

Cryogenic Infrastructure Installation

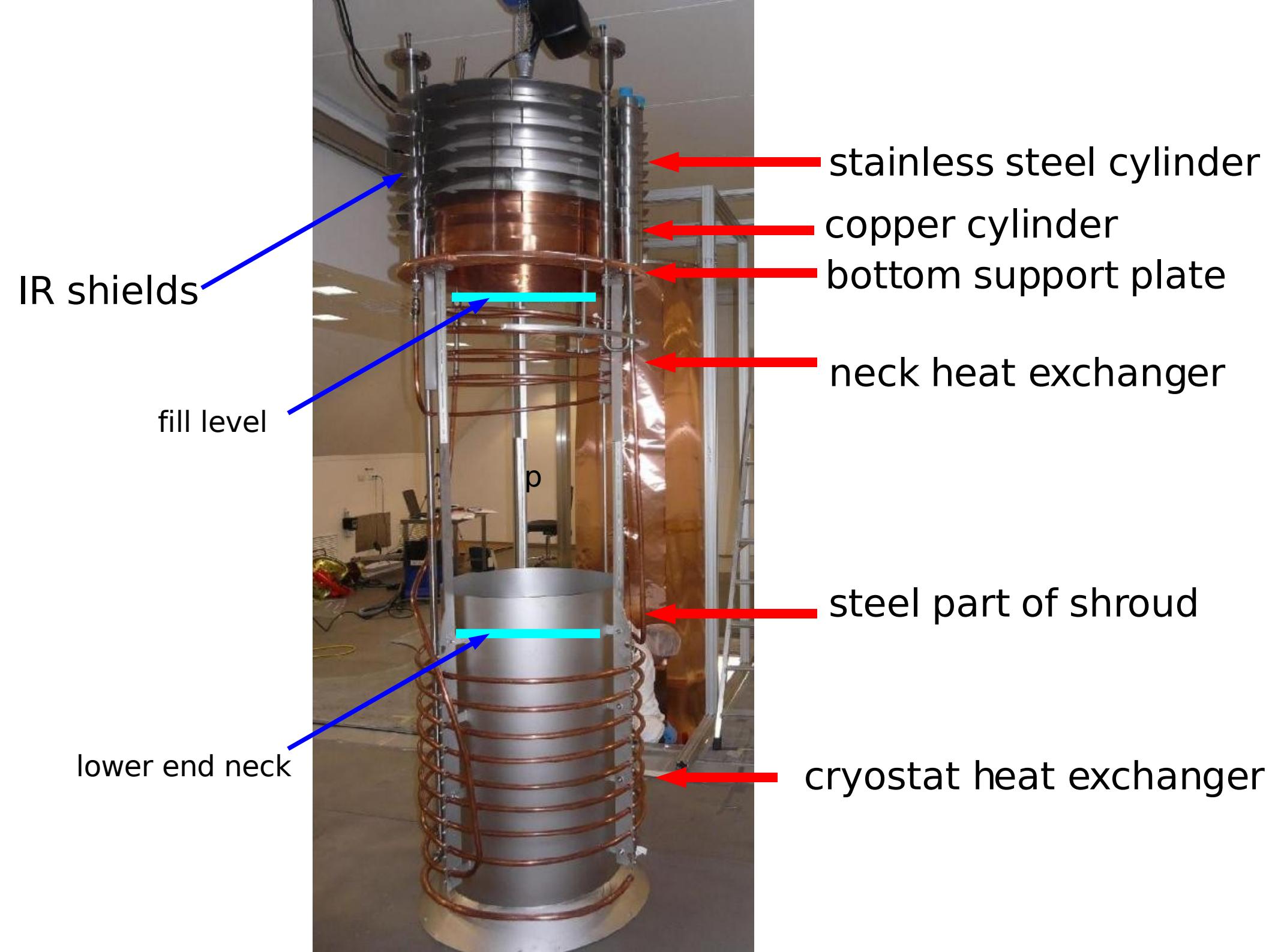
Bernhard Schwingenheuer, MPI Heidelberg

Content:

- slide show
- web interface
- commissioning plans

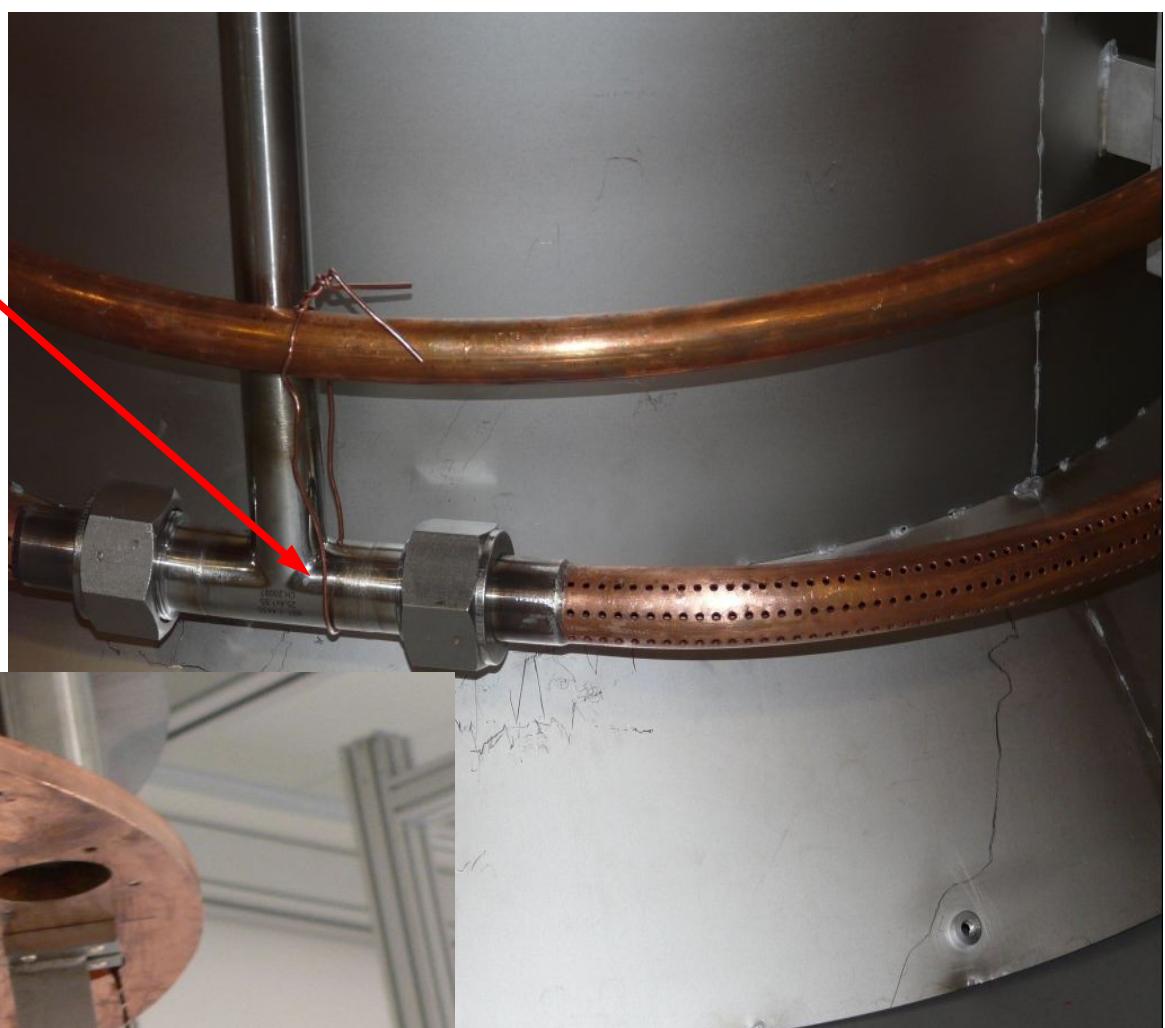
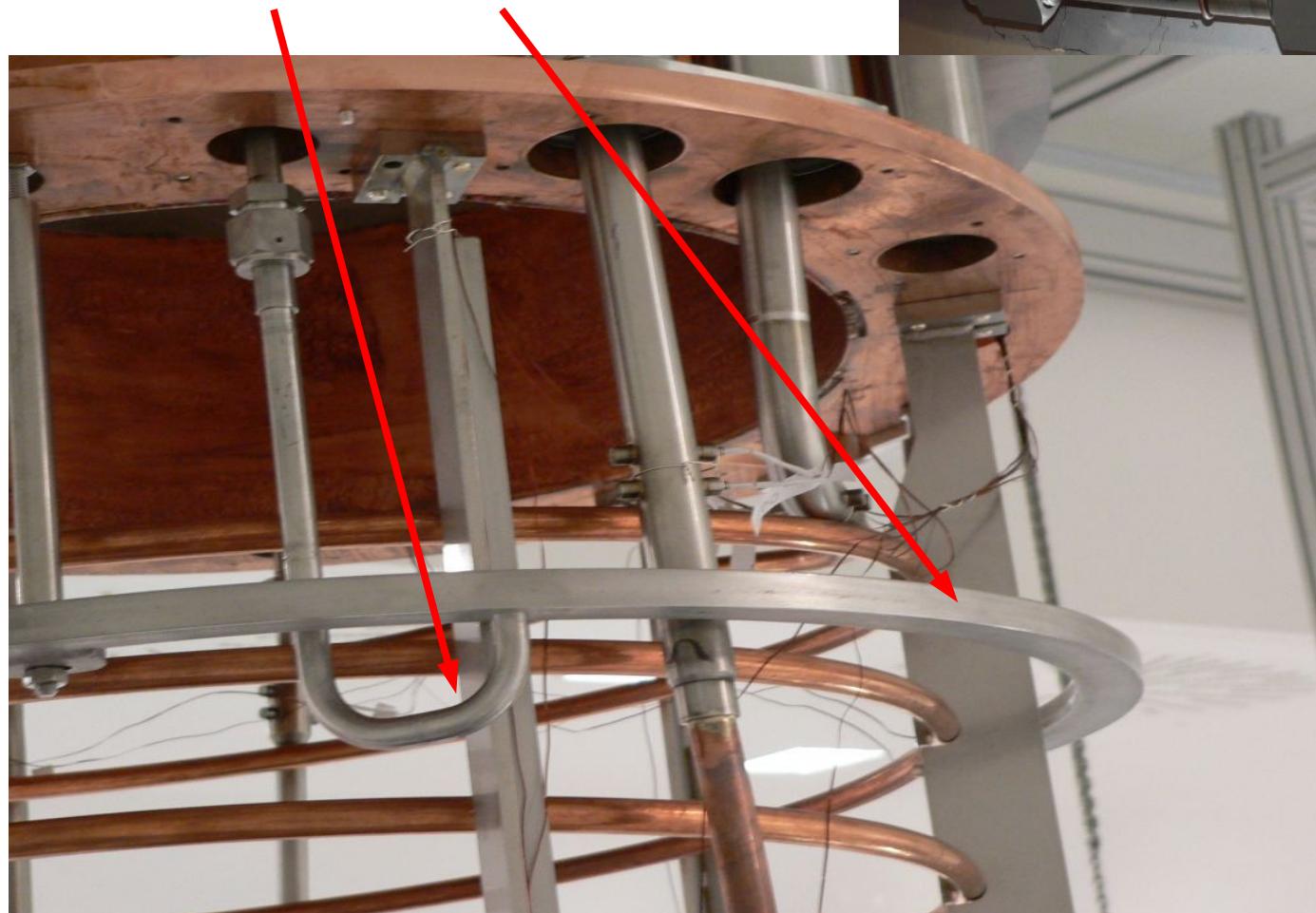
After inspection of cryostat (and wiping) assembly of internal cryostat piping



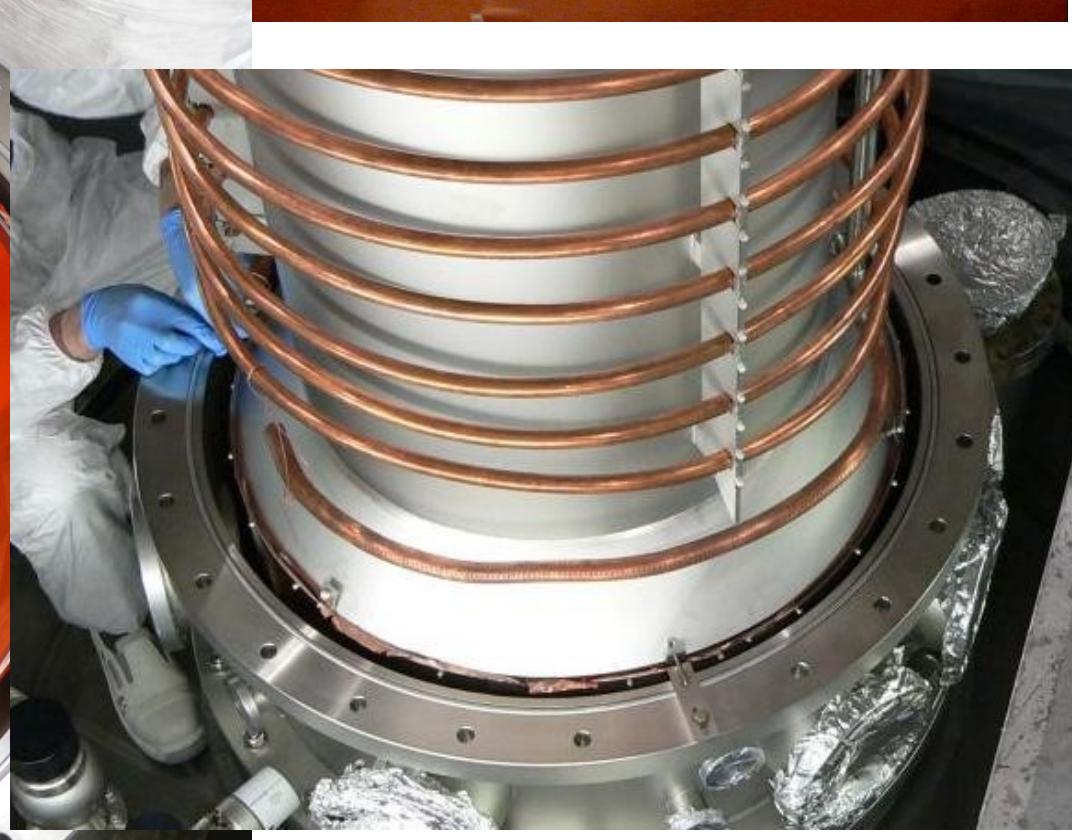
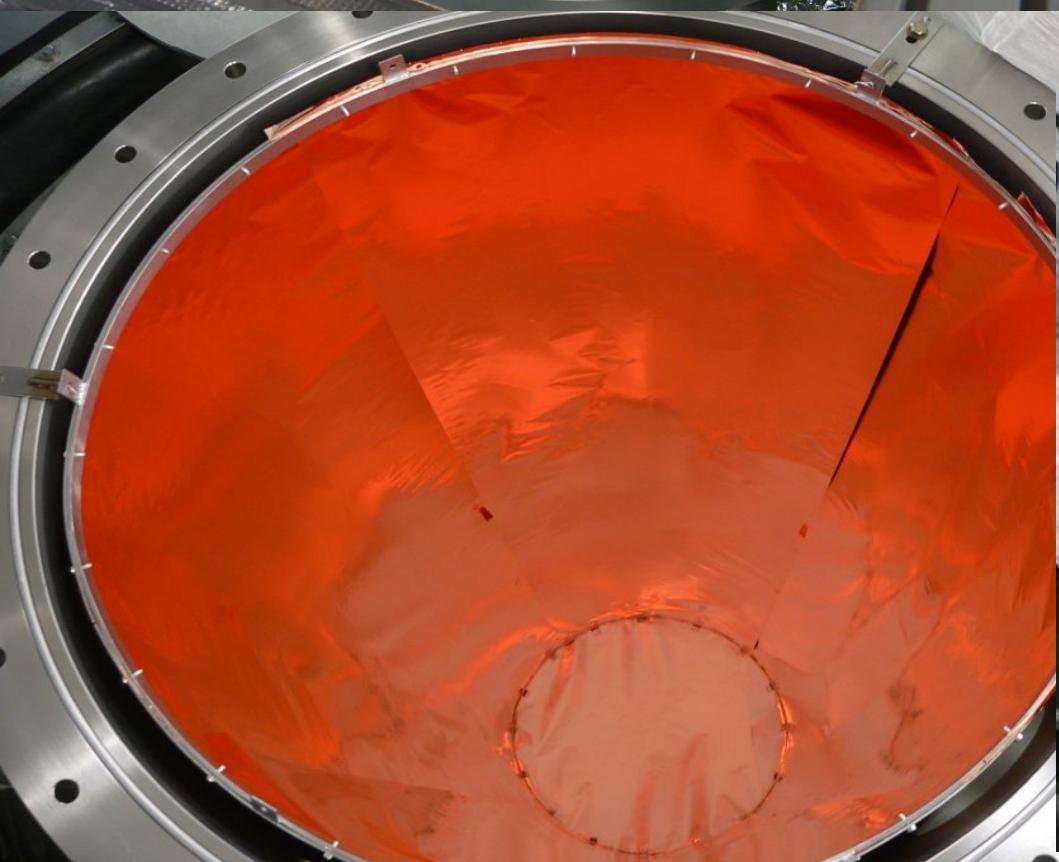
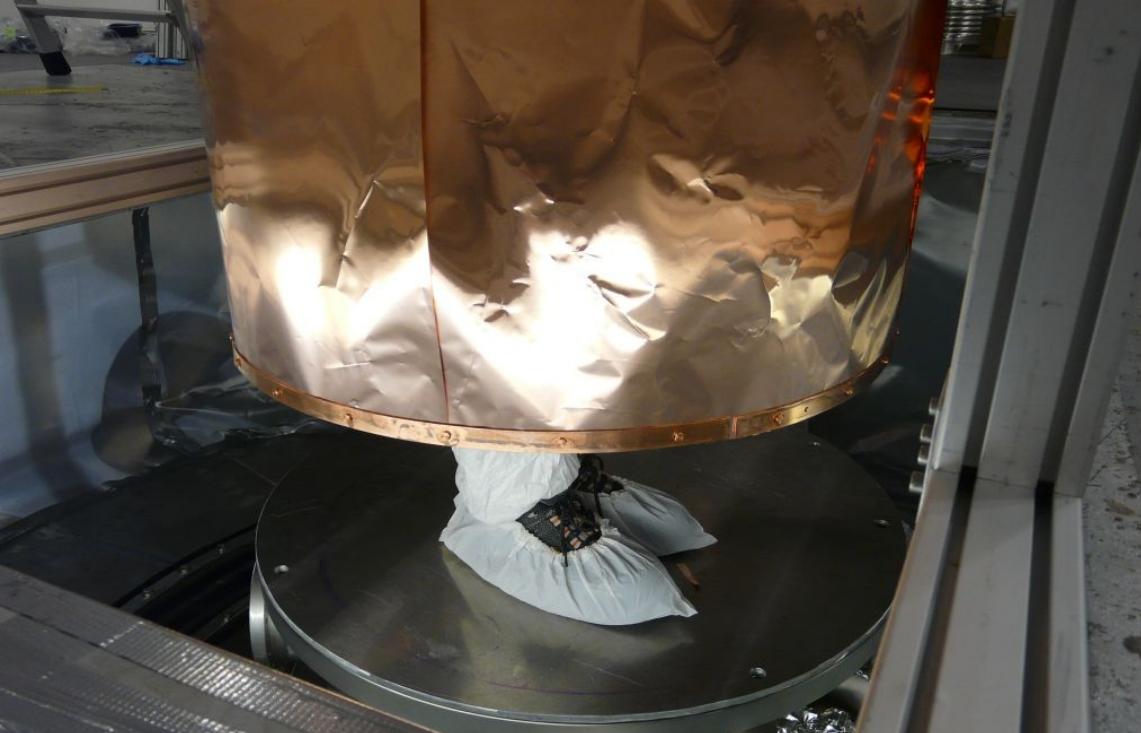


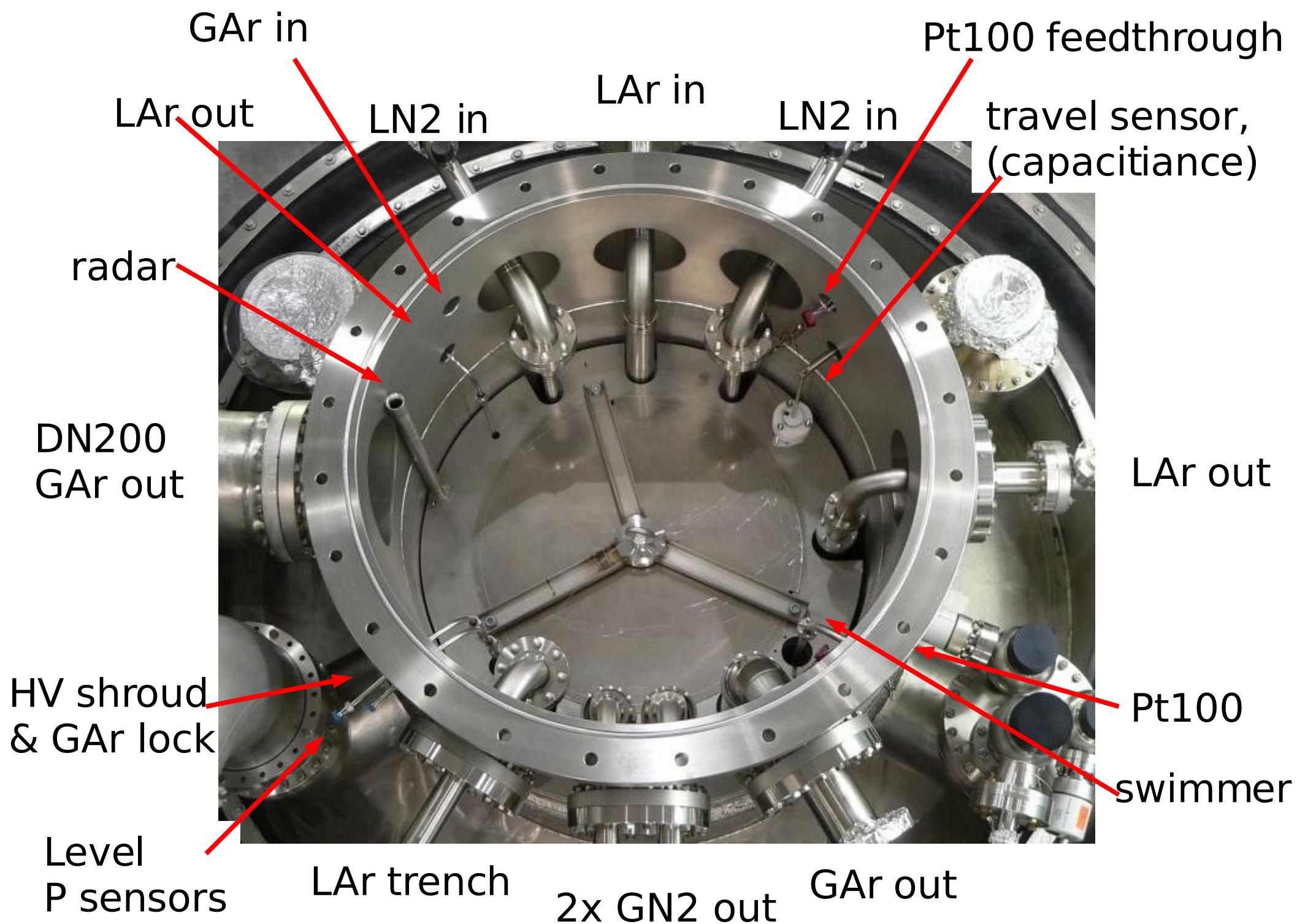
outlet trench (U-form)

LAr filling tube



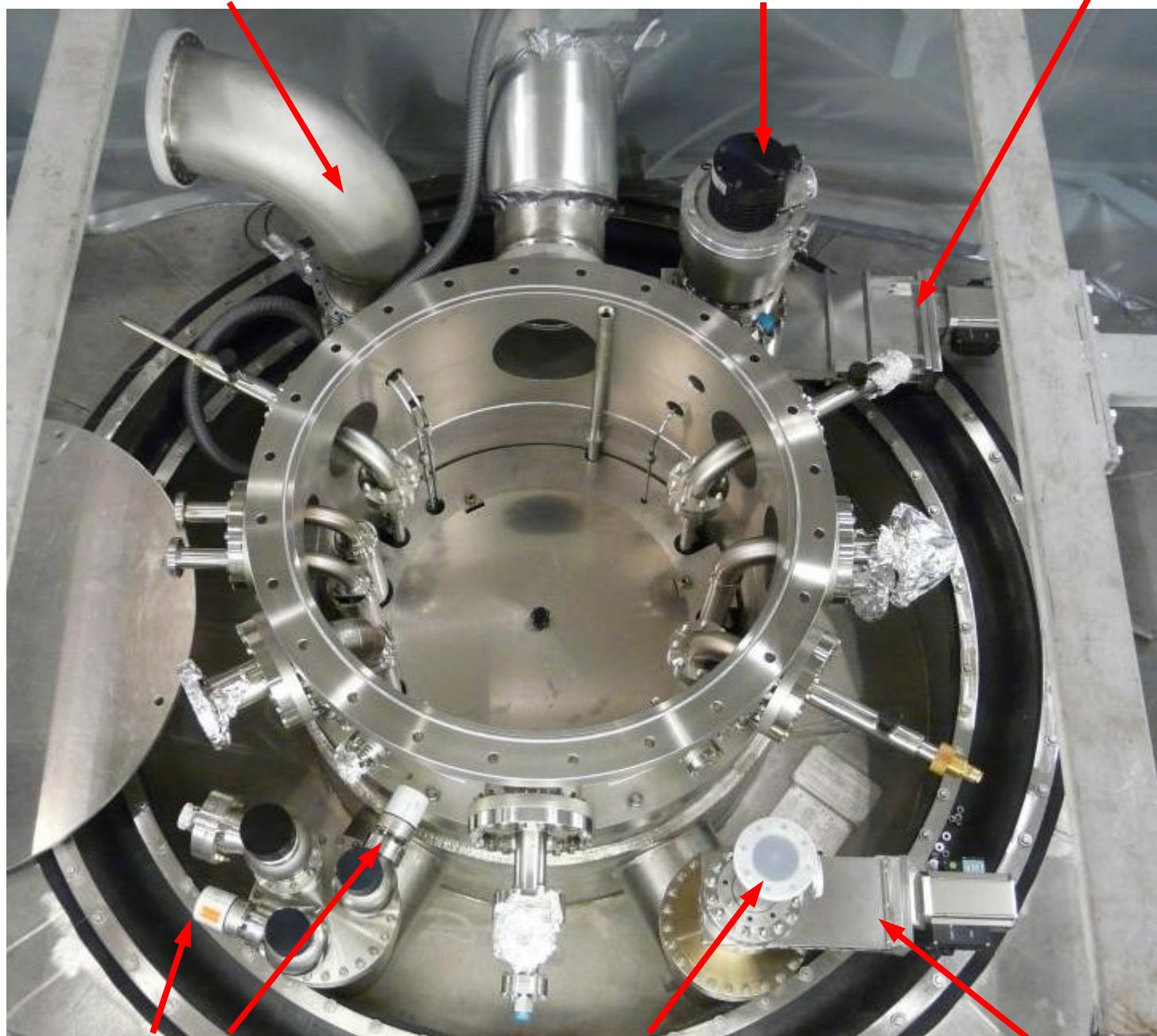






safety disk + exhaust

Turbo pump shutter

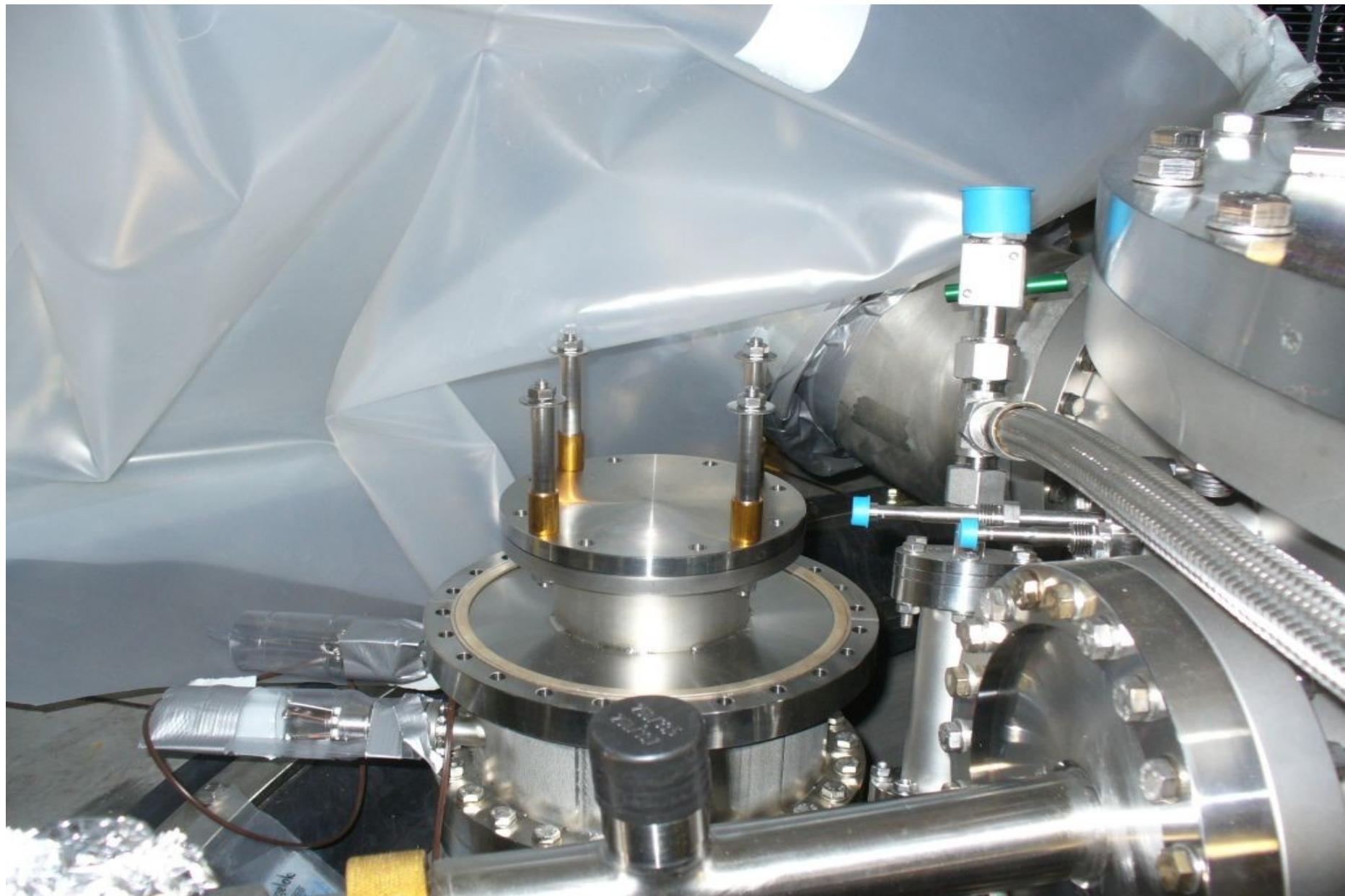


pressure sensors

port for residual
gas analyzer

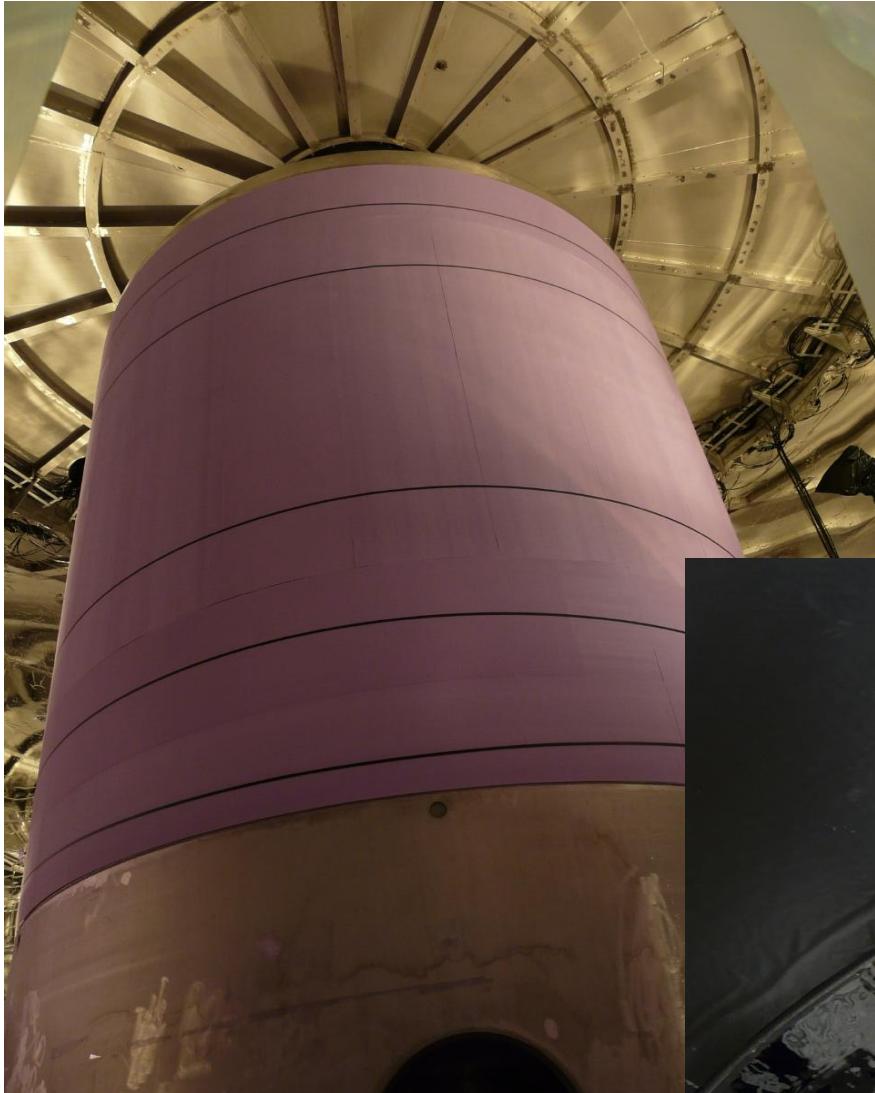
shutter

Safety disk for insulation vacuum after screw removal

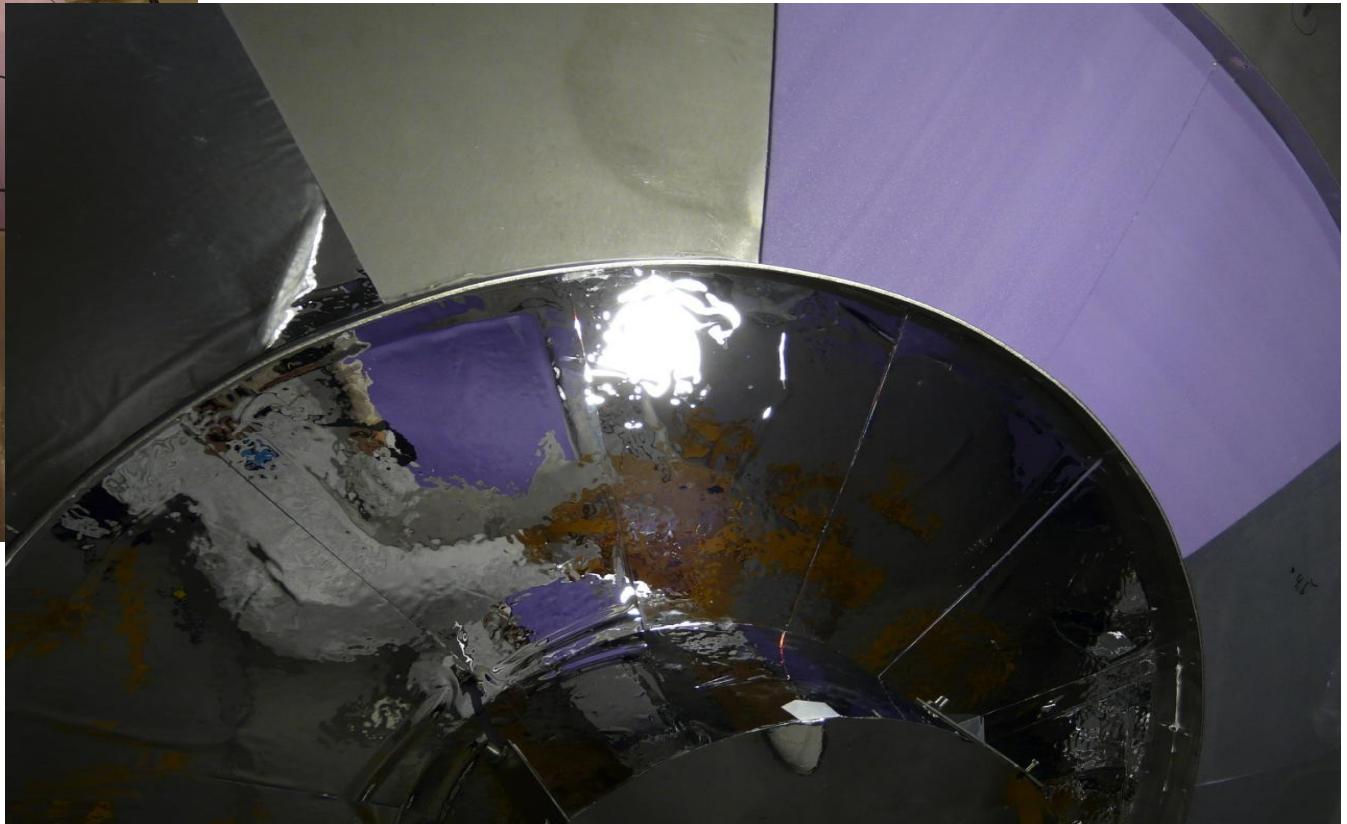




In addition: mounting of thermal insulation



at the cylinder



at the bottom head



rupture disk

safety
valve

rupture
disk



Valve box



PLC cabinet
connection to LNGS safety ready



WEB interface of PLC (under construction)

Applications Places System Mozilla Firefox Thu Sep 24, 5:40 PM

File Edit View History Bookmarks Tools Help

http://ge-gate-est.lngs.infn.it/cryo/~gerda/cryo-s7.cgi?form=map&group=

Getting Started Latest BBC Headlines GERDA MPIK

GERDA cryostat

Status date: 2009-09-24 15:40:00
Select group: Water Temperature Level Pressure Vacuum
Help about

Overview Status tables
Protected mode S7 status
Help
Manuals
General PID

The diagram illustrates the control system for the GERDA cryostat. It features a central blue rectangular box representing the cryostat vessel. Various control modules are connected to it:

- Vacuum Control**: Located at the bottom left, connected to the vessel.
- Water Tank Control**: Located at the bottom right, connected to the vessel.
- Pressure Control**: Located above the vessel, connected by a blue line.
- Temp. Control**: Located above the vessel, connected by a green line.
- Level Control**: Located to the right of the vessel, connected by a blue line.
- Infra.-Control**: Located at the top right, connected by a black line.
- LAr**: Located at the bottom right, connected by a green line.

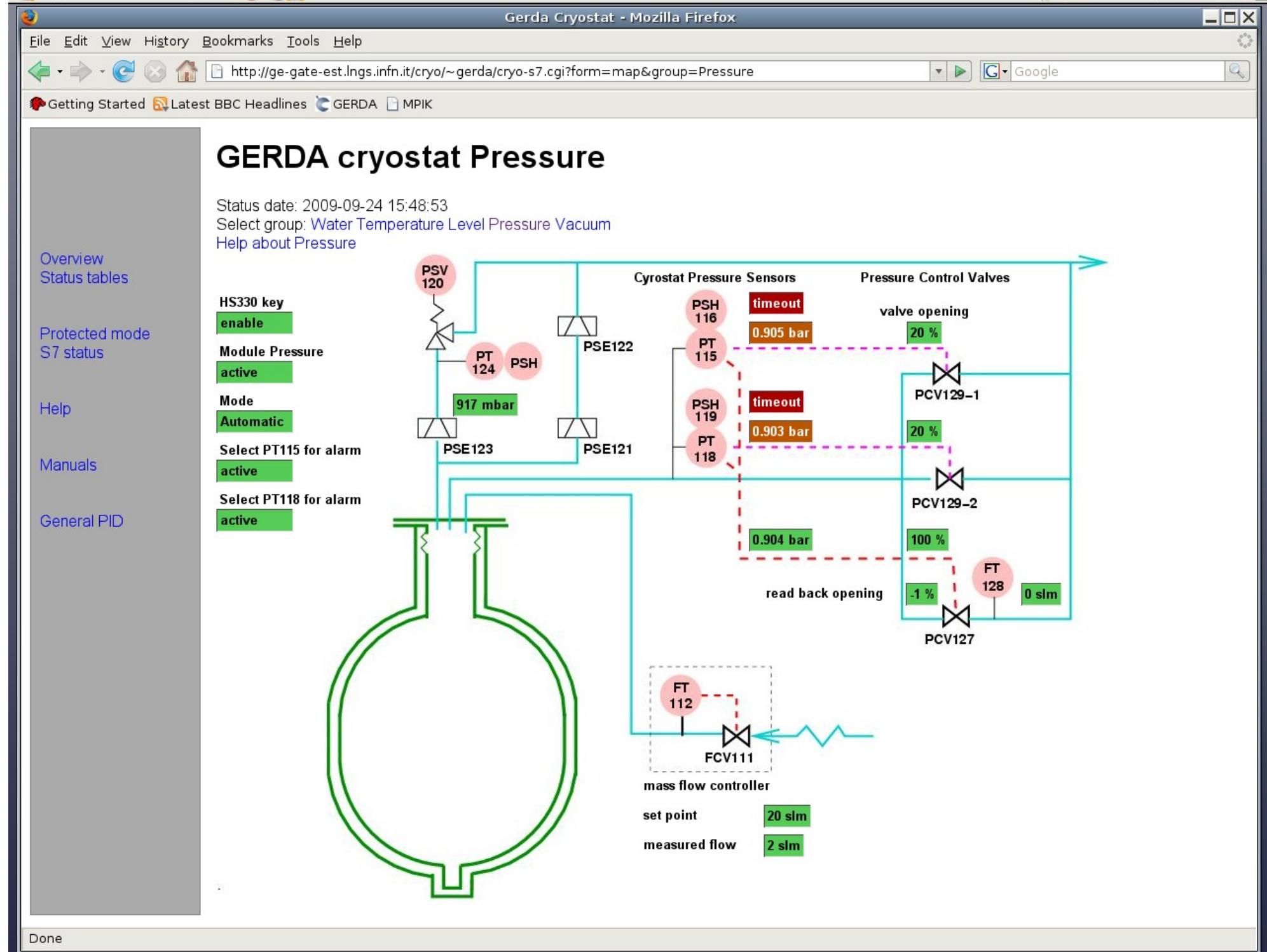
Each control module has an associated status box indicating errors and warnings:

- Vacuum Control: errors: 0 warnings: 6
- Water Tank Control: errors: 0 warnings: 7
- Pressure Control: errors: 2 warnings: 3
- Temp. Control: errors: 0 warnings: 46
- Level Control: errors: 0 warnings: 10
- Infra.-Control: errors: 0 warnings: 2
- LAr: errors: 0 warnings: 0

Done

Gerda Cryostat - Mozilla Firefox

PC inside PLC cabinet is WEB server, read/write data from SIMATIC S7 PLC via TCP/IP acces



GERDA cryostat Pressure

Status date: 2009-09-24 15:50:35
 Select group: Water Temperature Level Pressure Vacuum
[Help about Pressure](#)

HS330 key enable
Module Pressure active deactivate
Mode Automatic manual
 Select PT115 for alarm active deselect
 Select PT118 for alarm active deselect

Cryostat Pressure Sensors

- PSH 116: timeout 0.905 bar
- PT 115: timeout 0.903 bar
- PSH 119: timeout 0.904 bar
- PT 118: timeout 0.904 bar

Pressure Control Valves

- valve opening 20%: PCV129-1
- valve opening 20%: PCV129-2
- valve opening 100%: PCV127
- read back opening -1%: PCV127

mass flow controller

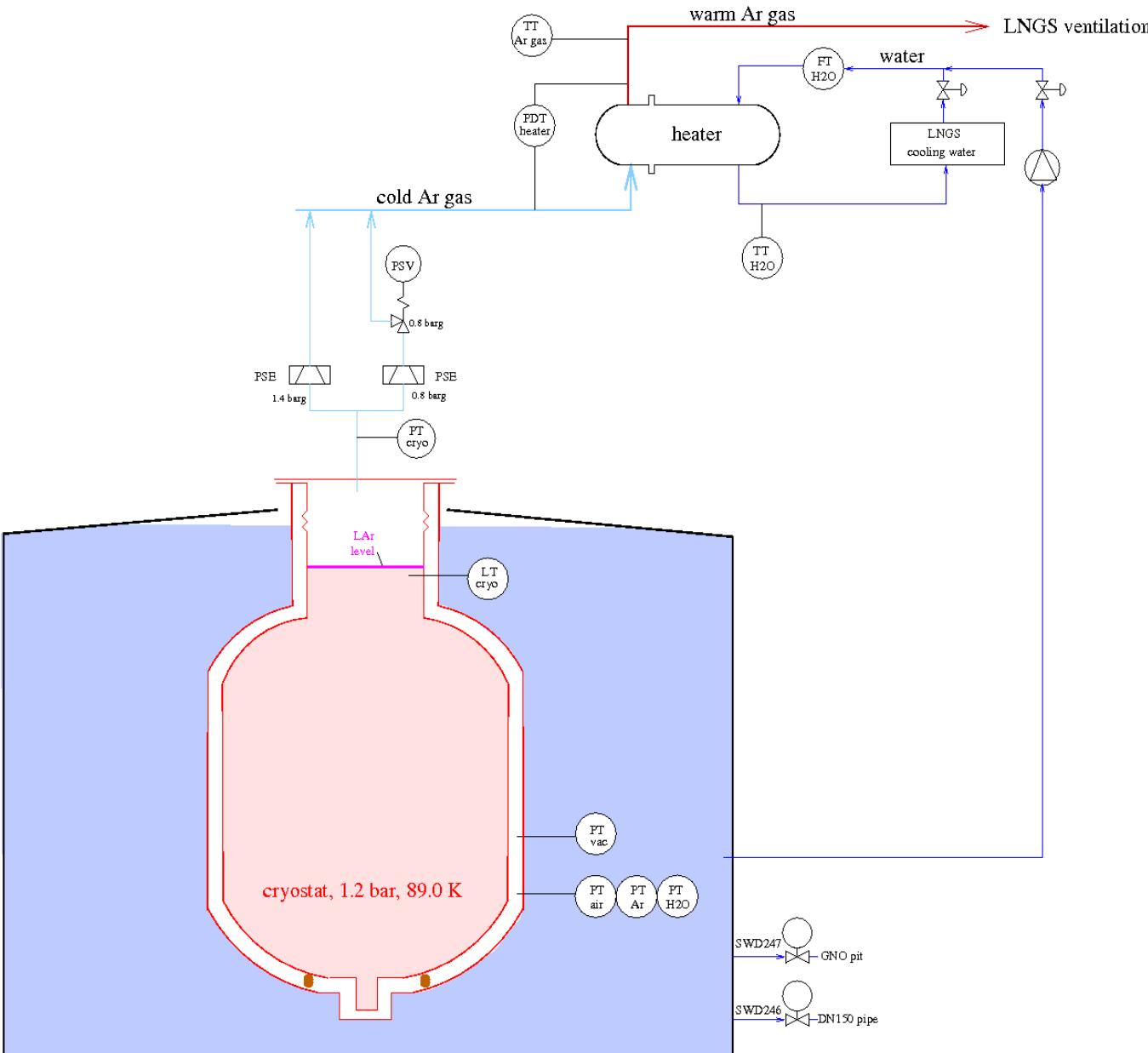
- set point 20 slm
- measured flow 2 slm

submit **reset**

Name	Value	Units
PCV127_Y	100	%
PCV127_W	1.200	bar
PCV127_Kp	1.00e+00	mult
PCV127_Tn	70	msec

Done

Information for LNGS safety



via MODBUS:

- 10 analog values
- status bits

via cable 5 signals:

- PLC working
- increase ventilation
- drain water
- evacuate Hall A
- close highway+lab

state	P_cryo bar(abs)	P_vac mbar	level	P_xxx mbar	Δp_h mbar	T_Ar.gas Celsius	Flow_wat l/sec	T_water Celsius	Incr. Vent.	Drain Water	Evac HallA	Evac LNGS
green	<1.5	<1E-4	ok	ok	<10	>2	>5	>6				
yellow					N2>1E-4							
Y1												
Y2					too high							
Y3							<5					
Y4												
Y5								2-6				
orange												
O1					Ar>1E-4				x		x	
O2					wat>1E-4				x		x	
O3			1E-4<P<0.1						x		x	
O4					10<P<30				x	x		x
O5						-5<T<+2			x	x		x
red												
R1									x	x		x
R2									x	x		x
R3									x	x		x
R4									x	x		x
R5*									x	x	x	x

Δp_h = pressure drop heater, 10 mbar ~ 250 Nm³/h argon gas, 30 mbar ~ 2500 Nm³/h

* for R5: any combination of 2 conditions of the 3 has to be true

if more than 1 sensor: analog = take average (autom. sensor disable in case of failure),
digital = both have to give alarm

Commissioning Plans

- finish last pipings
 - LAr filling line (this week)
 - water connection to LNGS cooling water
 - connection to LNGS ventilation (ordered)
- evacuate cryostat & another He leak test (start this week)
- fill cryostat with argon gas at some overpressure
- test behaviour of pressure control valves, adjust PI parameters (~ 2-3 days)
 - > ready for cool down + filling
- cool down + filling (3-4 weeks)
 - > ready for detectors
- test active cooling (4 weeks)