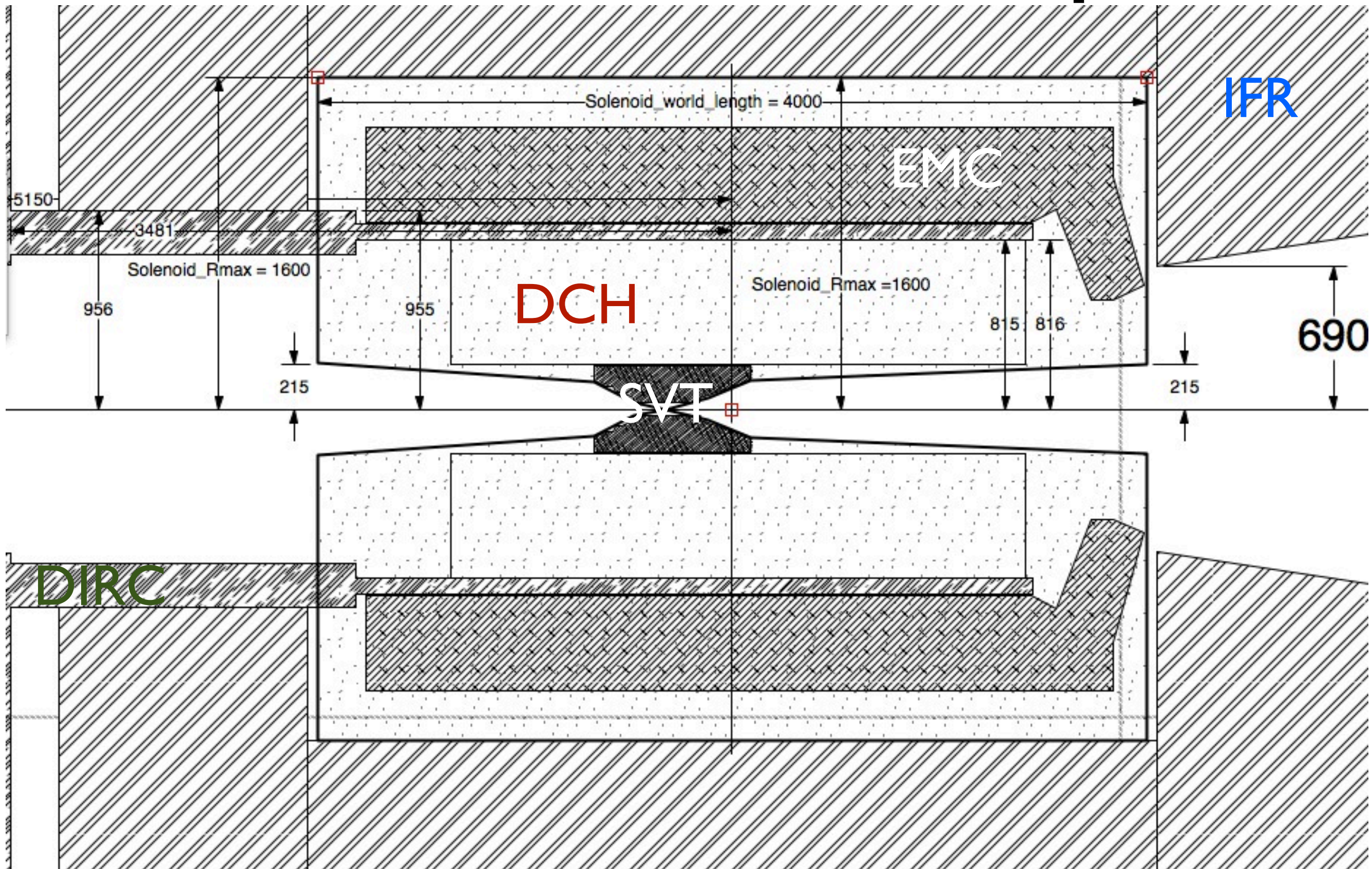


Machine Detector Interface geometrical envelopes & requirements

Geometrical Envelopes



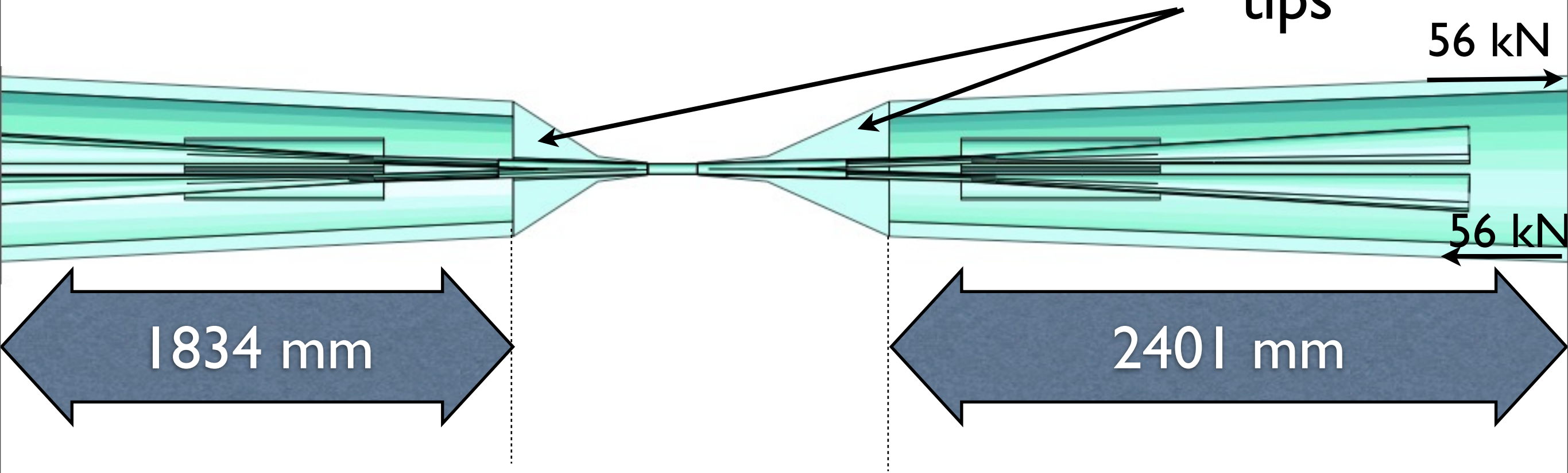
Requirement from the machine side

- Quick access to the SVT L0 (weeks instead of months as was in BaBar)
- Quick access to the permanent magnets of the beam line in the case they have to be taken away for the charm threshold running

The tungsten guests

Thickness 30 mm
Outer radius 225 mm

~1.7 metrical tons
each without the
tips



Torque to be exerted to keep the longer shield
in place $2.2 \cdot 10^4 \text{ N m}$

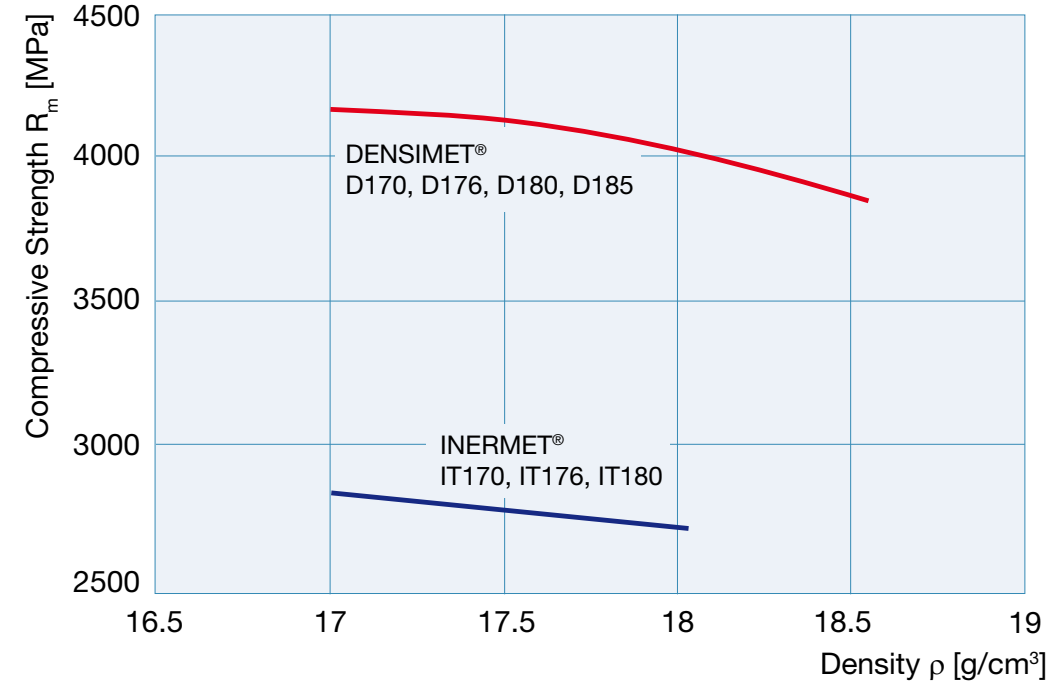
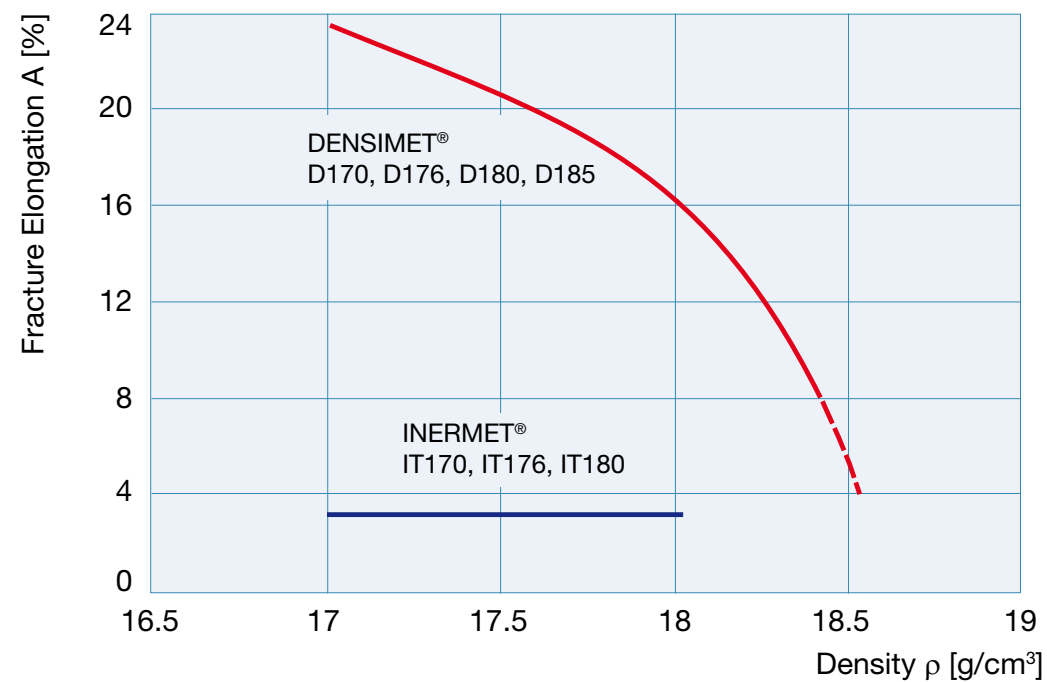
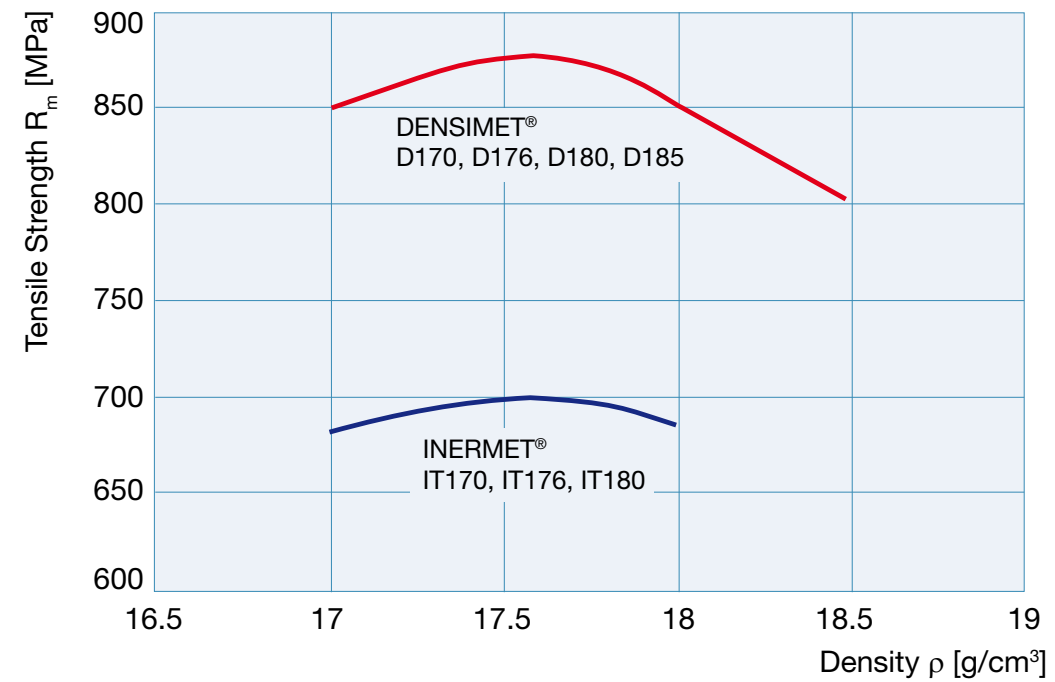
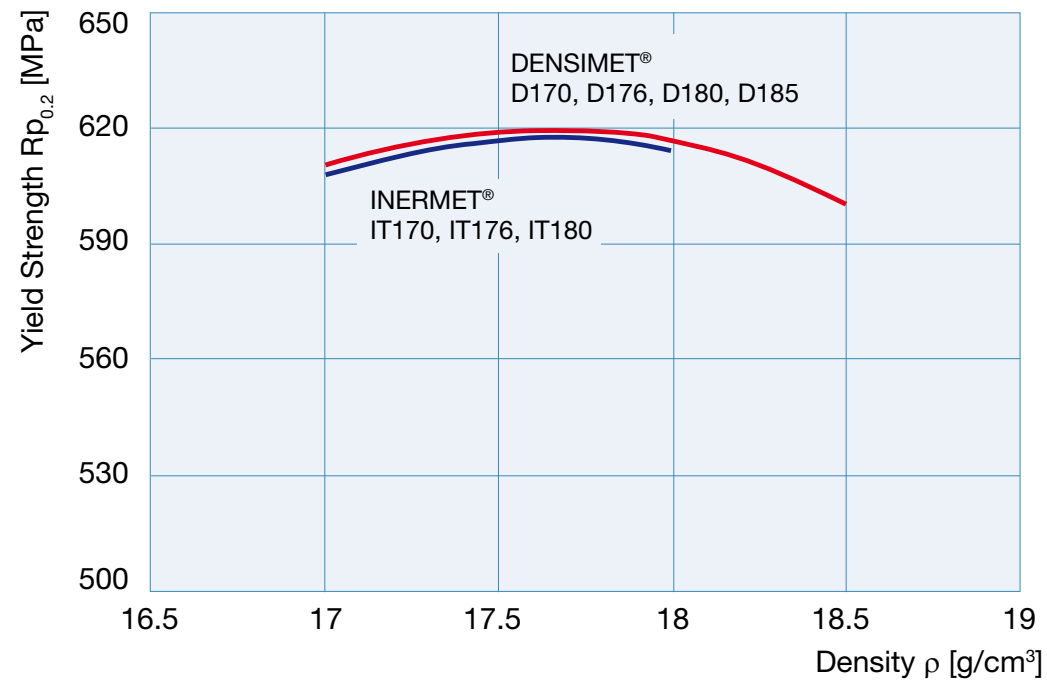
Tungsten alloys properties

Werkstoff Material	Abkürzung Abbreviation	Chemische Zusammensetzung [%] Chemical composition [%]		Nominelle Dichte Nominal density	AMS-T-21014 Class
		W	Rest		
		Schwach ferromagnetisch / Weakly ferromagnetic			
DENSIMET® 170	D170	90,5	Ni, Fe	17,0	1
DENSIMET® 176 / W	D176 / DW	92,5	Ni, Fe	17,6	2
DENSIMET® 180	D180	95	Ni, Fe	18,0	3
DENSIMET® 185	D185	97	Ni, Fe	18,5	4
DENSIMET® 188	D188	98,5	Ni, Fe	18,8	-
DENSIMET® D2M	D2M	90	Ni, Mo, Fe	17,2	-
Paramagnetisch / Paramagnetic					
INERMET® 170	IT170	90,2	Ni, Cu	17,0	1
INERMET® 176	IT176	92,5	Ni, Cu	17,6	2
INERMET® 180	IT180	95	Ni, Cu	18,0	3

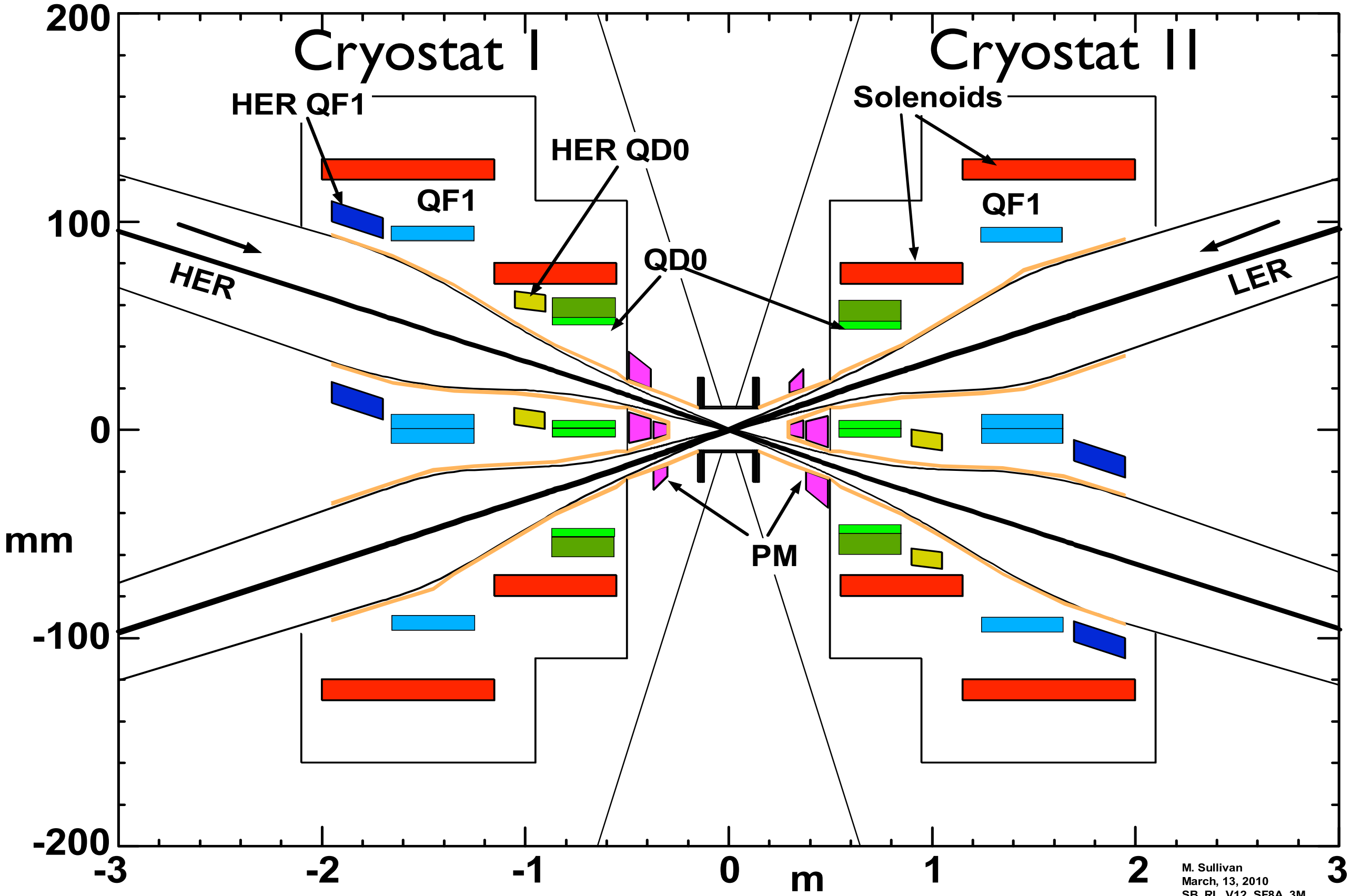
Mechanische Eigenschaften - typische Werte

Mechanical properties - typical values

	D170	IT170	D176 / W	IT176	D180	IT180	D185
Elastizitätsmodul E [GPa] Young's modulus E [GPa]	340	330	360	350	380	360	385
Schubmodul G [GPa] Modulus of rigidity G [GPa]	140	125	145	135	150	140	160



What will be placed inside the tungsten



M. Sullivan
March, 13, 2010
SB_RL_V12_SF8A_3M

Requirements from the accelerator side

- The final focus beam line oscillations must be damped to 800 nm RMS
- Can the tungsten shields be the mechanical support of the beam line?
- Do we need an additional support structure?

Element	RMS motion	Xfer Fn	IP displacement	
			no feedback	with feedback
Cryostat linear	< 1 μm	< 0.035	< 35 nm	< 3.5 nm
Cryostat rotation	< 2 μrad	0.014 m/rad	< 30 nm	< 3 nm
Arc quads	< 1 μm	0.03	< 30 nm	< 3 nm
Total (two rings)			< 78 nm	< 7.8 nm

- Assumes beam feedback achieves > 10x reduction of motion at IP
 - If motion is kept 10x smaller, may not need beam feedback
- Budget applies to integrated RMS motion > 1 Hz
- This budget will keep relative motion < 8 nm, and lumi loss < 1%

Quick accesso concept (Mike June 2010)

