Mechanical Design of the Barrel DIRC Readout Unit

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PANDA Collaboration Meeting LVII – June 2016
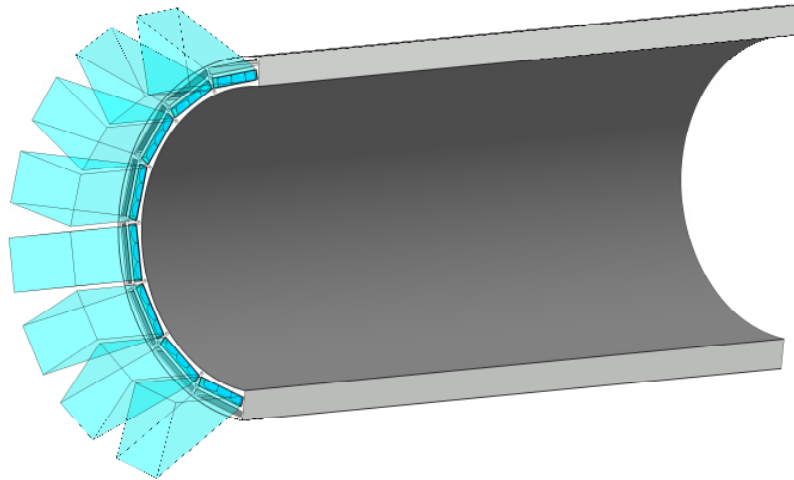
Outlines
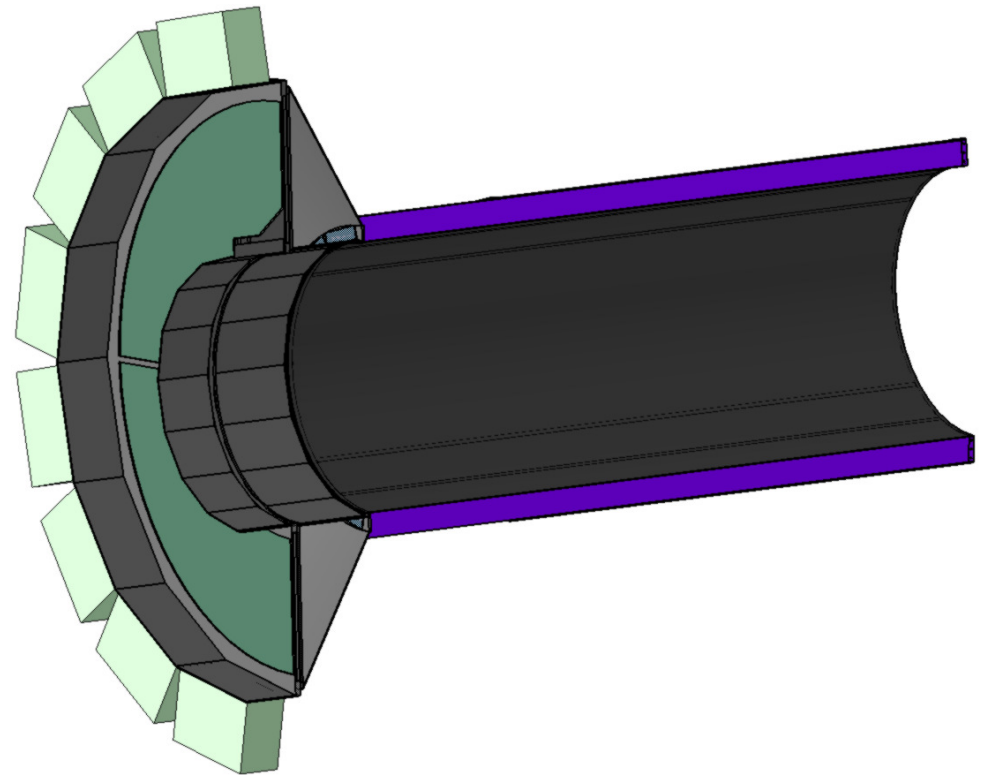
- Design concept of the readout unit.

- Effects on neighboring systems.

  - ➢ Attachment to cryostat upstream flange.
  - ➢ Implementation of the STT rail.
  - ➢ Collisions / Overlapping areas.

After beam test 2015:
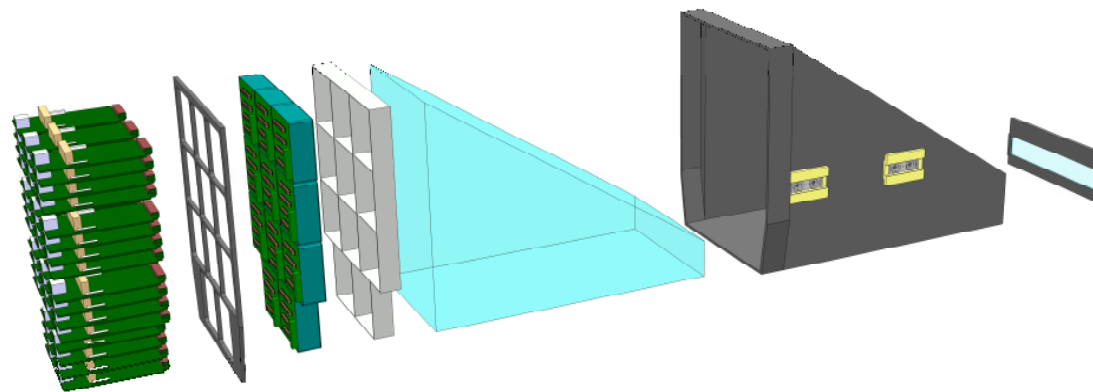Validation to use silica fused prisms as expansion volume.
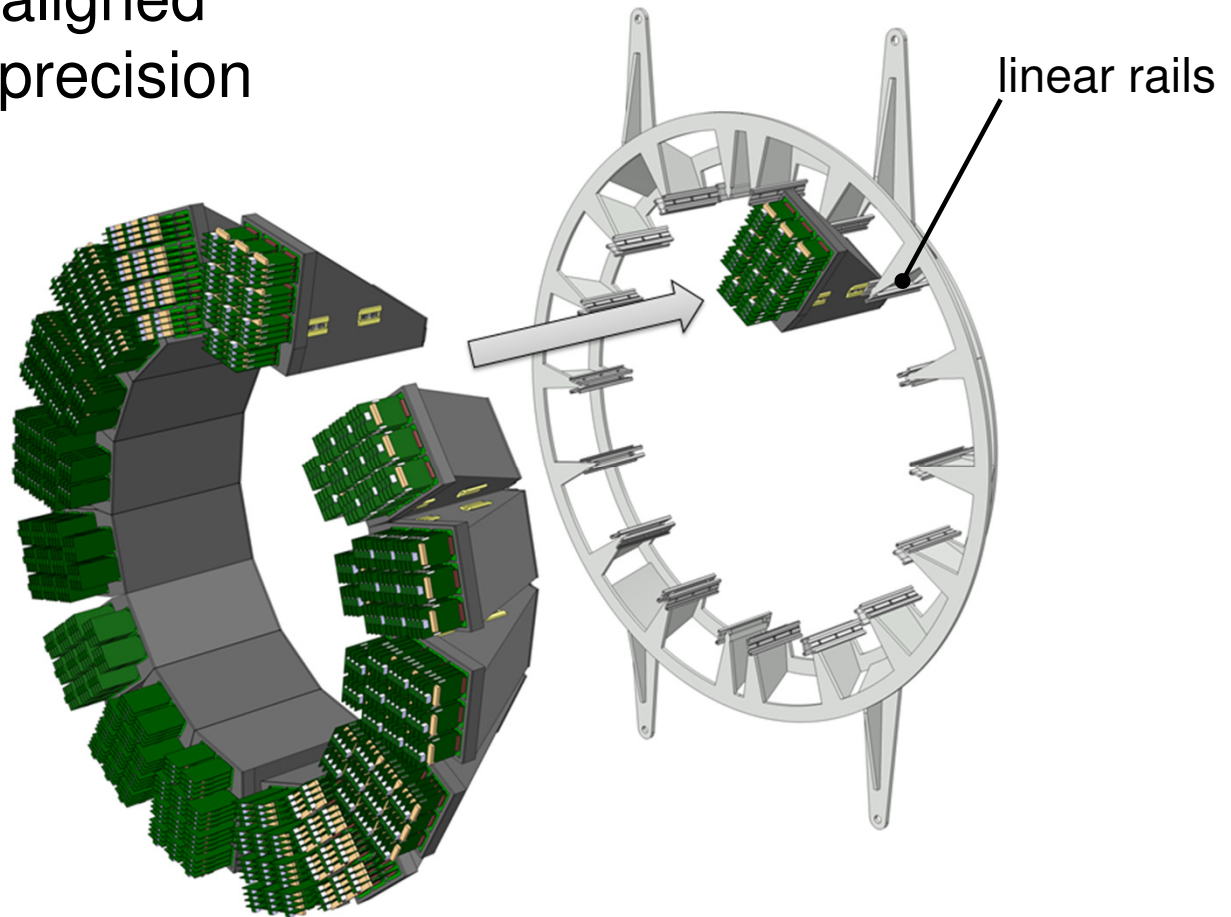
Oil tank design (obsolete).

Design concept of the readout unit

- Usage of 16 single prism boxes.
- Light-tight, (gas-tight).
- Coupling flange to connect to bar box.
- Grid to install single MCP-PMTs.
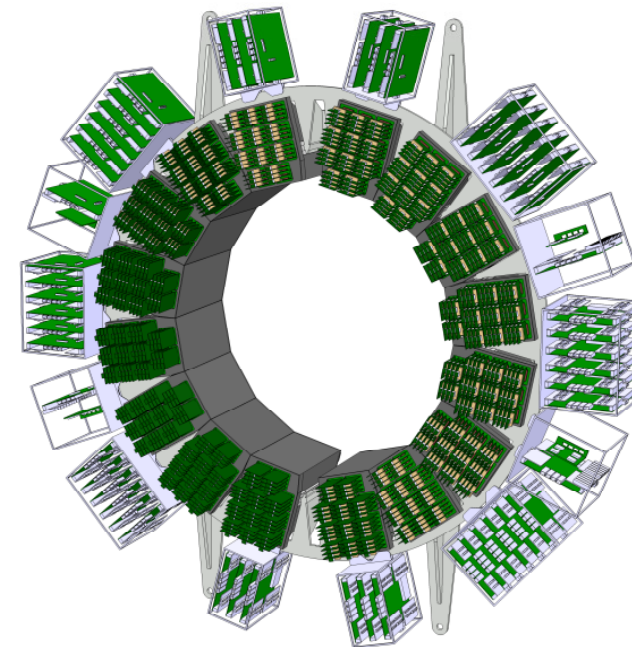- Pre-assembled in cleanroom.

GSI

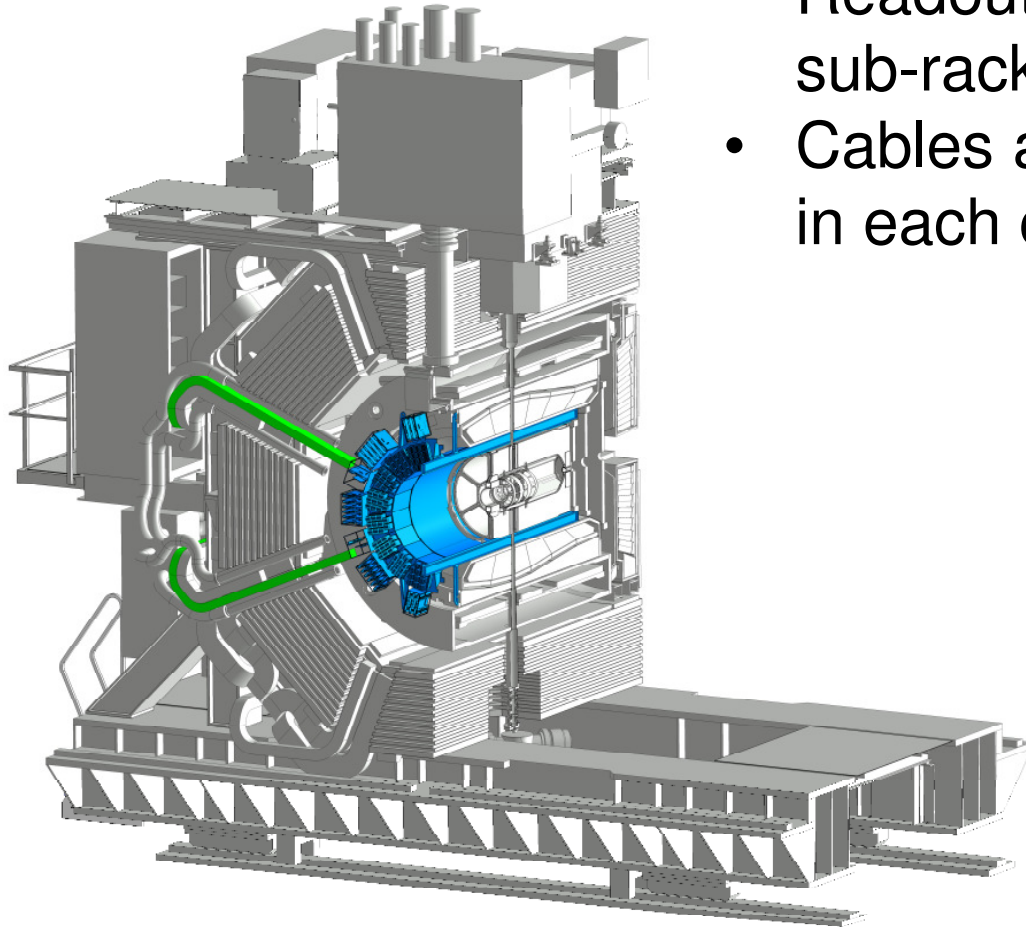# Design concept of the readout unit

Each prism box is aligned and positioned by precision linear rails.

linear rails

Design concept of the readout unit

- Readout electronics arranged in sub-racks.
- Cables and supply lines merged in each quadrant.

Design concept of the readout unit

Barrel DIRC Cable Cross Section
(modifications in green)

Barrel DIRC	Connection	Number of Cables/Lines	Single Cross Section [mm²] (including insulation)	Total [mm²]	From	To
HV	176 MCPs	176 coaxial cables	15	2640	readout unit	Service Area E10
LV	44 TRBs	88 cables	7	616	readout unit	Service Area E10
Readout	TRB hub	4 ethernet	30	120	readout unit	Service Area E10
Gases	16 bar boxes +16 prism boxes	32 lines +32 lines	29	928 +928	readout unit	Gas Supply
Readout Cooling	readout electronics	8 lines	250	2000	readout unit	Service Area E10
Oil	expansion volume	2 pipes	750	1500	readout unit	Oil Supply

$\Sigma = $ **7232** mm²
$\approx \varnothing$ **95** mm

GSI

Design concept of the readout unit

Readout unit with prisms as expansion volume.
(modifications in green)

Expansion volume/Readout	
Internal radius	448mm
External radius	~~1270~~mm **1080mm**
Total weight	~~> 400kg~~ **≈ 500kg**
z – position	-1710...-1190mm
Δz	520mm
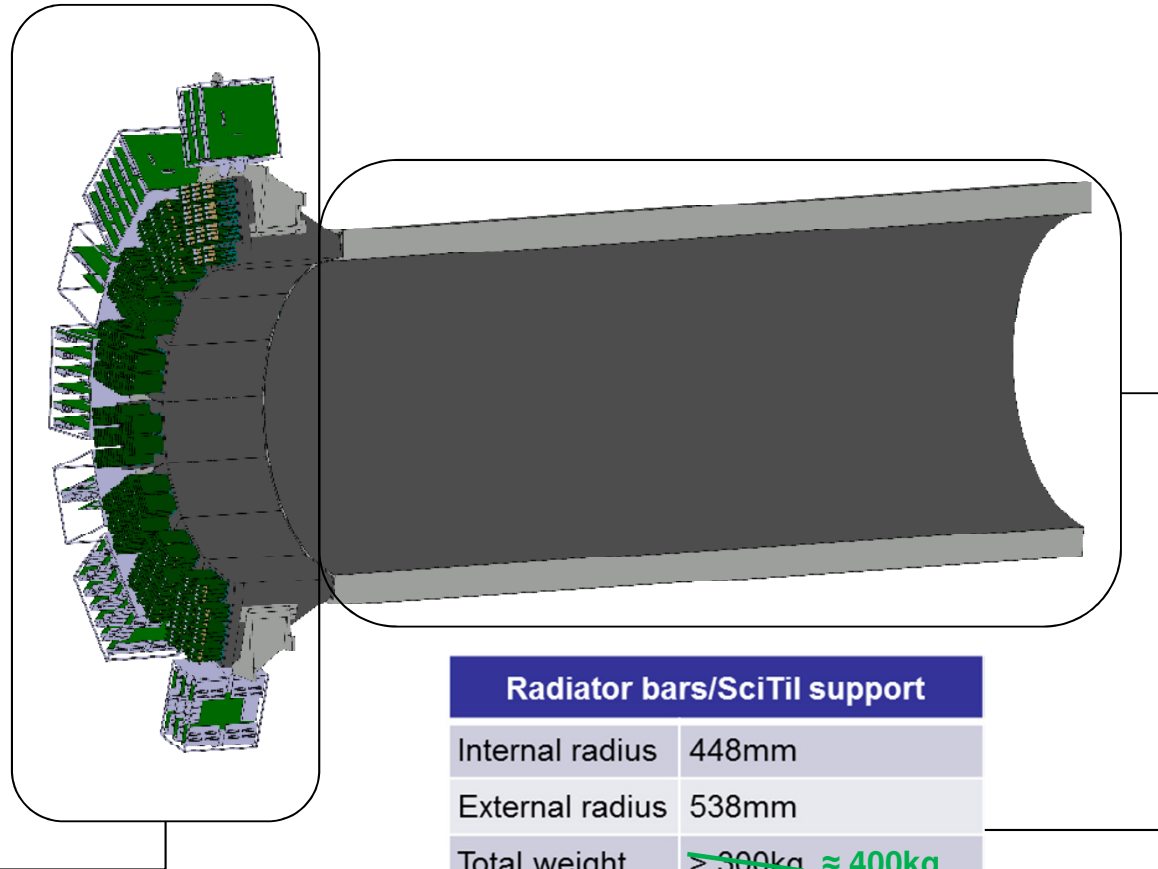
Radiator bars/SciTil support	
Internal radius	448mm
External radius	538mm
Total weight	~~> 300kg~~ **≈ 400kg**
z – position	-1190.... +1270mm
Δz	2460mm

Readout unit support ring attached to the cryostat upstream flange with 4 rigid spacers.
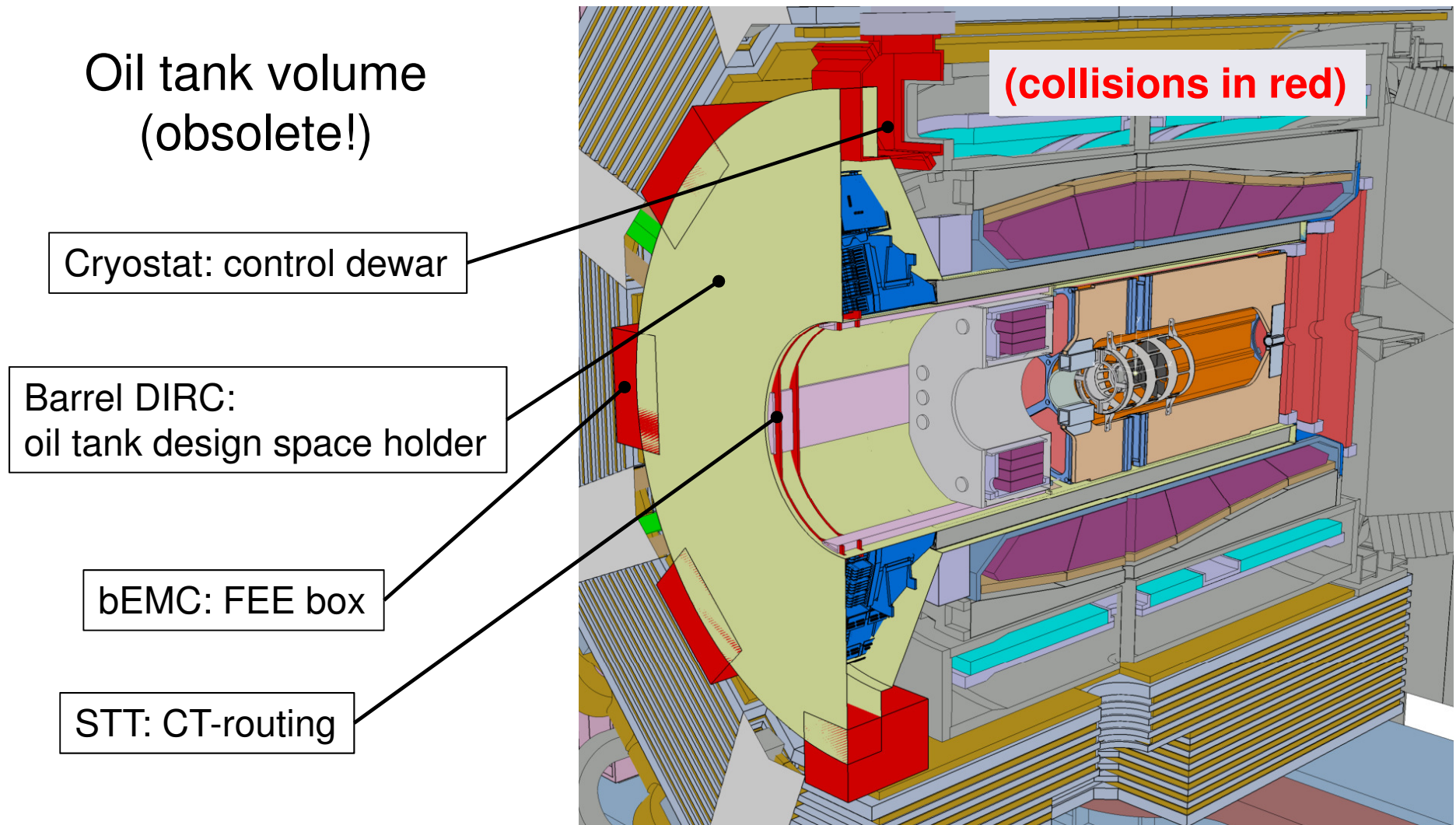

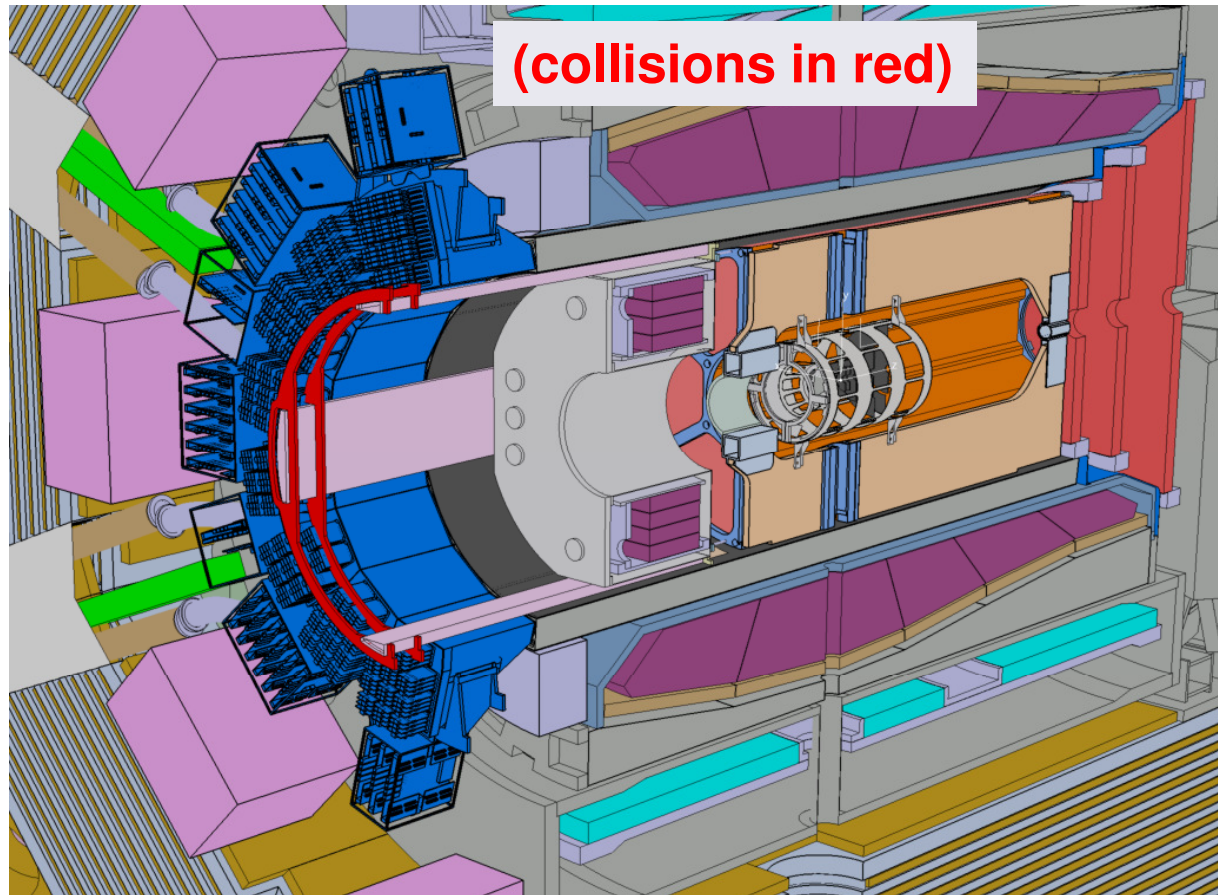rigid spacer
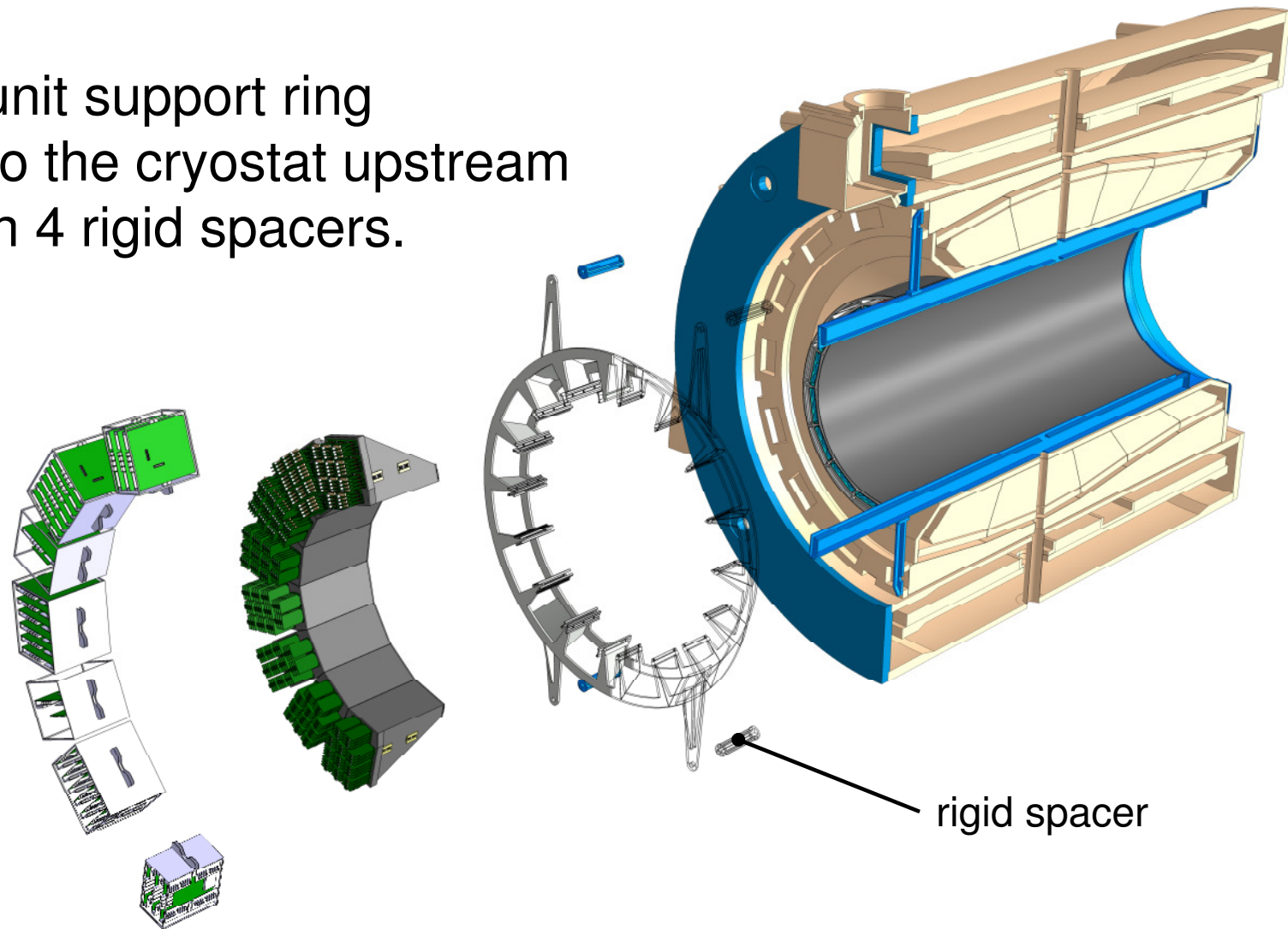
Implementation of the STT rail

- The constraint to implement the STT rail into the Barrel DIRC readout unit is eliminated.
- The STT rail support can be chosen independently from the Barrel DIRC design.

STT rail

Oil tank volume
(obsolete!)

(collisions in red)

Cryostat: control dewar

Barrel DIRC:
oil tank design space holder

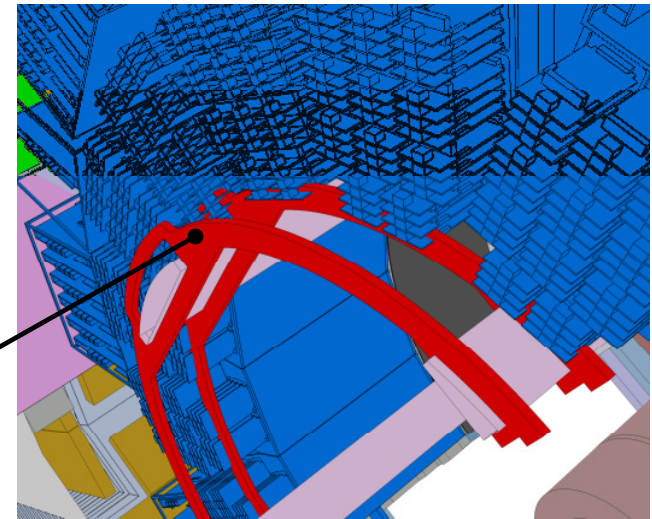bEMC: FEE box
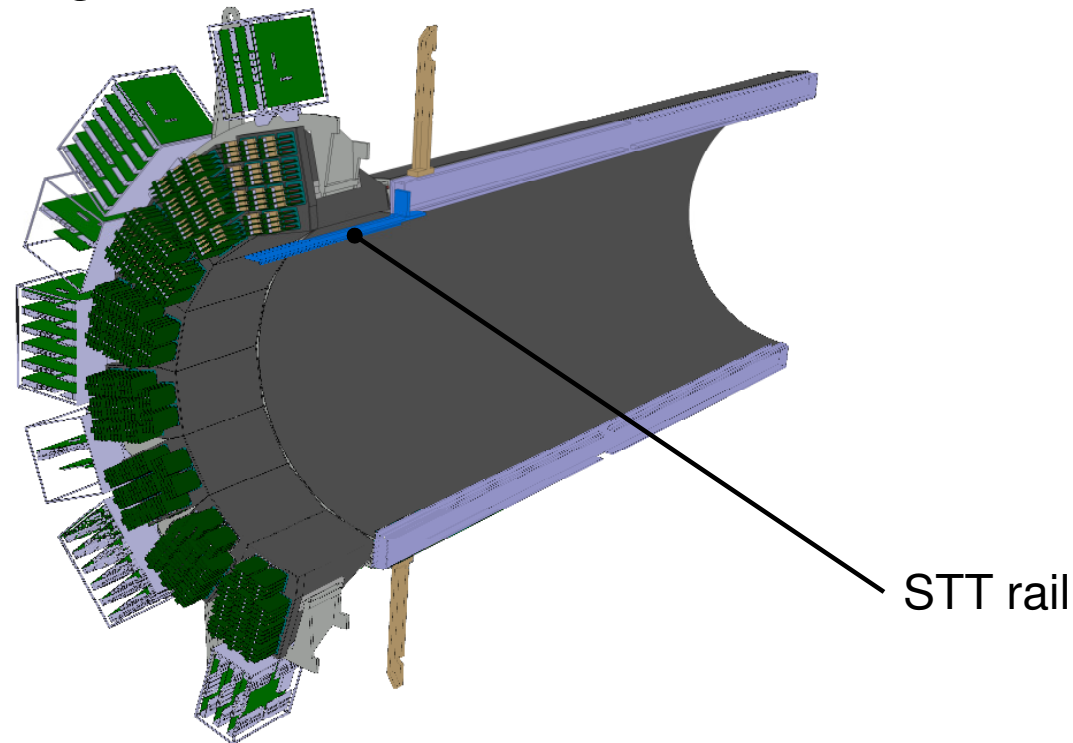
STT: CT-routing

Collisions / Overlapping areas

(collisions in red)

Current design:
PANDA v1601

- CT-routing external radius= 490mm
- Barrel DIRC internal radius= 448mm

Summary

- No significant design modifications of the barrel part.
- EDMS update of the Barrel DIRC including readout unit available end of June 2016.
- Barrel DIRC TDR draft available (version 1, dated May 30, 2016): https://panda.gsi.de/publication/re-tdr-2016-001