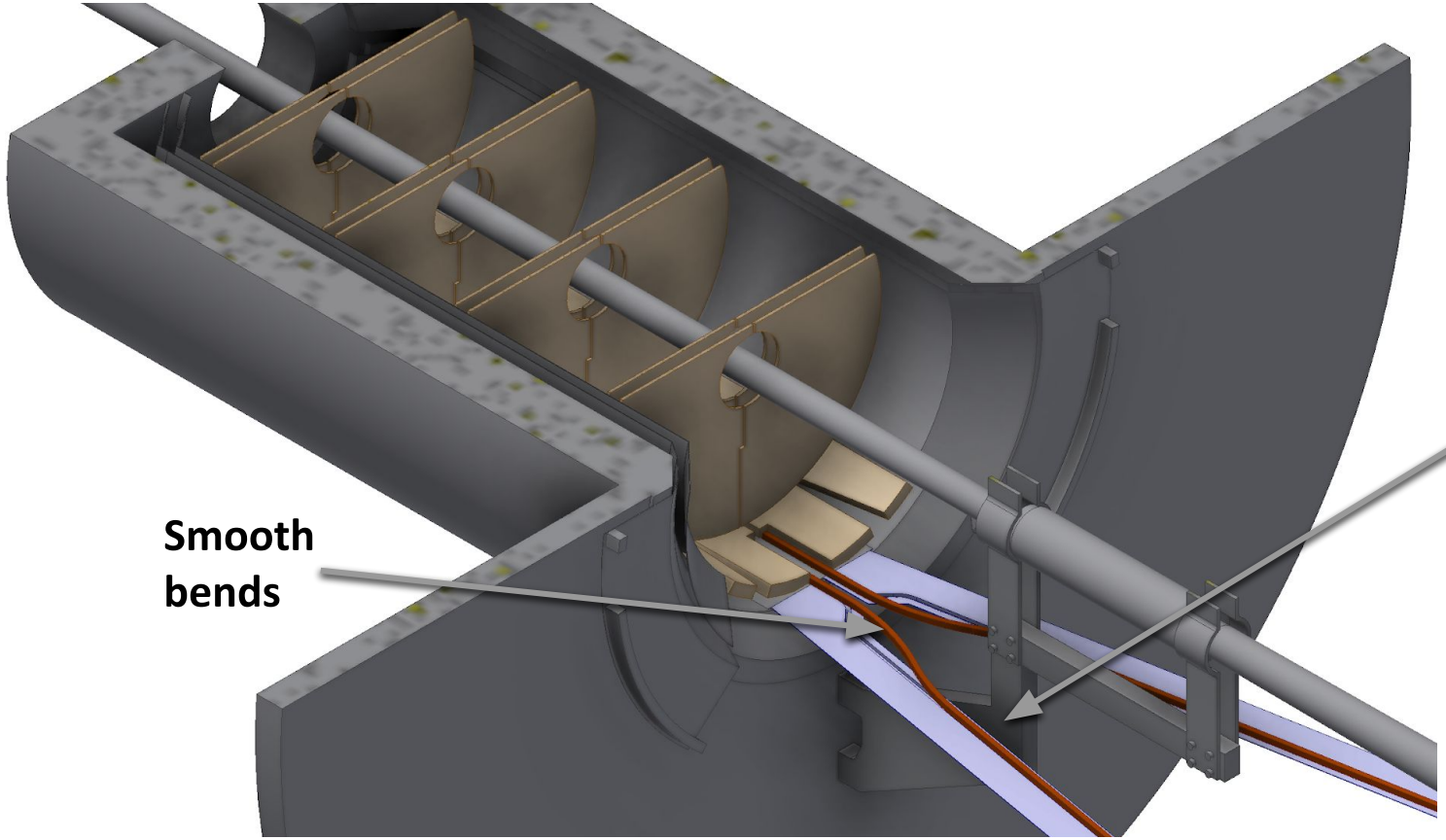
- **Only one disk design for all positions.**
- **Disks D1&D2/ D3&D4 BmO/BmI must be installed synchronously (+/- 5mm along the z axis).**

ePix Installation Issues



The installation rails have sharp bends, making the use of wheels impossible, because they block in the sharp bends. Only pins are an option (current FPIX solution).

ePix Installation Issues



The above rail design would allow the use of wheels again.
Also the cabling & tubing at the PP0 would be more convenient.

Alternative Element B Idea (Rejected)

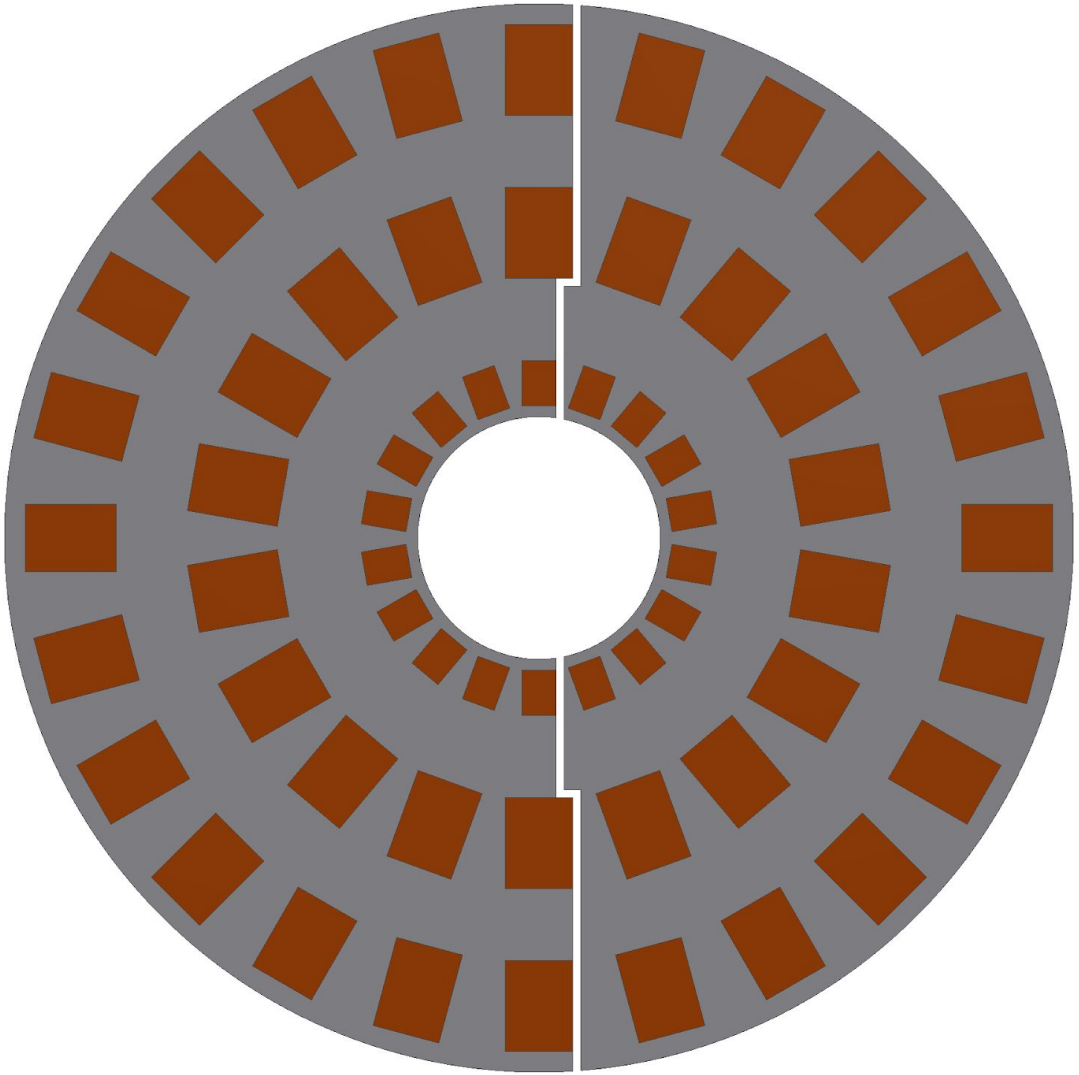
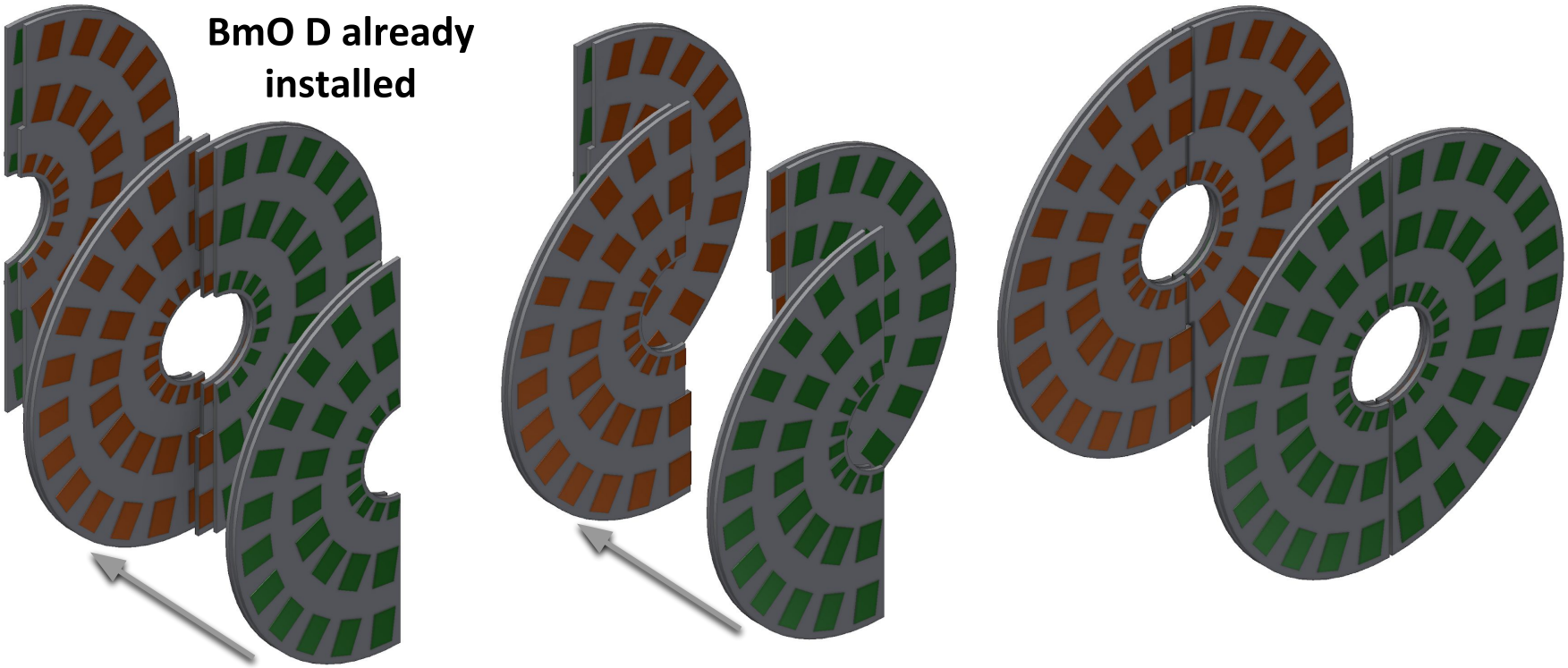


Image shows the double-sided sensor module arrangement on element B.

Cons:
This design requires two different B elements.
Resulting in 4 different D designs A & B.

Pros:
The half disks along the Z-axis are easier to close to a full disk.

Closing of Disks (Rejected Idea)



BmI start disks closing

BmI disks halfway closed

BmI disks complete closed

Pros: Uncritical start point for closing discs in Z.
Cons: 4 different D variants with different number of modules (even more when direction of cooling loops is taken into account).

Conclusions

- **Found a solution to have equal ePix D (half disk) everywhere.**
- **Combination of D1/D2 (D3/D4) and corresponding supply tubes are equal.**
- **Can confirm that the installation process proposed by CERN works for the ePix.**
- **The given space seems sufficient for all supplies & PCB boards for the ePix disks.**
- **Due to the sharp bends of the rails no wheels can be used.**
- **Modifications on the BP support would make it possible to use rails with smoother bends (possible conflict with end cap?) → would make the use of wheels possible again → would make cabling & tubing @ PP0 more convenient.**