SPY@DND new yoke: part 2

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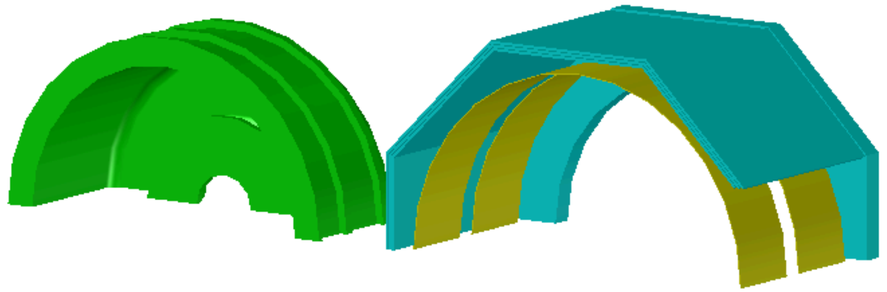
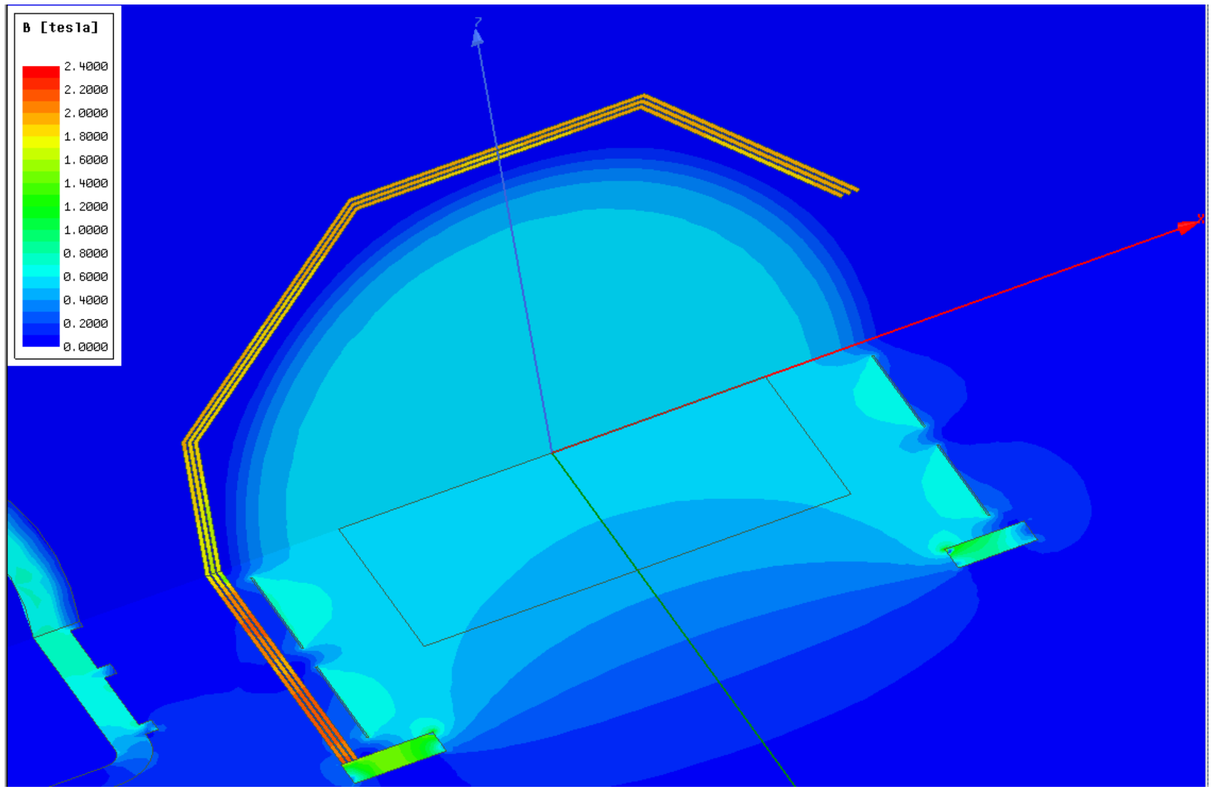
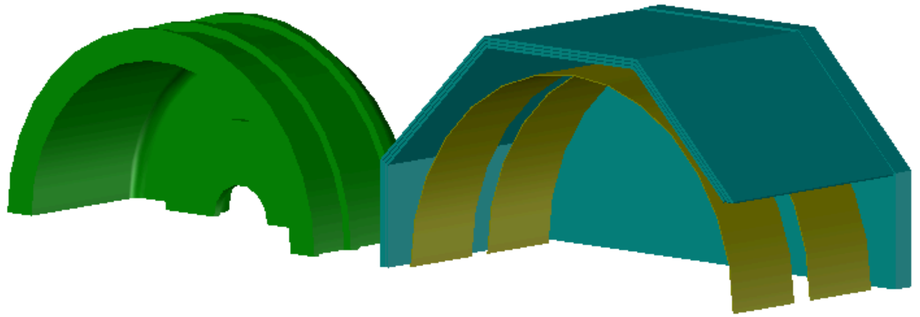
Reference design: SPYDND06



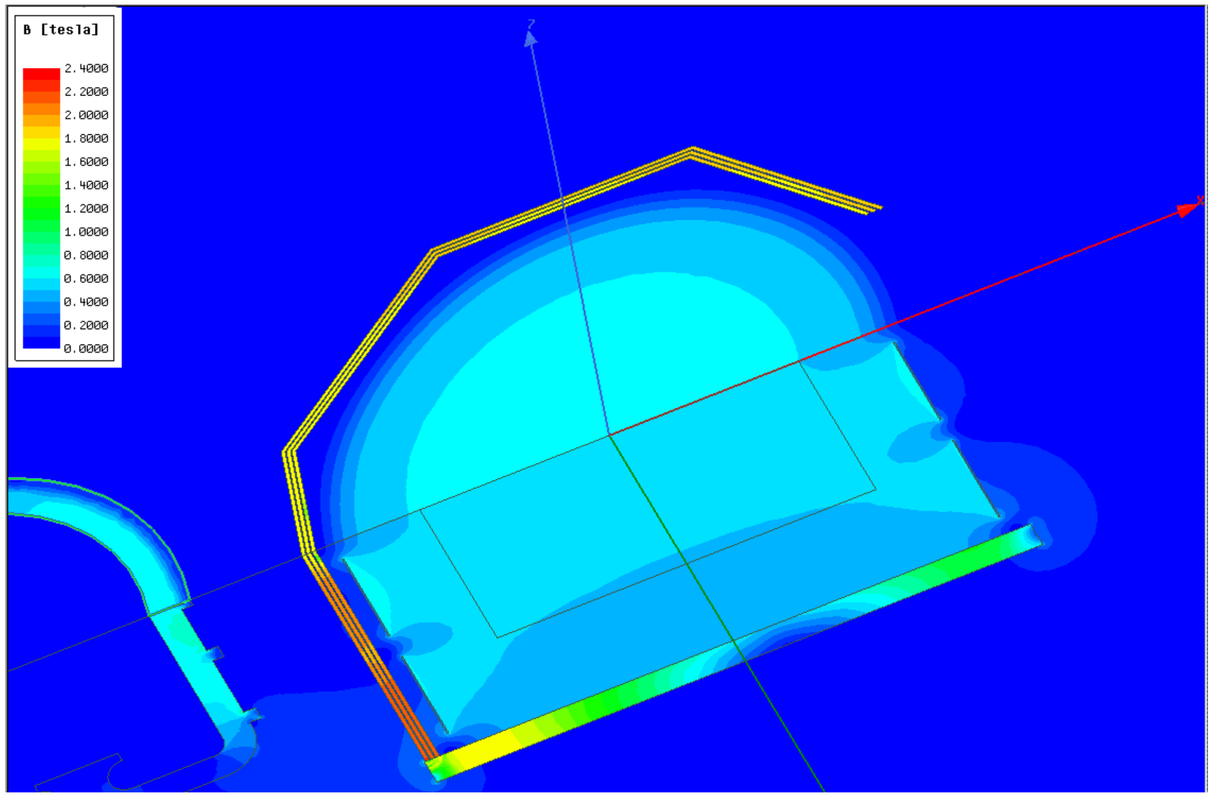
- Window only towards LArTPC
- "Thin" iron yoke
- Wide hole on end-caps



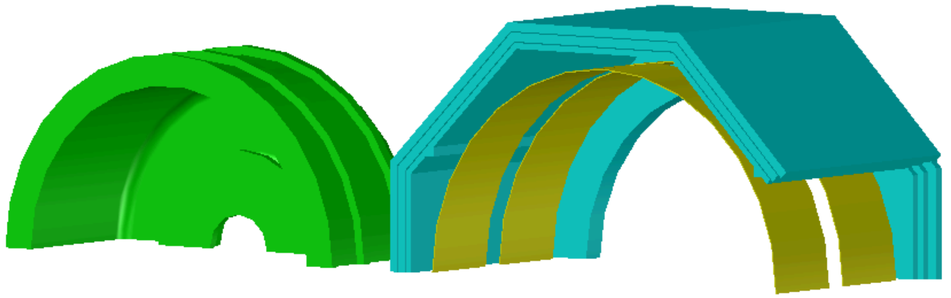
Closed end-caps: SPYDND07



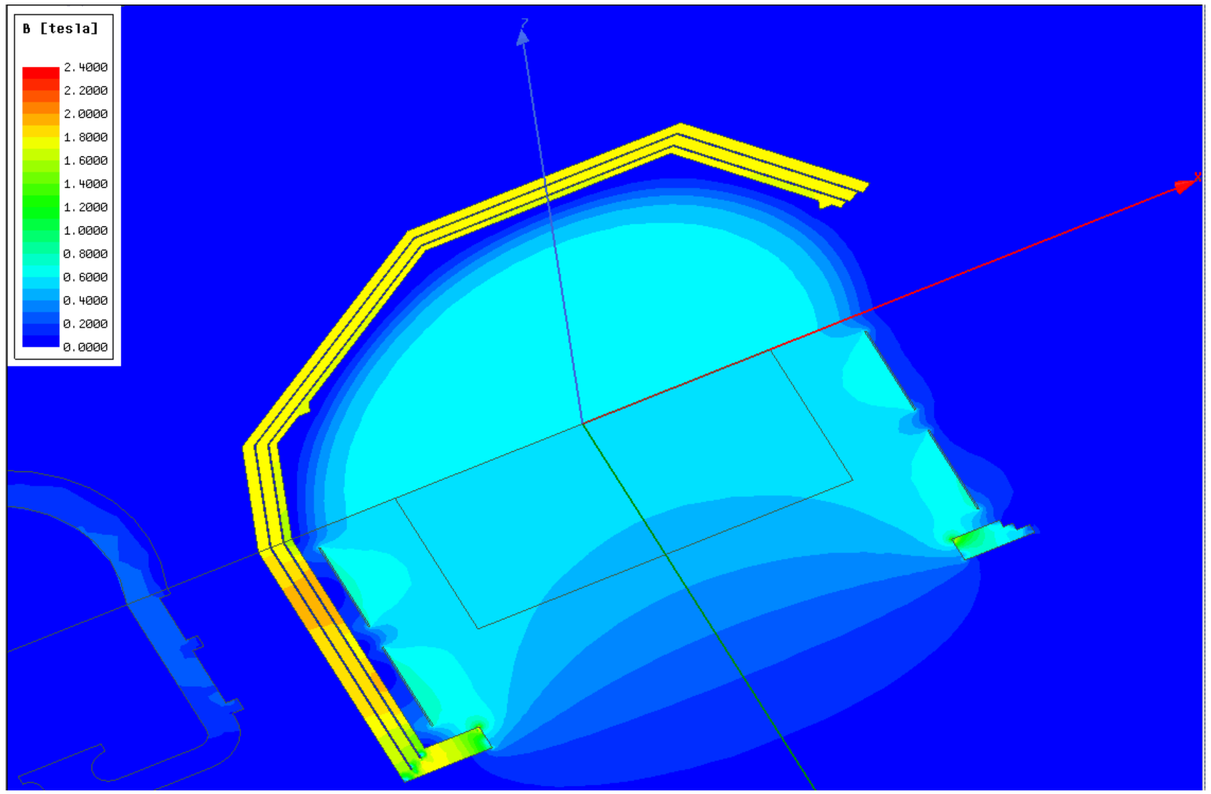
- Window only towards LArTPC
- "Thin" iron yoke
- No hole on end-caps



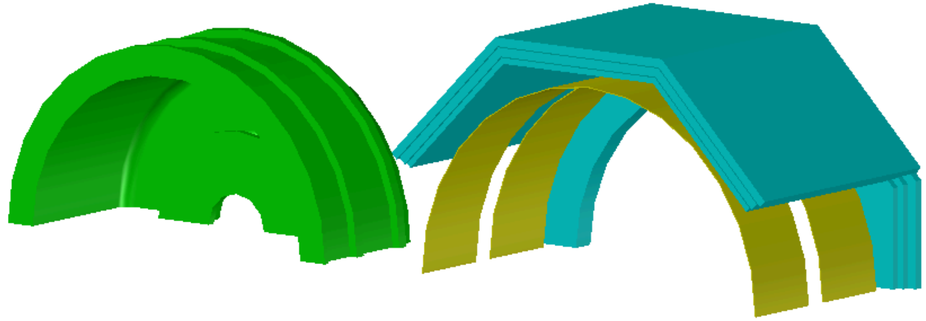
Thick iron yoke: SPYDND08



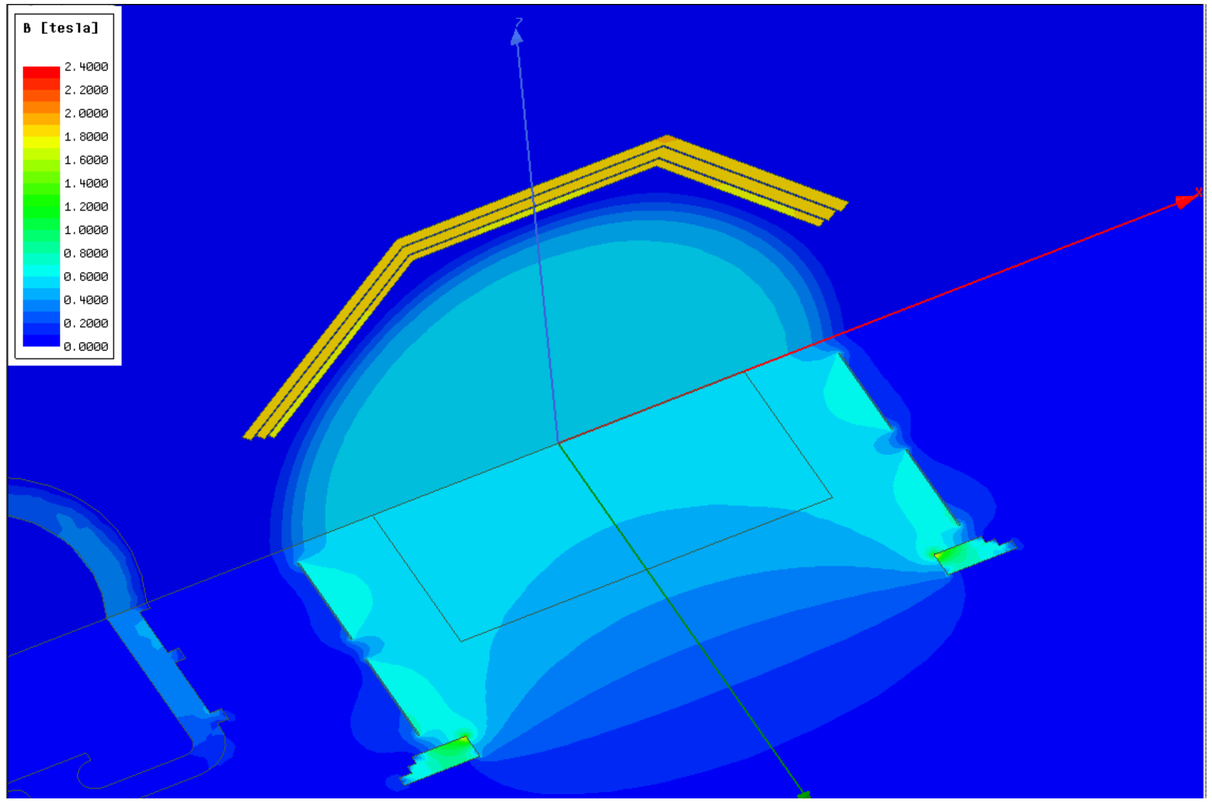
- Window only towards LArTPC
- "Thick" iron yoke
- Wide hole on end-caps



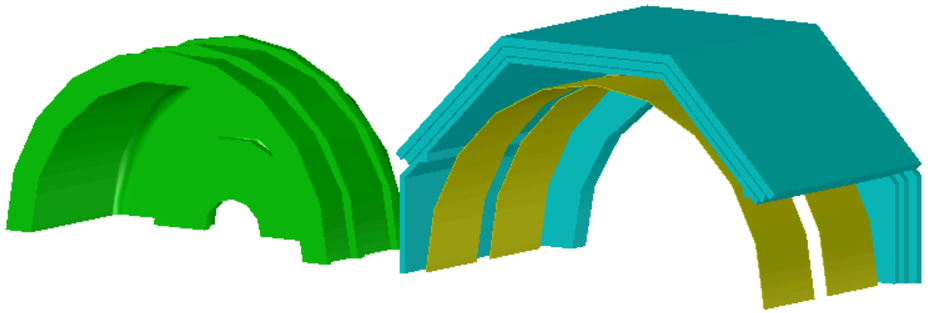
Thick yoke, two windows: SPYDND09



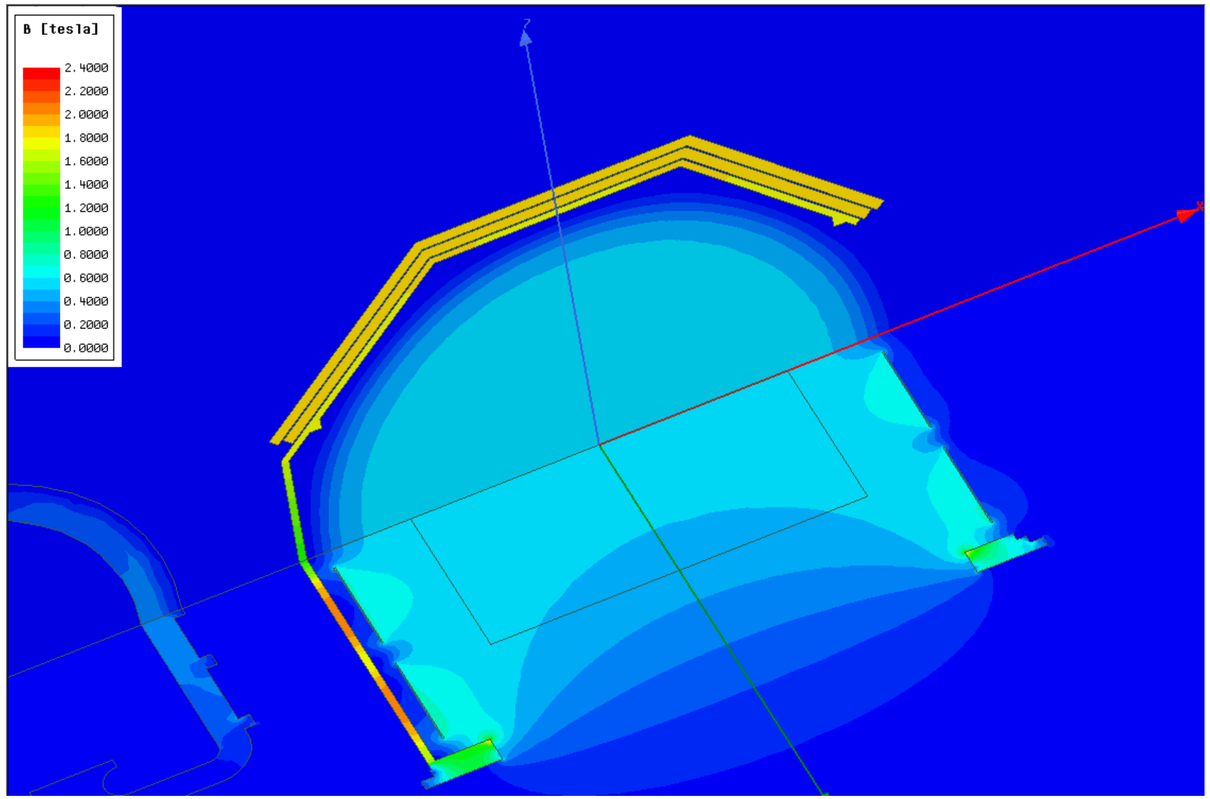
- Window towards LArTPC
- Window towards SAND
- "Thick" iron yoke
- Wide hole on end-caps



Thick/thin yoke: SPYDND10

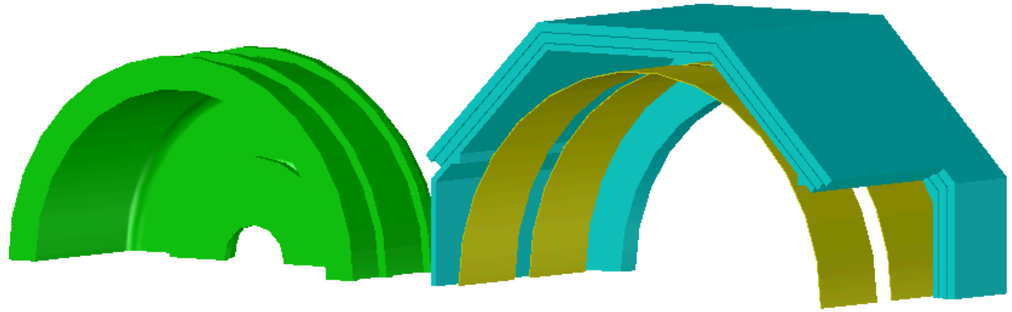


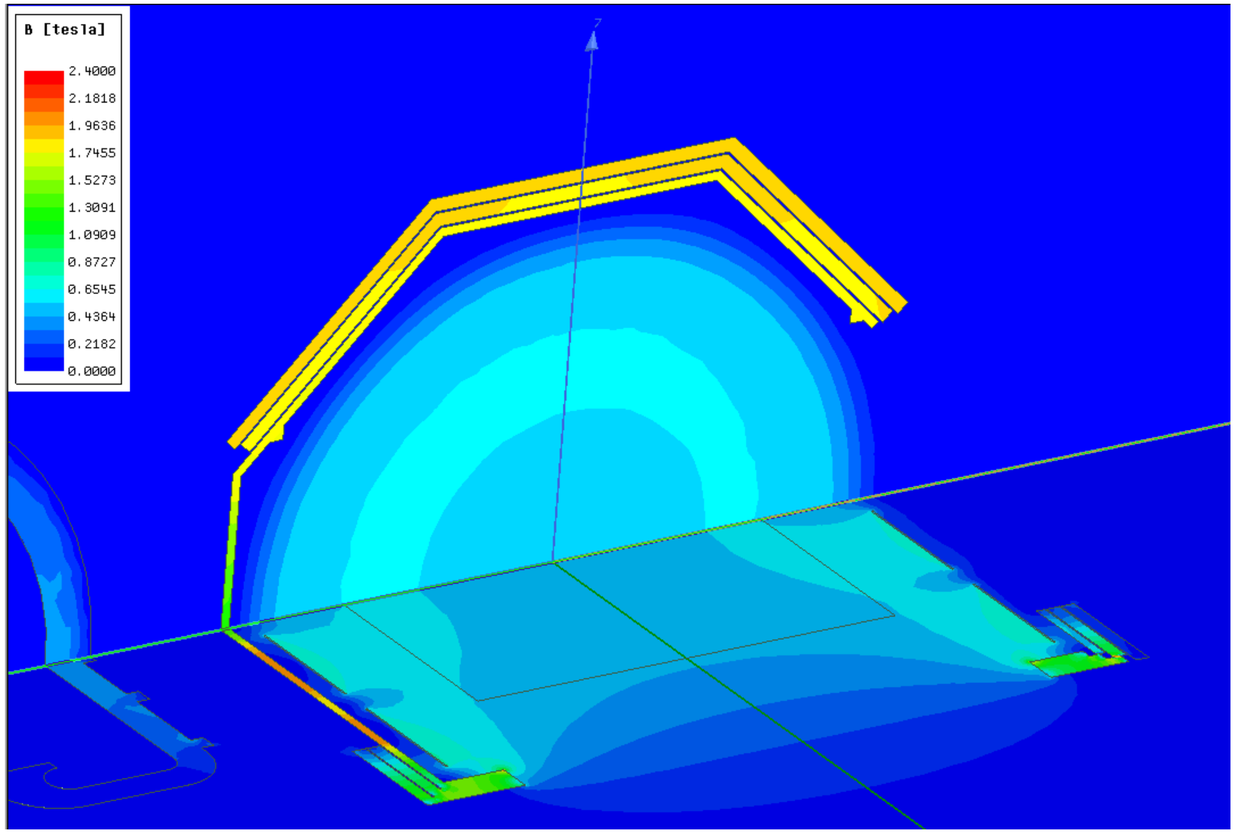
- Window towards LArTPC
- Thin yoke towards SAND
- Thick iron yoke elsewhere
- Wide hole on end-caps



Thick/thin yoke, end rings: SPYDND11

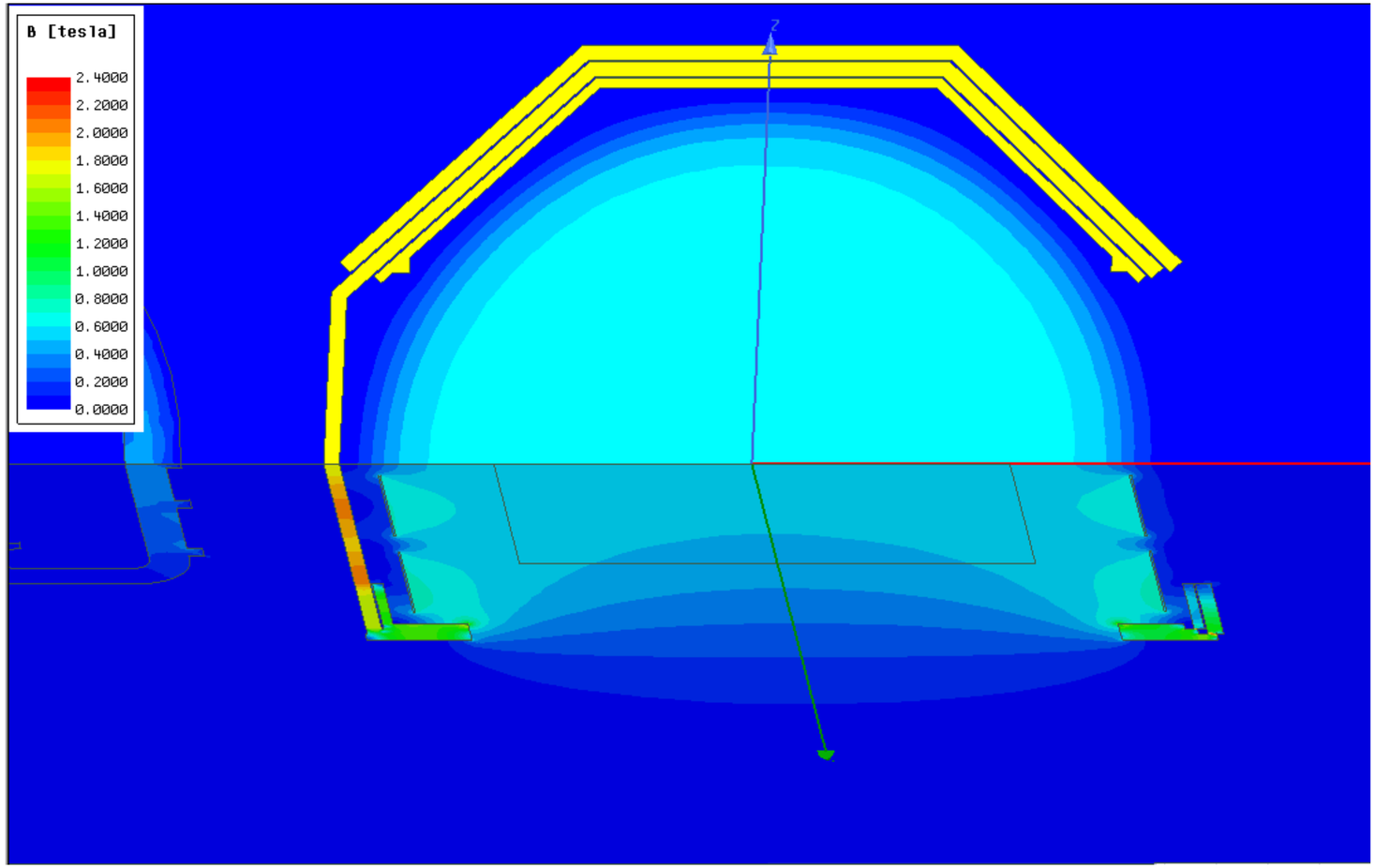
- Window towards LArTPC
- Thin yoke towards SAND
- Thick iron yoke elsewhere
- Wide hole on end-caps
- "Rings" around the window





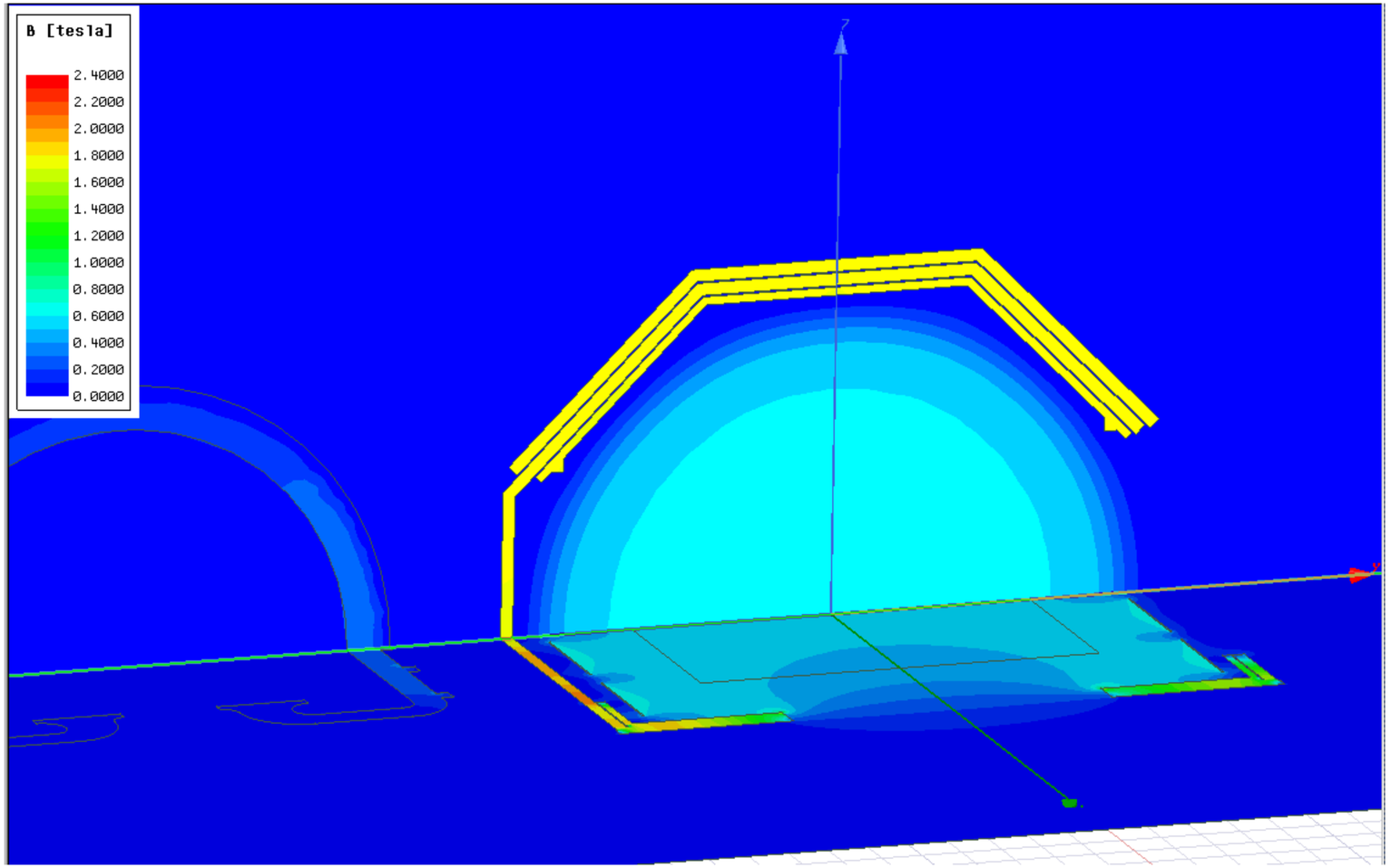
Thick/thin yoke, end rings, v2: SPYDND12

- Window towards LArTPC
- Thin yoke towards SAND
  - second layer kept
- Thick iron yoke elsewhere
- Wide hole on end-caps
- "Rings" around the window



Thick/thin yoke, end rings, small hole: SPYDND12b

- Window towards LArTPC
- Thin yoke towards SAND
  - second layer kept
- Thick iron yoke elsewhere
- Smaller hole on end-caps
- "Rings" around the window



Parameters comparison

	SPYDND 06	SPYDND 07	SPYDND 08	SYDNDo 9	SPYDND 10	SPYDND 11	SPYDND 12	SPYDND 12b
Bmin on TPC	0.4454 T	0.4981 T	0.4580 T	0.4499 T	0.4522 T	0.4540 T	0.4543 T	0.4596 T
Bmax on TPC	0.5588 T	0.5238 T	0.5781 T	0.5614 T	0.5675 T	0.5682 T	0.5687 T	0.5326 T
Force along beam	160 kN	100 kN	460 kN	60 kN	260 kN	124 kN	132 kN	84 kN
Force along axis	2.15 MN	0.95 MN	2.15 MN	2.1 MN	2.1 MN	2 MN	2 MN	0.52 MN
Current per coil	1.05 MA	0.95 MA	1 MA	1 MA	1 MA	1 MA	1 MA	0.9 MA
Stored energy	46.6 MJ	41 MJ	46 MJ	45 MJ	45.5 MJ	45.2 MJ	45.5 MJ	48 MJ
Force on SAND	120 kN	104 kN	12 kN	32 kN	24 kN	28 kN	23 kN	18 kN

- Force along beam: force felt by the 4 coils pointing towards SAND
- Force along axis: force felt by 2 coils pointing towards the other 2 coils
- Force on SAND: force felt by SAND yoke, generated by stray field

Comments

- The most promising design is the "thin yoke towards SAND"
  - second layer works better than first
- The introduction of a "ring" close to the end caps seems advantageous
  - the length of the ring still needs optimisation
- The optimisation of this design is still ongoing
- Partially losed end-caps are being investigated
  - reducing hole radius from 3 to 2 metres has a dramatic effect