


# Update on Cryostat & Cryogenic Infrastructure



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# Corrosion of the cryostat

Reason for Bernhard being at LNGS  
where repair is in progress.

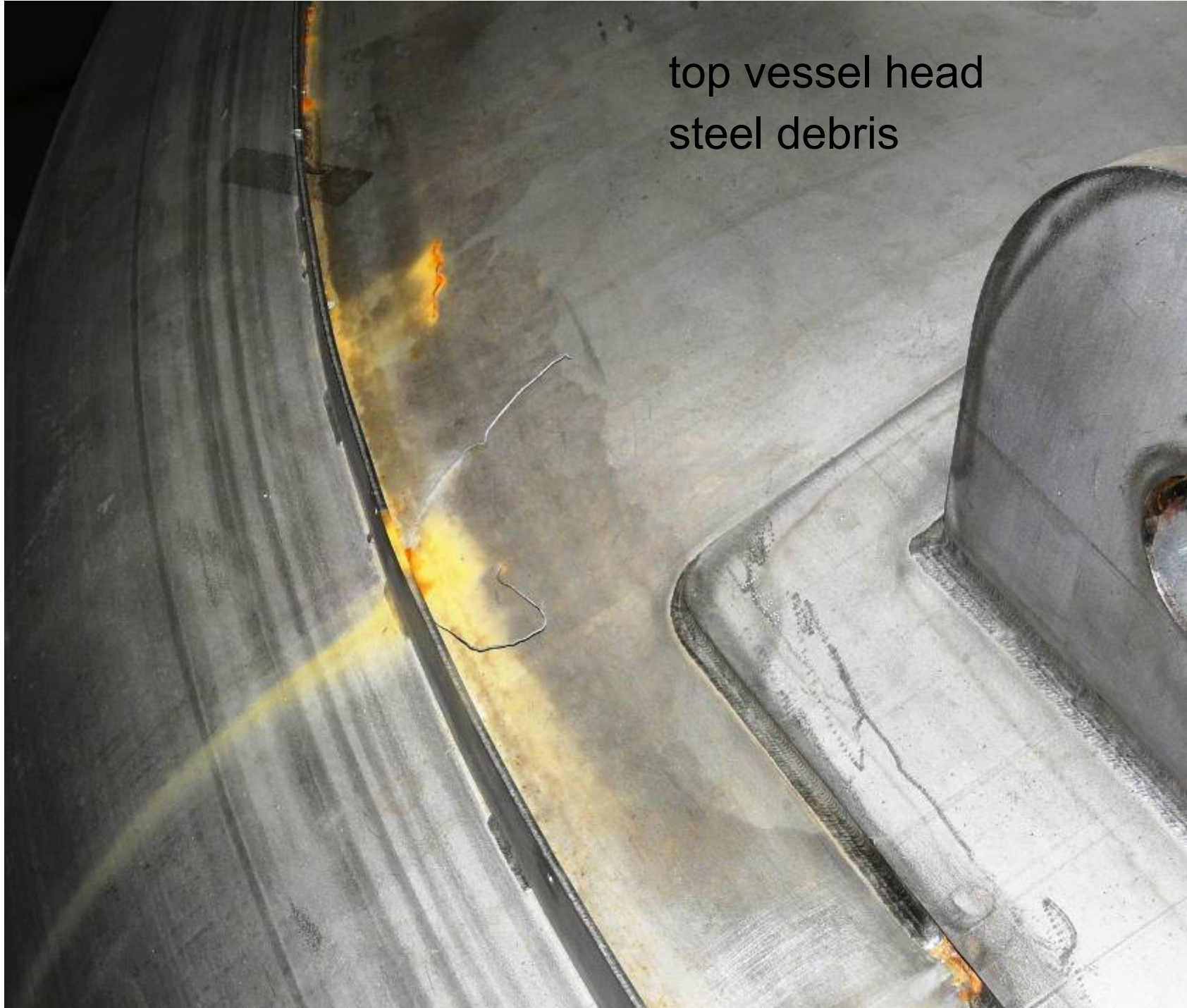
# Corrosion of the cryostat



top vessel head

steel debris

## Corrosion of the cryostat

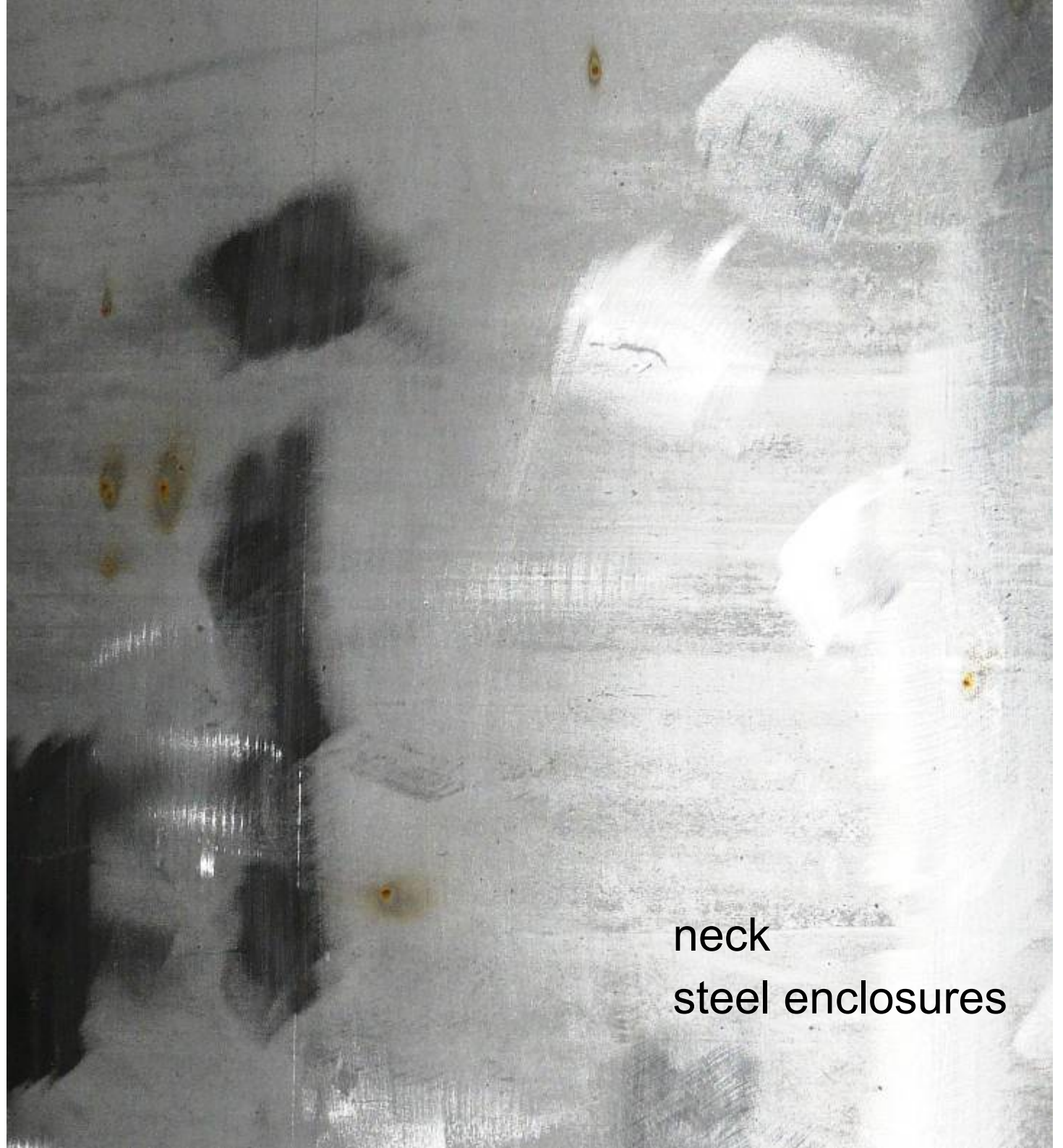


top vessel head  
steel debris

# Corrosion of the cryostat



# Corrosion of the cryostat

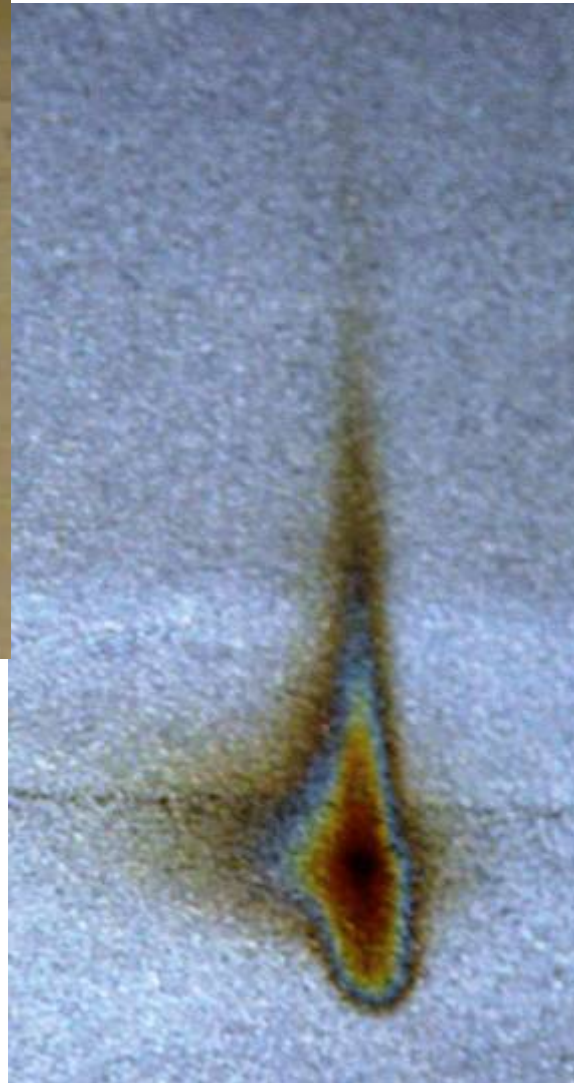


neck  
steel enclosures

# Corrosion of the cryostat



cylindrical shell  
steel enclosures



# Corrosion of the cryostat



weld  
poor pickling/passivation



## Corrosion of the cryostat



weld

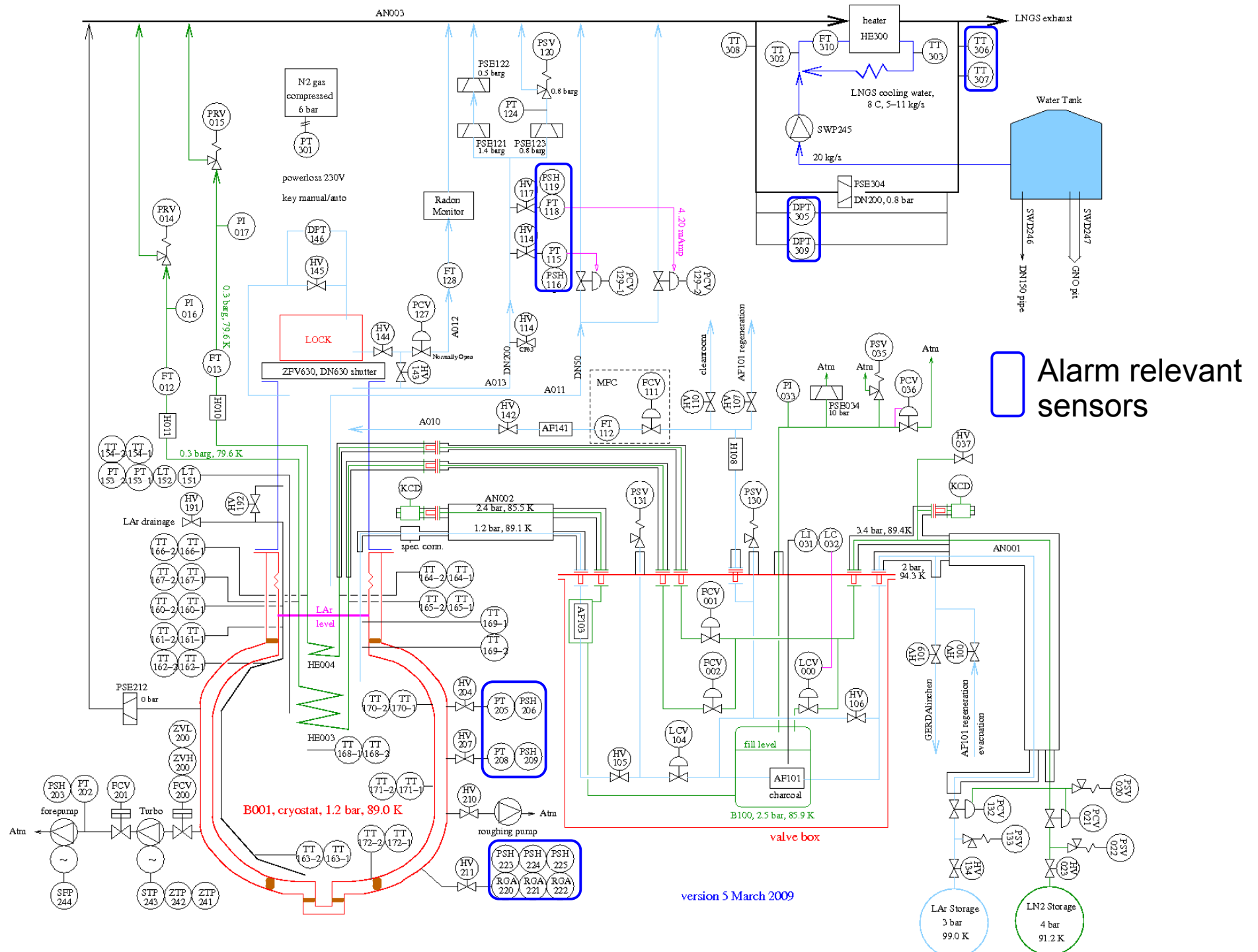
poor pickling/passivation

## Corrosion of the cryostat

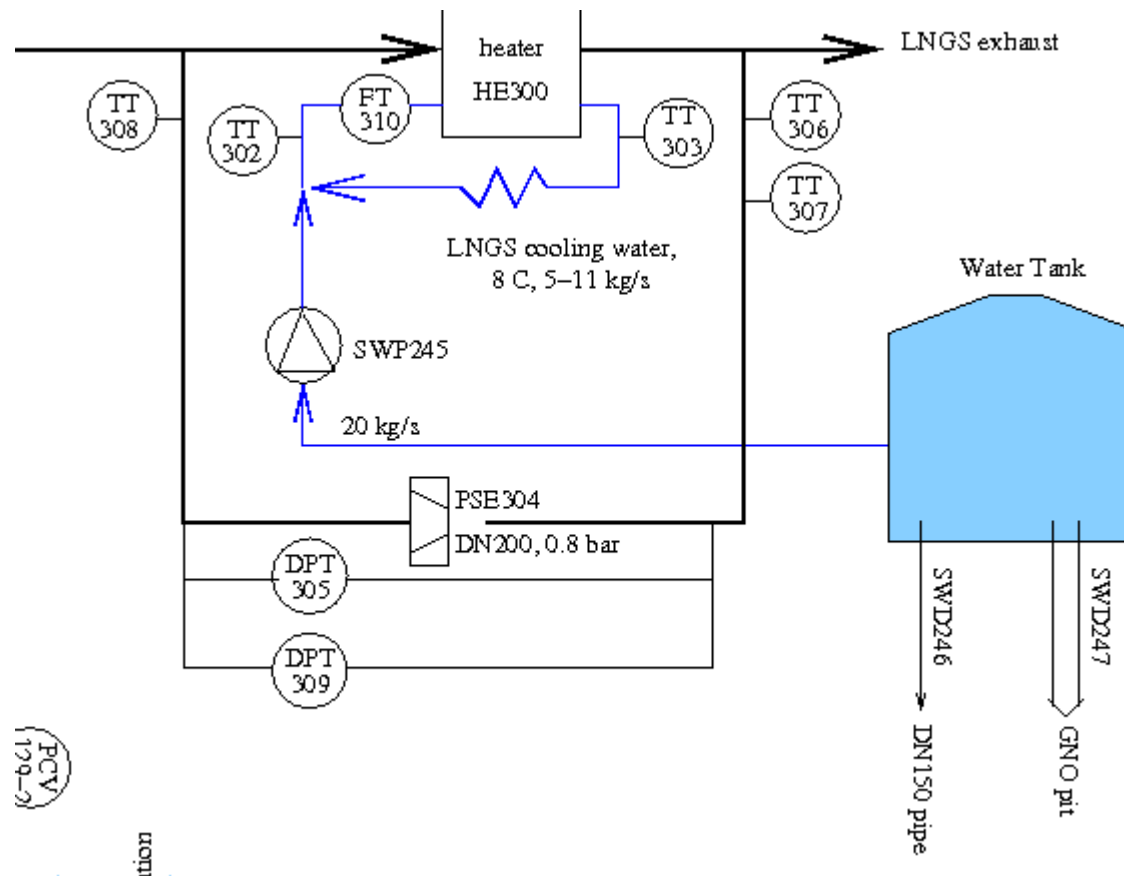


bottom vessel head  
poor pickling/passivation

# Latest Piping & Instrumentation Diagram



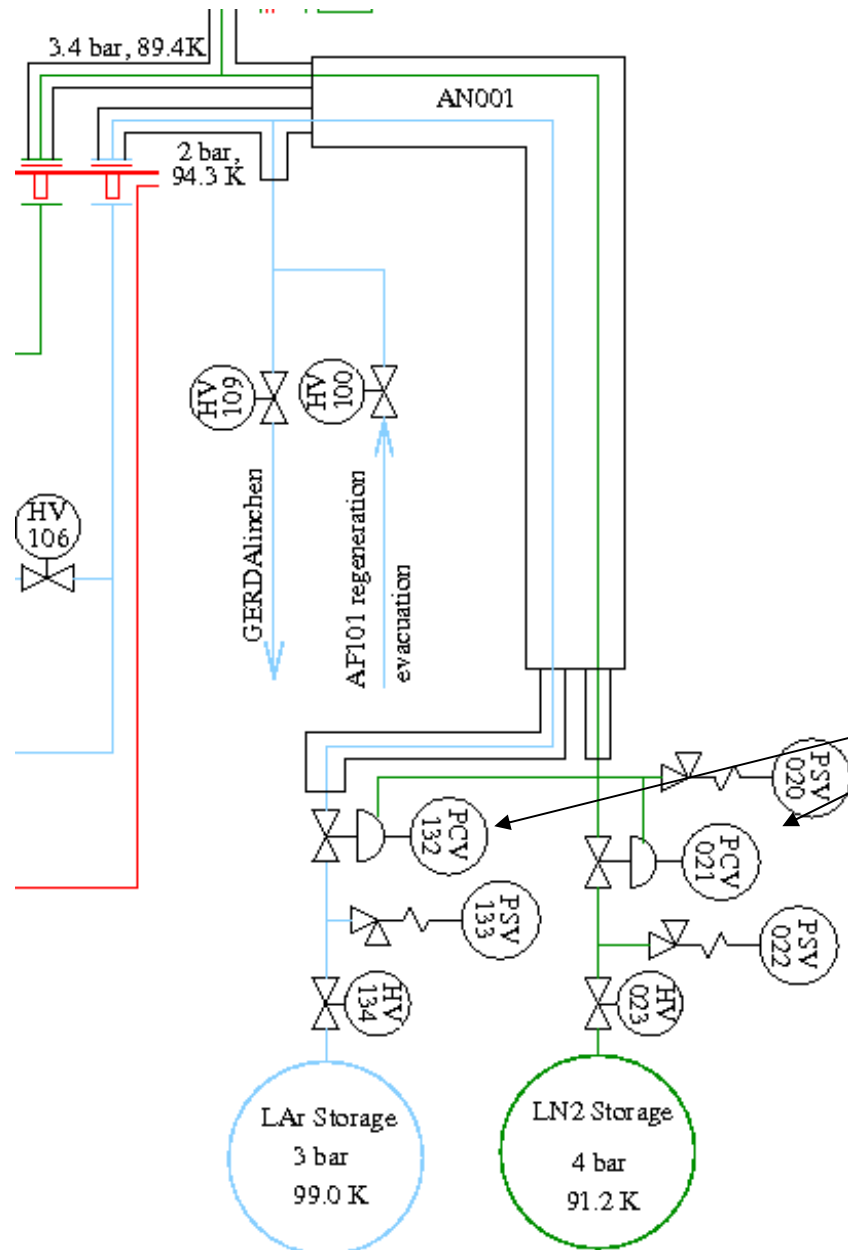
# Modifications: instrumentations for exhaust gas heater



- Added:
- 2 temperature sensors at heater output
  - 2 differential pressure sensors for rough measurement of gas flow rate
  - temperature sensors for cooling water
  - cooling water flow meter
  - water pump for heating by water from water tank
  - rupture disk in bypass of heater for the case of clogging

► Draft available on 'GERDA Alarm Levels and Corresponding Actions'

# Modifications: "Safety valves" for transfer line to cryostat

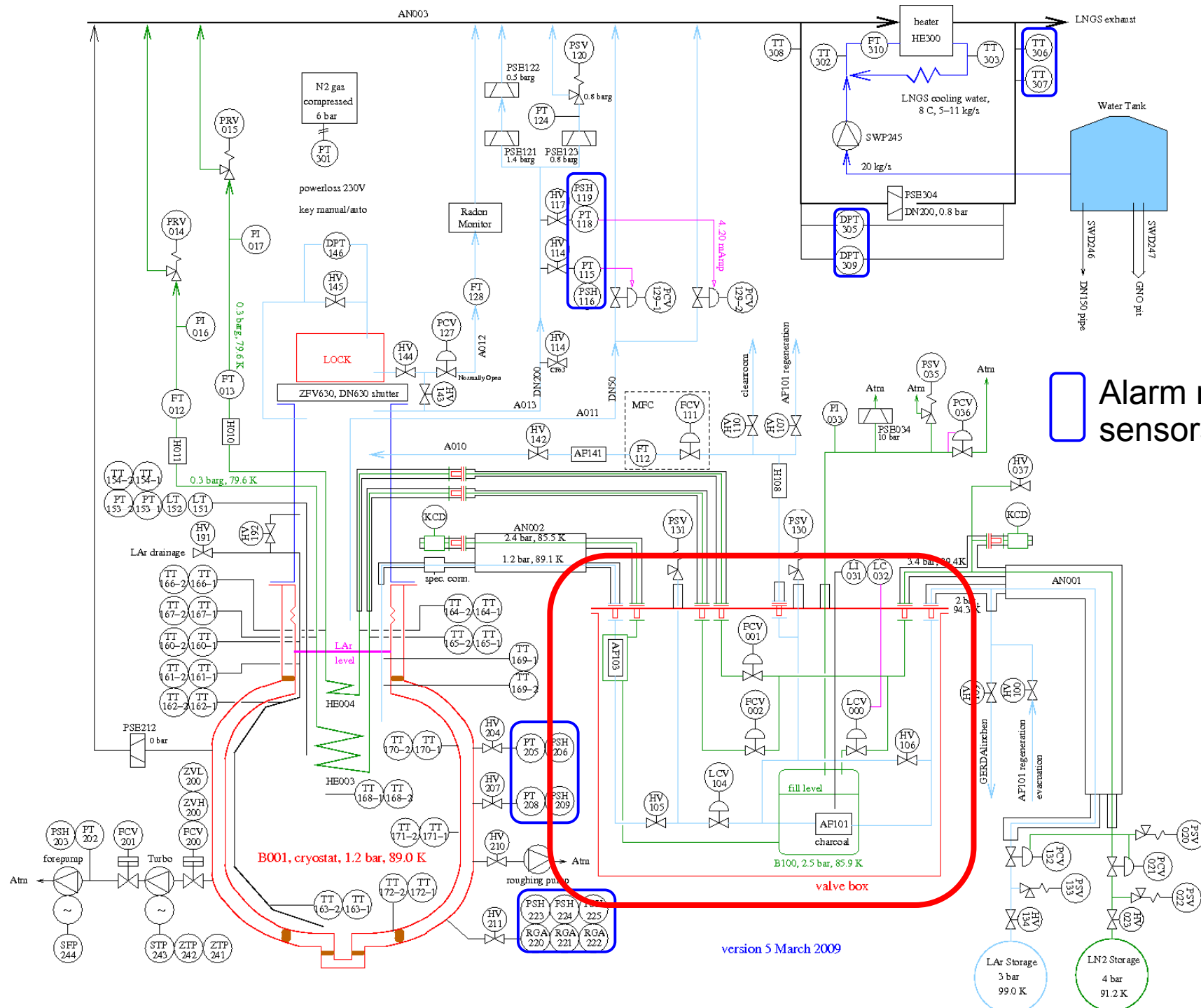



Added 2 pressure controlled valves  
- open if pressure in LN2 pipe high

In case of rupture of the tri-axial line  
- pressure in LN2 drops  
- both valves close

Status of hardware

# Latest Piping & Instrumentation Diagram



 Alarm relevant sensors

valve box

# Status of hardware

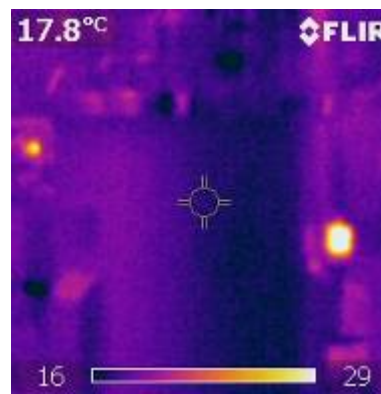
Valve box during Factory Acceptance Test



PTFE Filter



InfraRed pictures of  
body of cold valve box Johnston connection

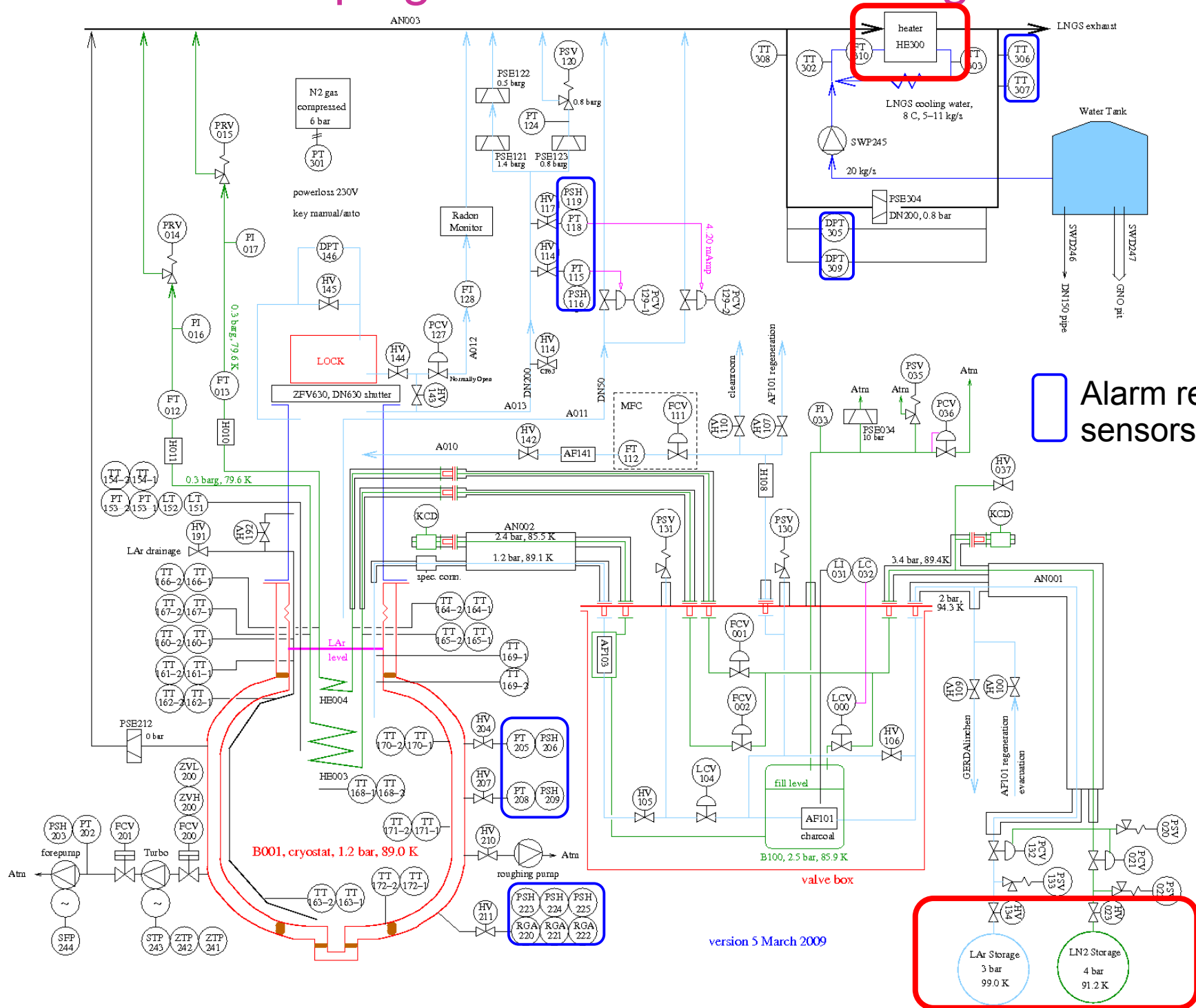




# Valve box + cryogenic pipes at LNGS



# Latest Piping & Instrumentation Diagram



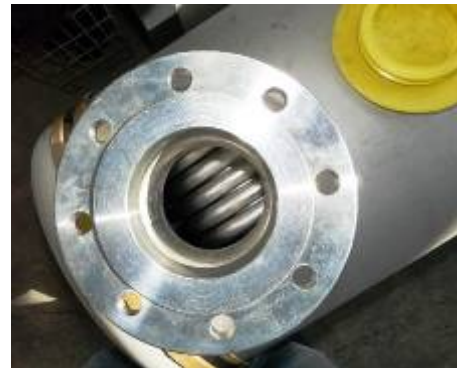
exhaust gas heater

Alarm relevant sensors

storage tanks

version 5 March 2009

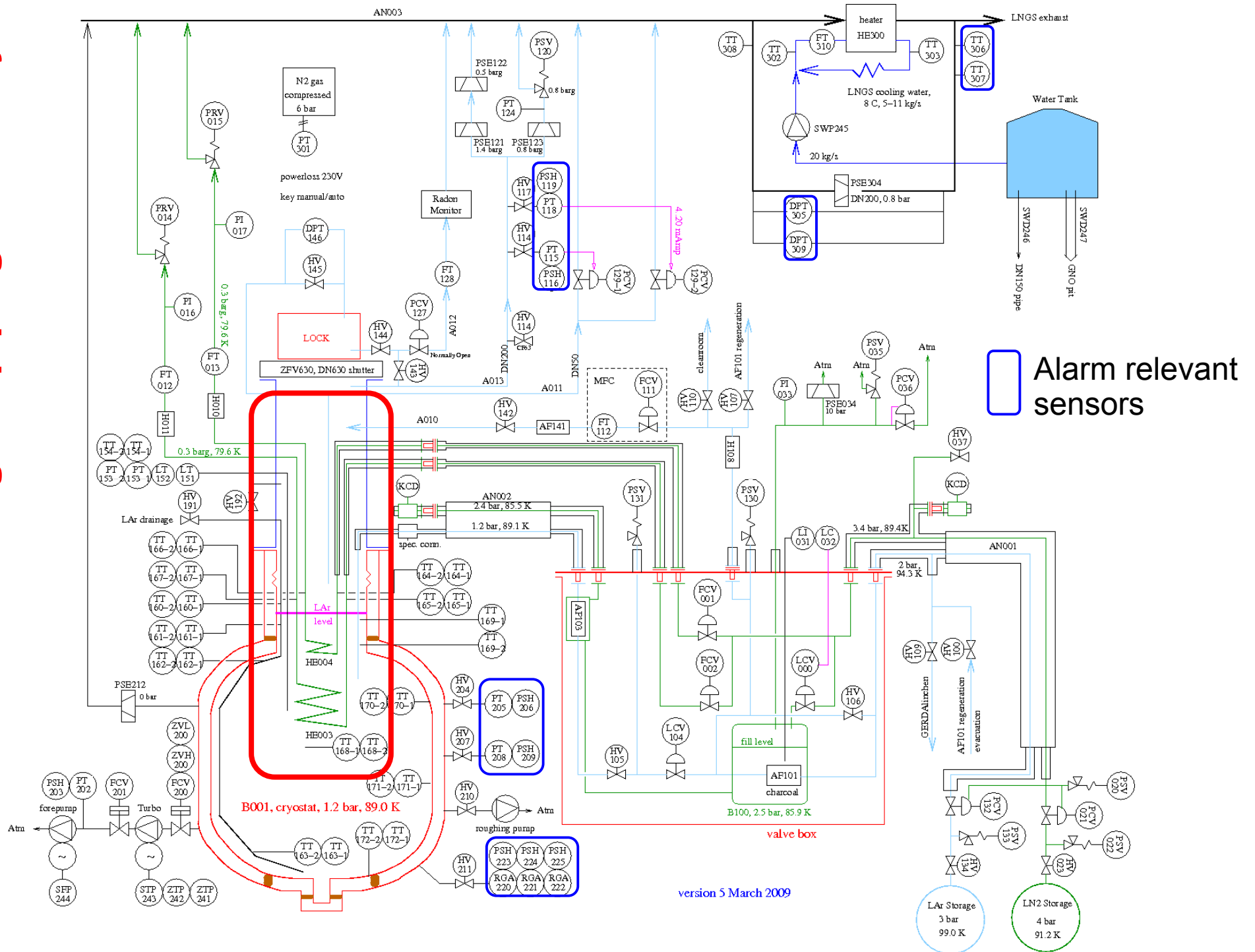
# Storage tanks + exhaust gas heater



storage tanks in place - heater delivered

# manifold, heatexchangers, piping inside cryostat

# Latest Piping & Instrumentation Diagram



# “Piping inside cryostat”

Test installation in Heidelberg

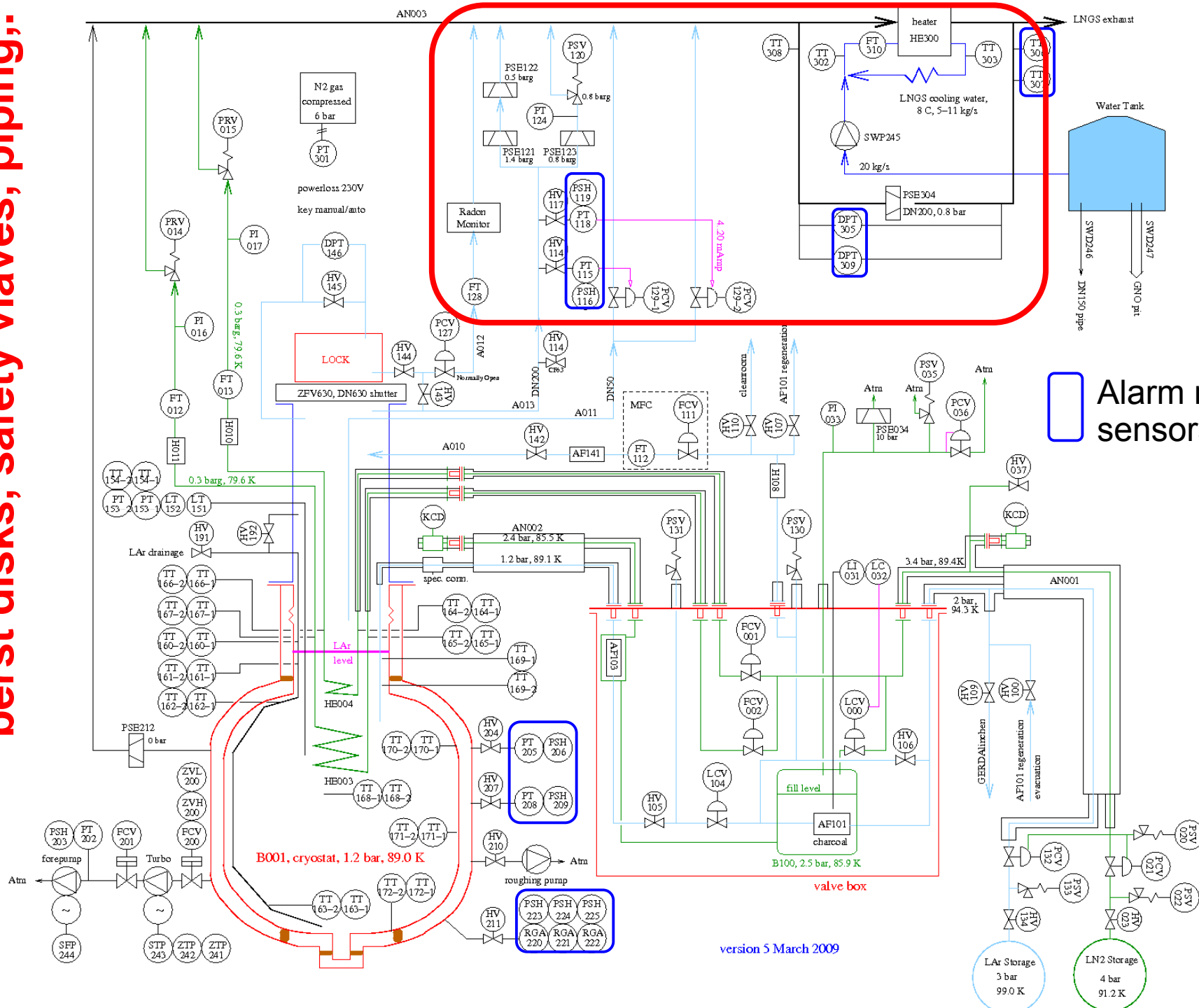


Missing: shroud to keep Rn away from crystal array



# Latest Piping & Instrumentation Diagram

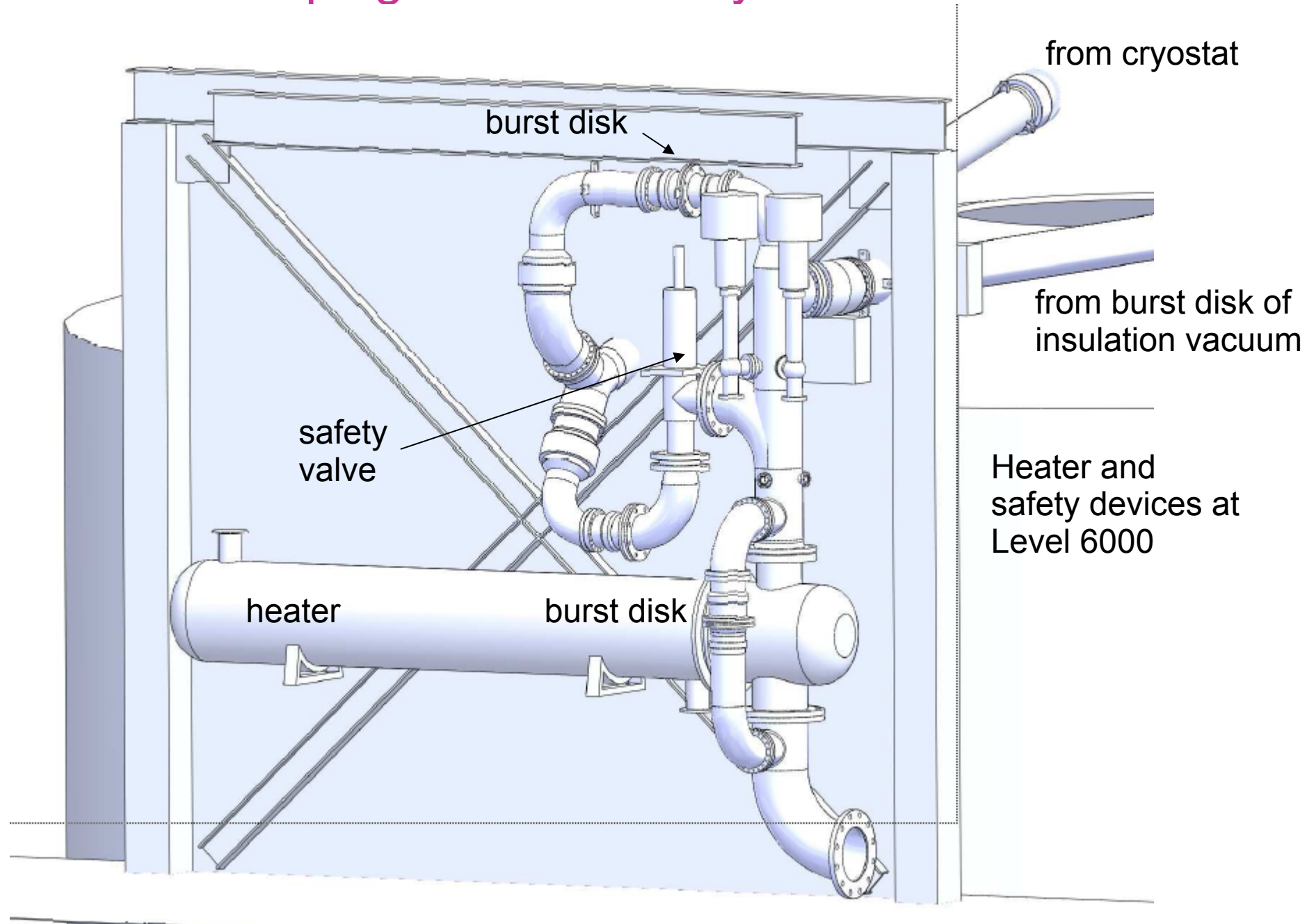
burst disks, safety valves, piping,-



Alarm relevant sensors

version 5 March 2009

# “Piping outside the cryostat”



**Design is practically finished, parts are ordered, welding of most parts by Uni Dresden**

# PLC status

PLC at MPI Heidelberg



First version of PLC program available:  
- tests in HD as far as possible completed  
- WEB server running on PLC too slow,

modification:  
get PLC data via TCP/IP and program  
WEB server on PC

Future modification of PLC program  
- safety logic + I/O after discussion in GERDA  
- MODBUS communication to LNGS safety

Commissioning at LNGS by anapur



## Schedule + Summary

- surprisingly large corrosion on cryostat:  
reasons: (1) debris from works on platform  
(2) carbon steel enclosures  
(3) insufficient pickling & passivation  
(4) scratches  
(5) debris in water or moved by water from bottom of WT to cryostat  
treatment = grinding + pickling + passivation
  - cryogenic pipes + valves box will be installed in week 12 by DeMaCo
  - storage tanks installed - exhaust gas heater waiting for installation
  - PLC ready for commissioning at LNGS
  - other piping ready for installation middle/end of April
  - mechanical shroud design for Rn shielding still to be tested (end of March)
- final installation after clean room is available, time estimate = 4 weeks,  
start filling of cryostat end of June?
- installation further improved w.r.t. safety
  - draft available on 'GERDA Alarm Levels and Corresponding Actions'