

Space constraints for the cryostats of the triplets

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with input from:

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K.Artoos, S.Bartolome'-Jimenez, K.Kershaw, TS-IC

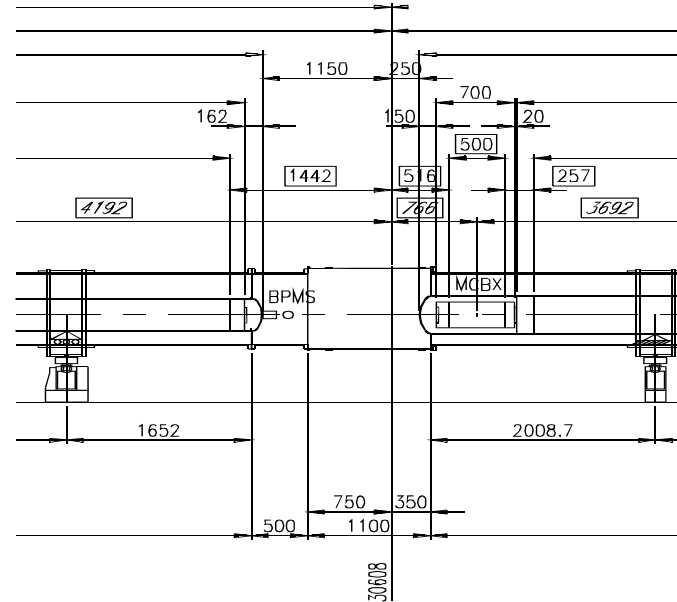
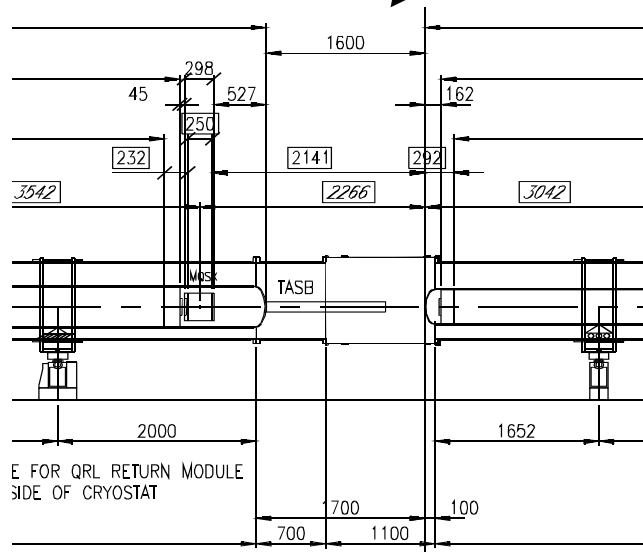
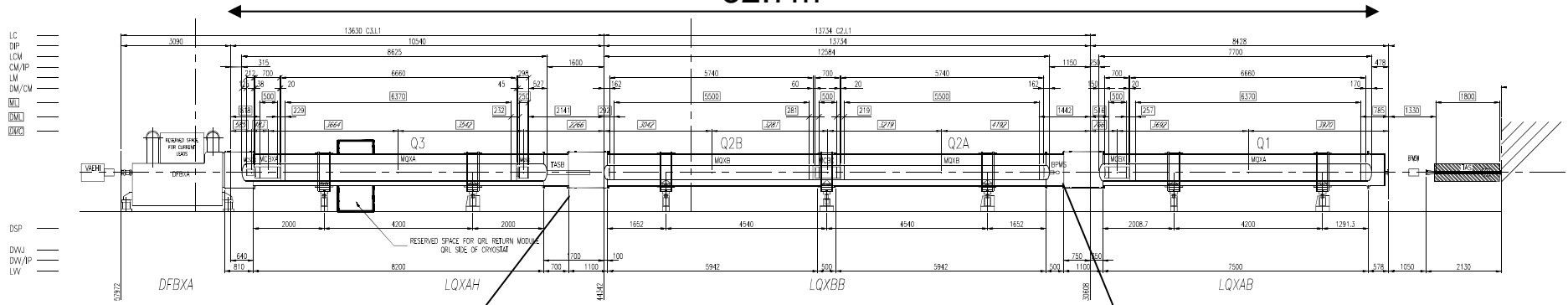
Topics:

- Cross section
- Interconnections
- Transport/handling limitations
- Tentative dimensions
- Summary

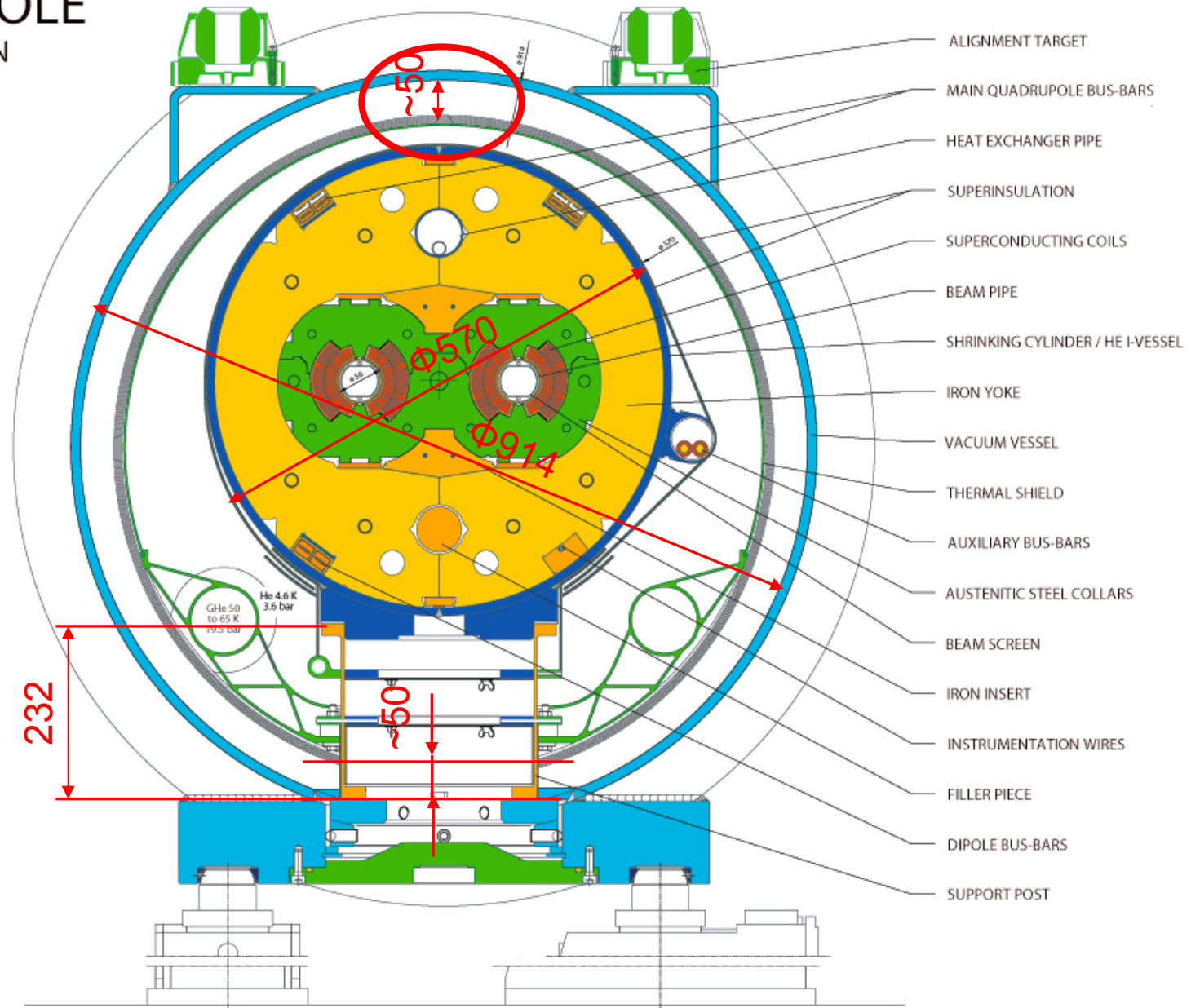
IRWG meeting, 18th October 2007

Present triplet

32.7m



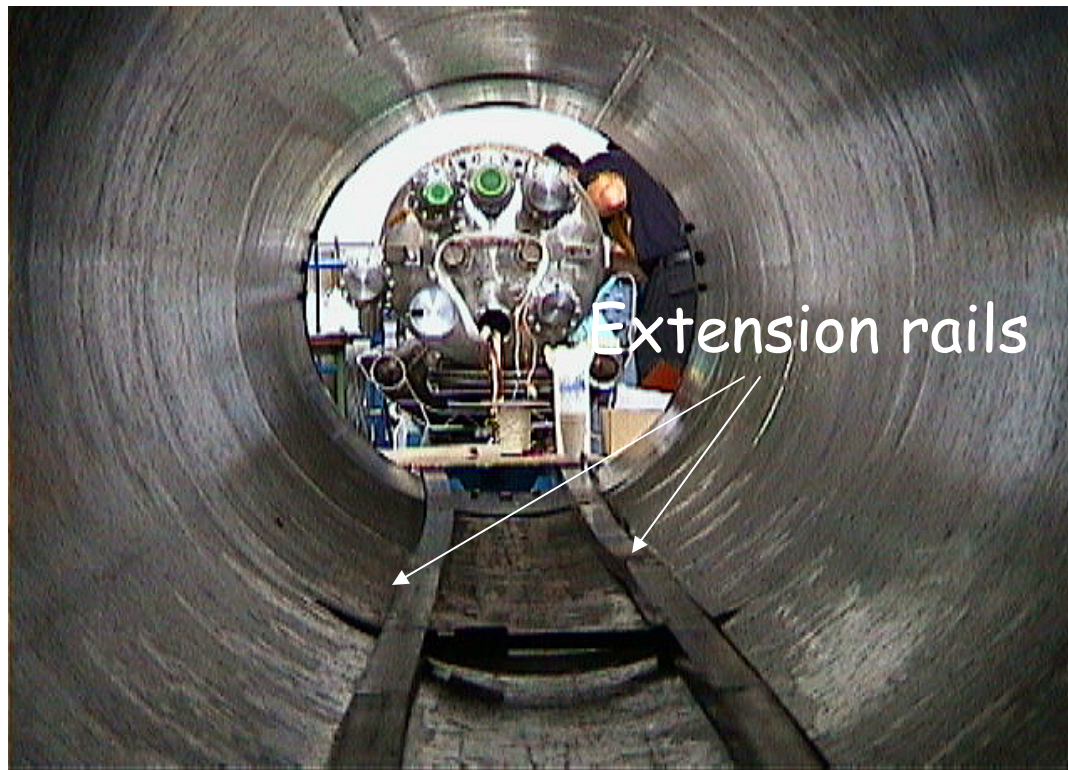
LHC DIPOLE CROSS SECTION

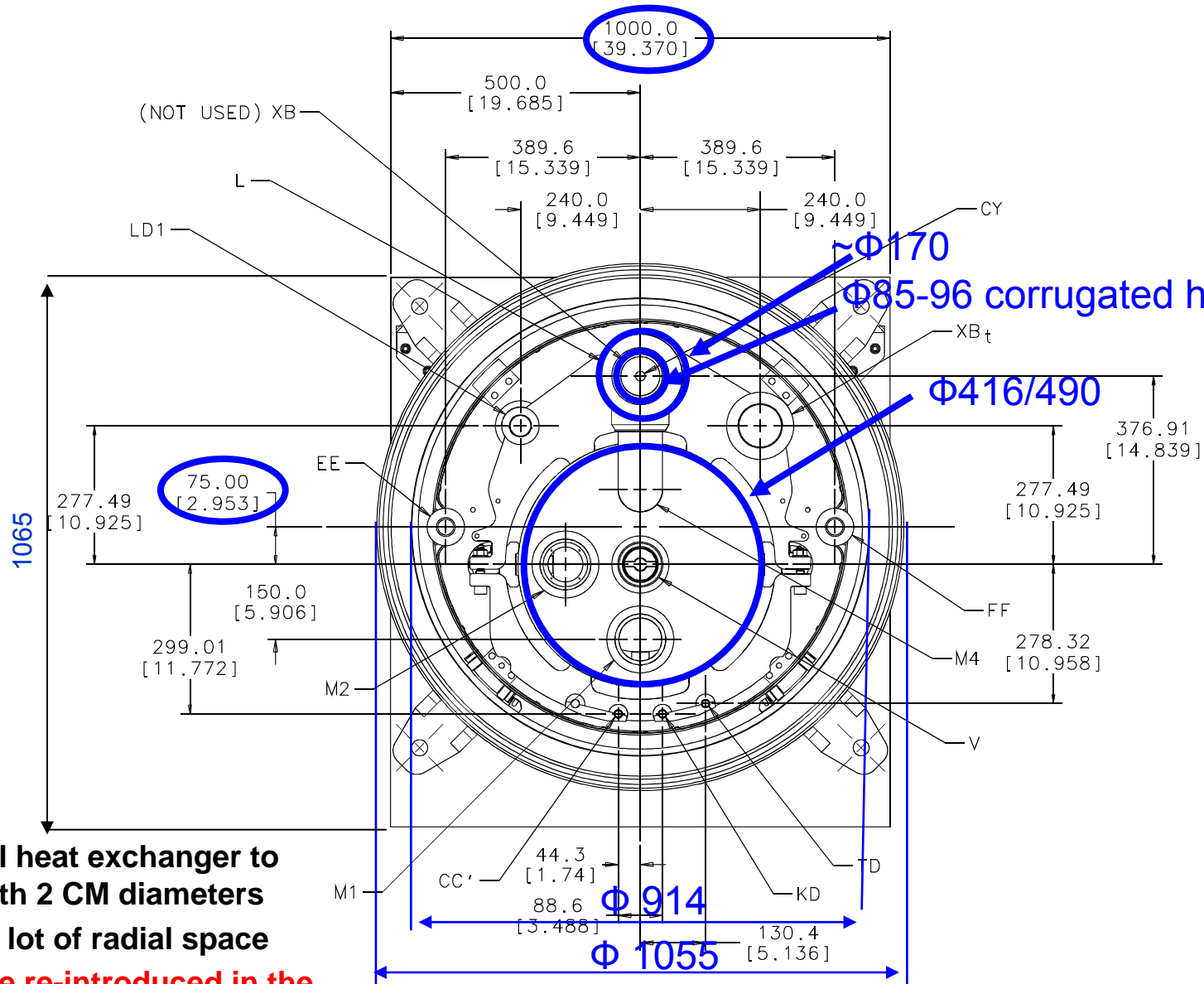


~50 mm lifting, functional to cryostating (dipole cryostating)

Dipole cryostating principle

- “pull-through” of cold mass on sledges under support posts



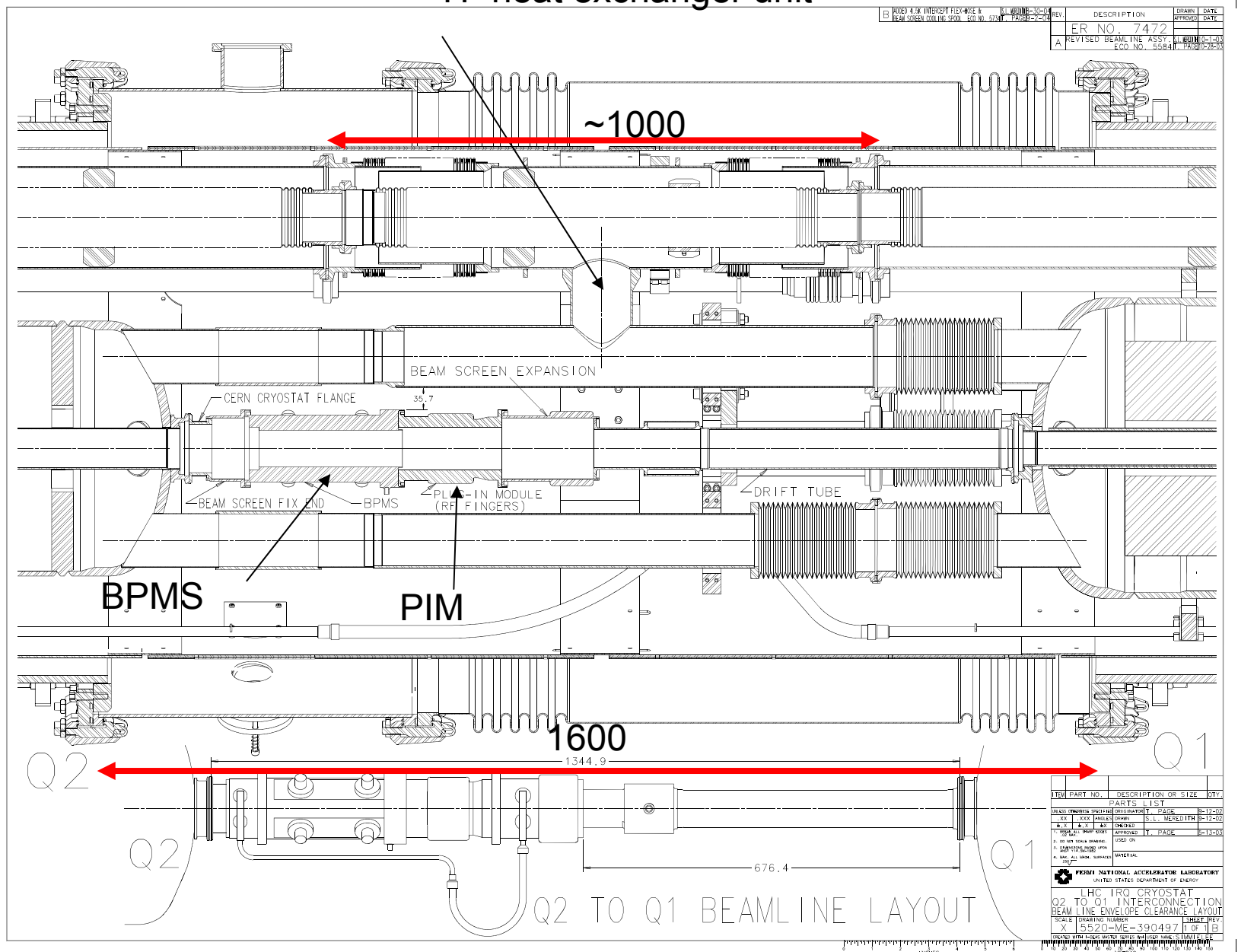


- External heat exchanger to cope with 2 CM diameters
- Takes a lot of radial space
- Can it be re-introduced in the CM?:
 - Magnetic calculations
 - Heat exchange calculations

NON-IP Q3 END VIEW
(LOOKING TOWARD IP)

WARM

"H" heat exchanger unit

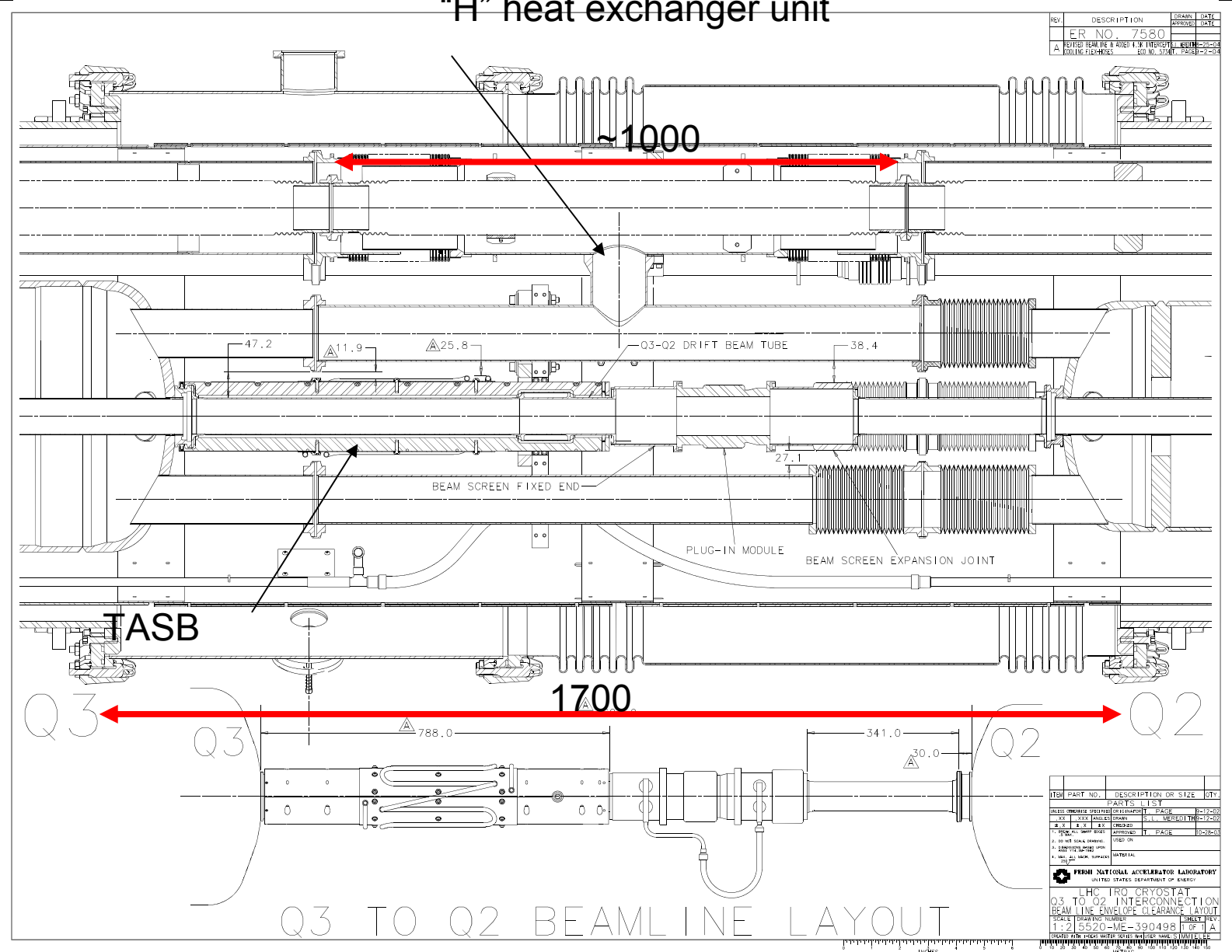


REV. 1	NOV 4 1997	INTEGRITY FILE: WIRE 4	REV. 1	DESCRIPTION	DATE
REV. 2	FEB 2004	TO: INC 500	REV. 2	ER NO. 7472	DATE
A				REVISED BEAMLINE ASSY.	11/01/03
				ECO. NO. 5584	11/01/03

ITEM	PART NO.	DESCRIPTION OR SIZE	QTY.
PARTS LIST			
1	XXXX	XXXX	1
2	XXXX	XXXX	1
3	XXXX	XXXX	1
4	XXXX	XXXX	1
MATERIAL			
FEDERAL NATIONAL ACCELERATOR LABORATORY			
UNITED STATES DEPARTMENT OF ENERGY			
LHC TRO CRYOSTAT			
Q2 TO Q1 INTERCONNECTION			
BEAM LINE ENVELOPE CLEARANCE LAYOUT			
SCALE	DRAWING NUMBER	SHEET NO.	TOTAL SHEETS
X	15520-ME-390497	1	1

Q2-Q1 interconnect

"H" heat exchanger unit



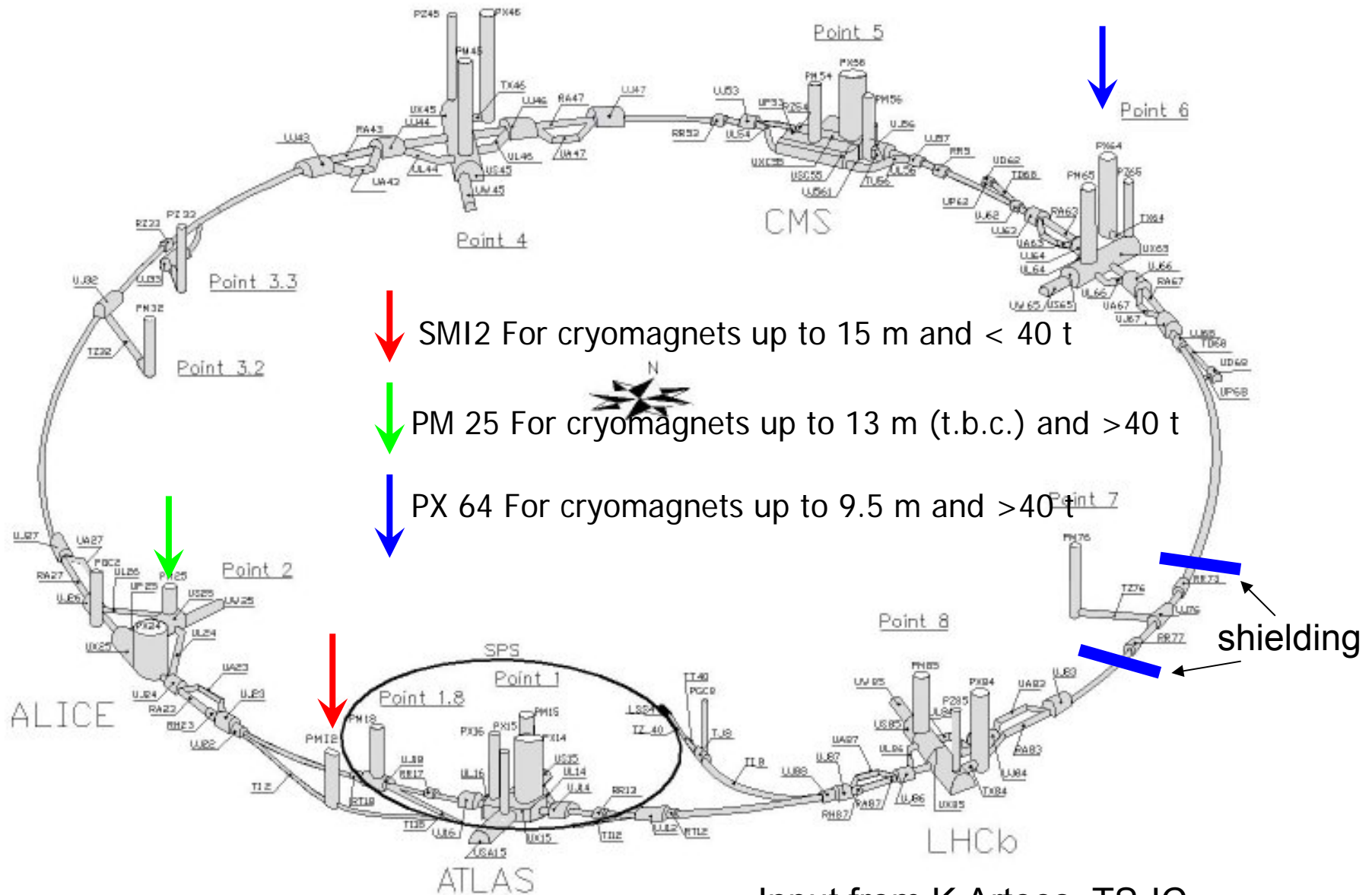
REV	DESCRIPTION	DRAWN	DATE
	ER NO. 7580		
A	REVISED PER INVOICE # 40674.3.1.1 IMPROVED COILS		03/08
	WORKING DRAWING	REV. NO. 3.1	1993-07-28

ITEM	PART NO.	DESCRIPTION OR SIZE	QTY
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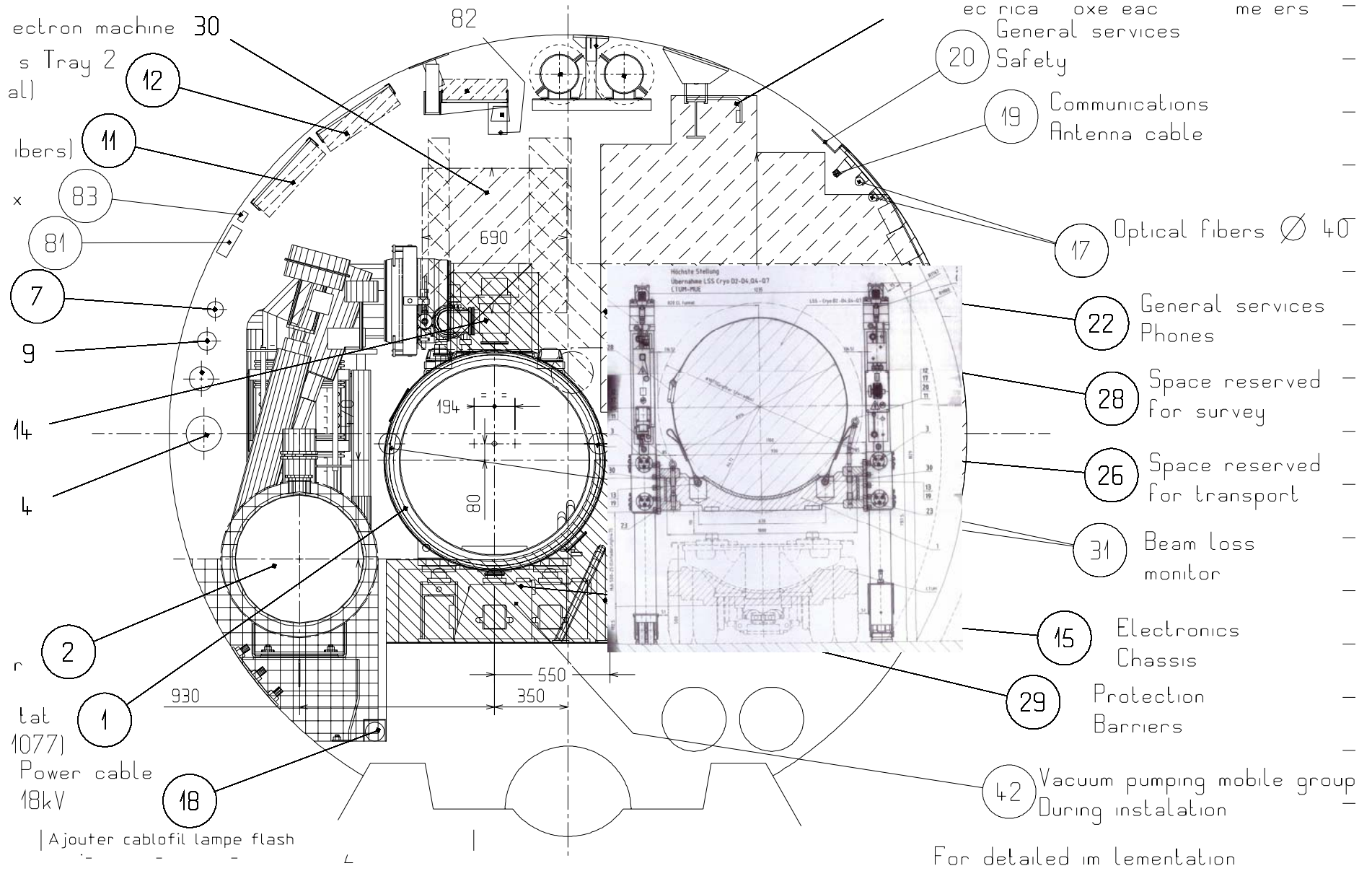
Q3 TO Q2 BEAMLIN LAYOUT

Q3-Q2 interconnect

Lowering Points during Operation



Input from K.Artoos, TS-IC



For detailed im lumentation

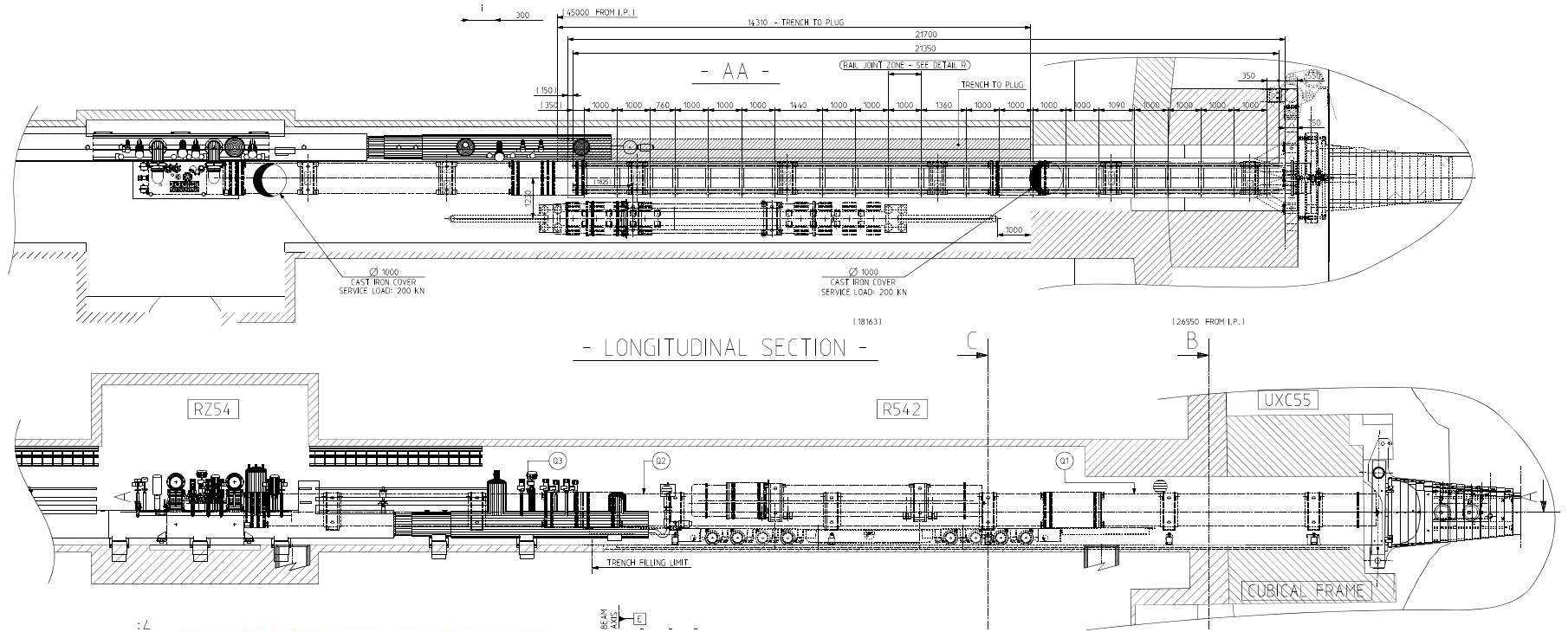
Input from K.Kershaw, TS-IC

Tunnel transport



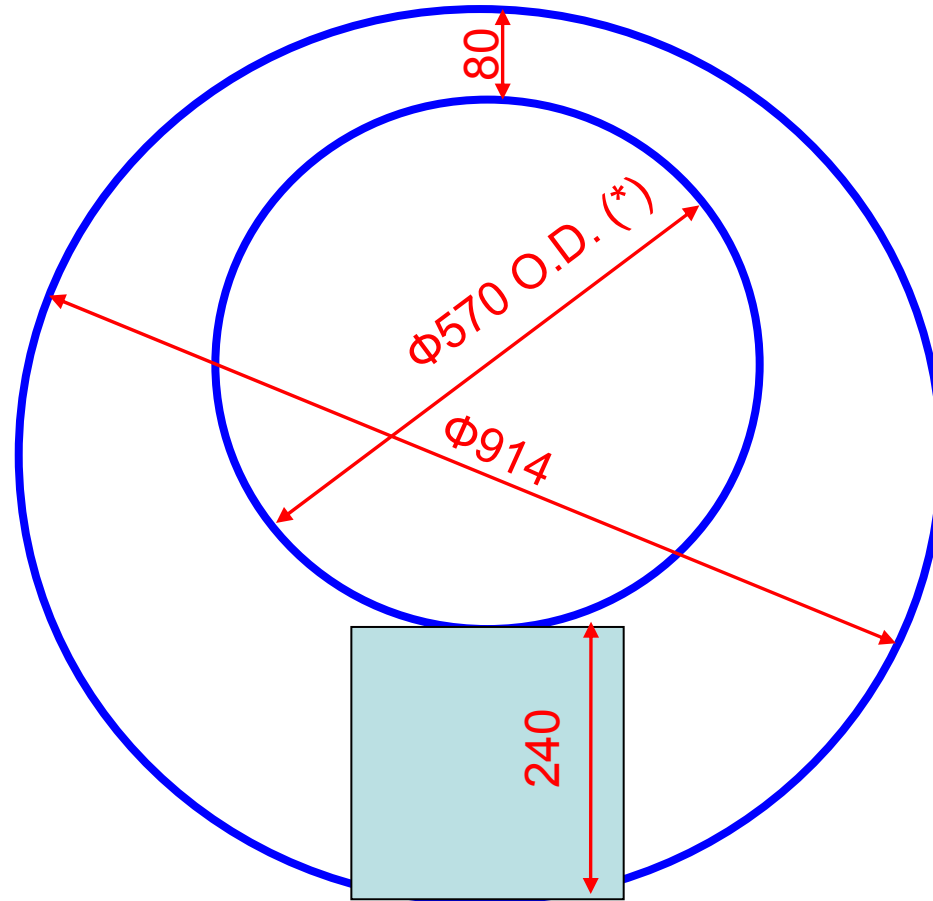
Courtesy of TS-IC

Space limitations



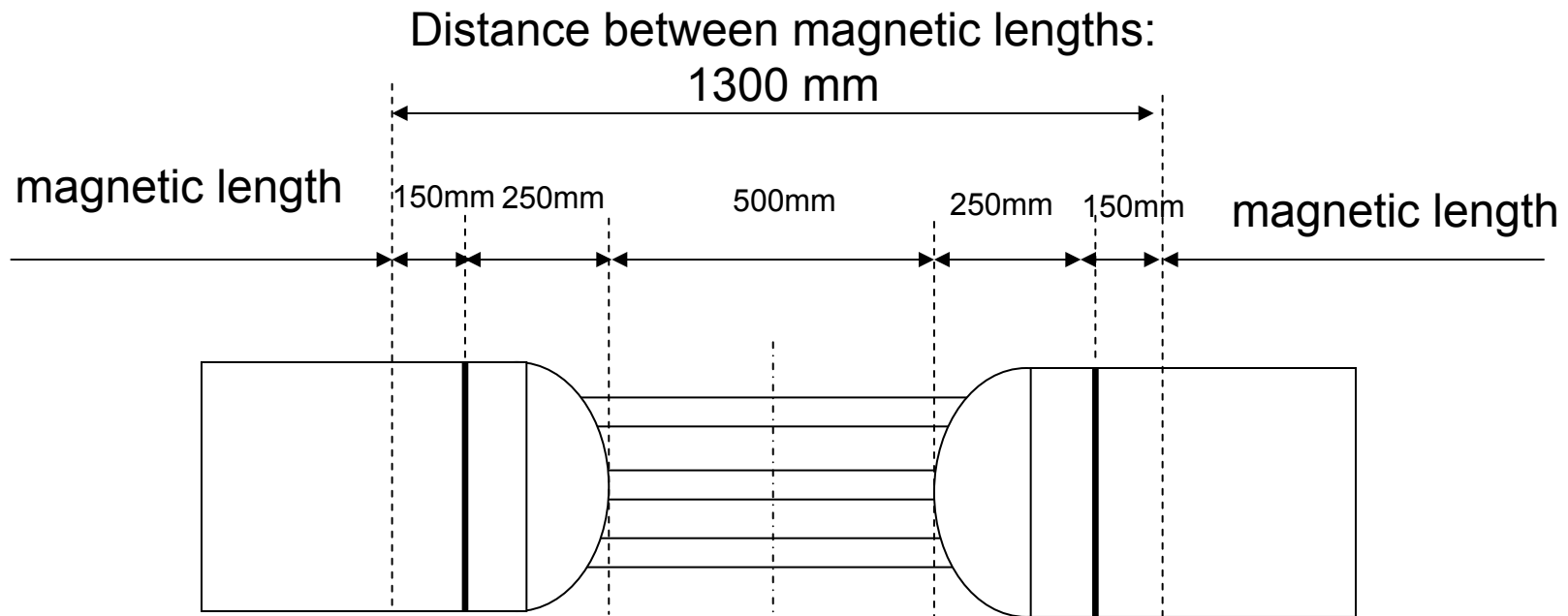
S.Bartolome'-Jimenez, TS-IC

Cross section: tentative basic dimensions



(*) R.Ostojic, using existing dipole steel laminations

Interconnection zones: tentative dimensions



500mm includes BS+PIMs, not BPM nor TAS.

Additional equipment will increase space requirements

Warm lengths of present equipment:

- **Correctors (without connection space):**
 - **MCBX (full x-section magnet): 700mm (480 magnetic, 780 slot length)**
 - **MCSQX (small magnet): 215 mm (138 magnetic)**
 - **MQSX (small magnet): 315 mm (223 magnetic)**
- **BPMS: 260mm**
- **TASB: ~960mm**

Input from J.Kerby, R.Ostojic

Summary

- Cross section:
 - Wide use of dipole cryostat concepts:
 - Support posts instead of spiders
 - “lift-and-slide” cryostating concept
 - Use of existing dipole cryostating concepts
 - Standard pipeline diameter: $\Phi 914$ mm O.D.
 - CM diameter 570 (using existing dipole laminations)
 - Requires vertical space: can the heat exchanger be moved inside the cold mass (or moved elsewhere)?
- Transport/handling limitations:
 - 15 m is a limit for SMI2 shaft access to tunnel
 - Cross-section. Tunnel transport constraints: only (very) limited increase of diameter possible
- Cryostat interconnection space:
 - “H” heat exchanger removed? (heat exchanger inside cold mass)
 - 500 mm CM-to-CM space (as for arcs interconnects) is a good start. Does not include BPM or TAS.
 - ...which leads to 1300 mm distance between magnetic lengths
 - Correctors will have to be included