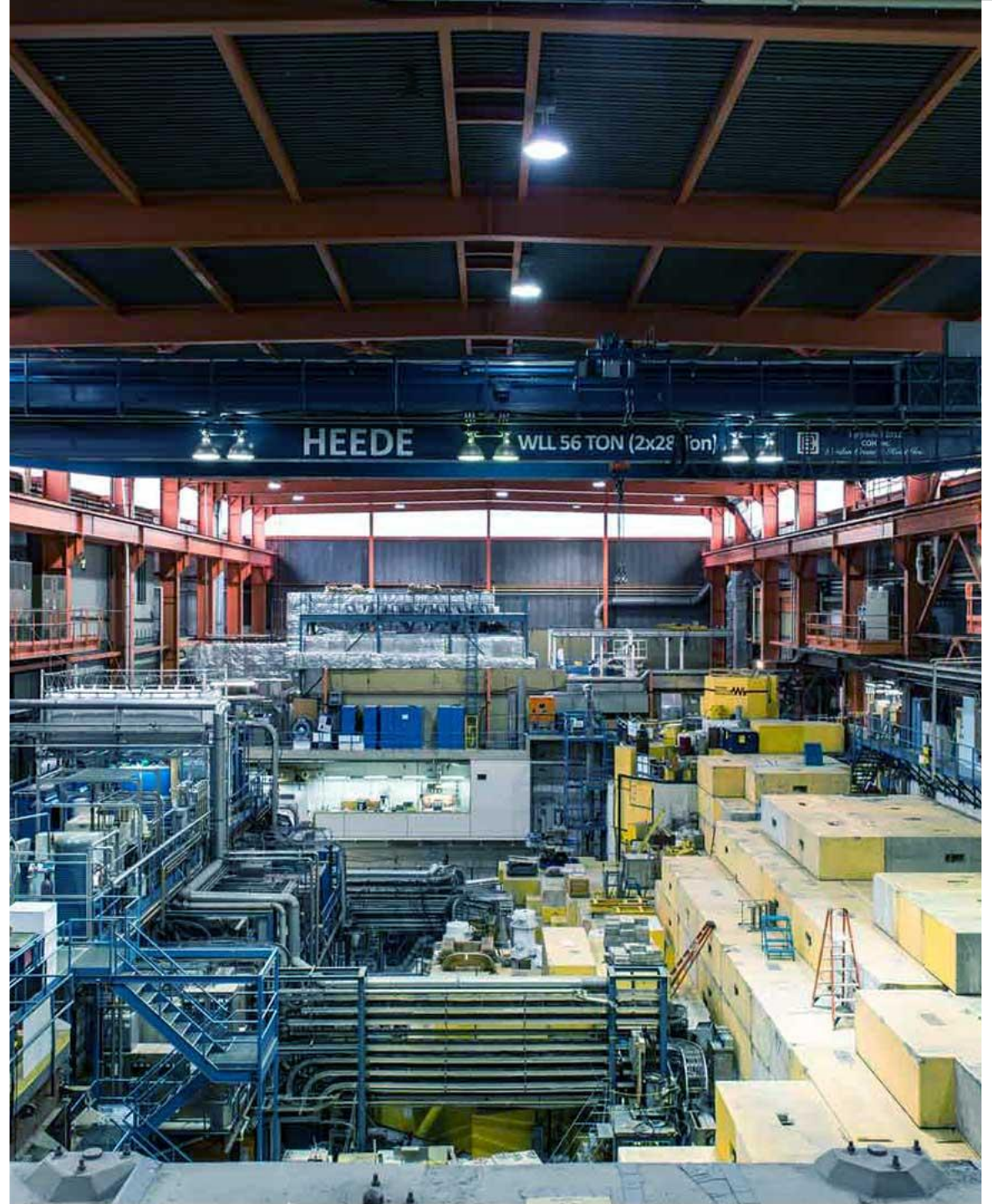


# UCN controls update & shutdown work 2018

Florian Kuchler

Aug 8<sup>th</sup> 2018 - TUCAN collaboration meeting

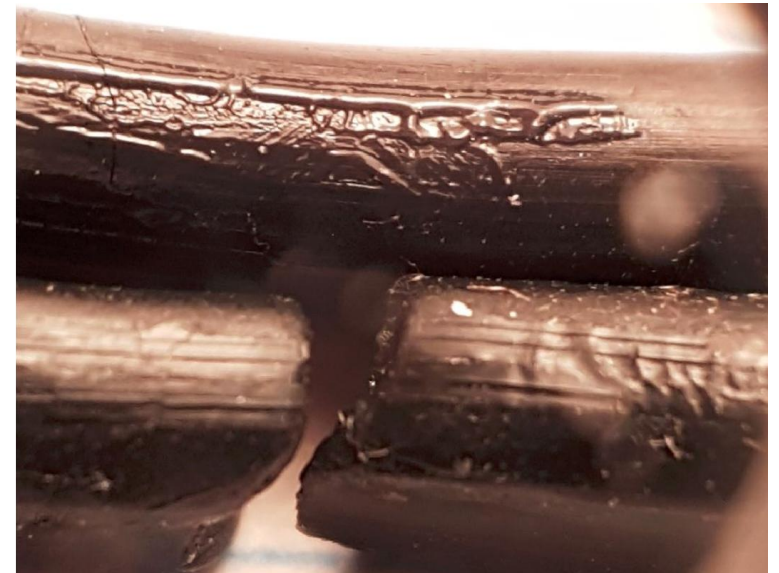
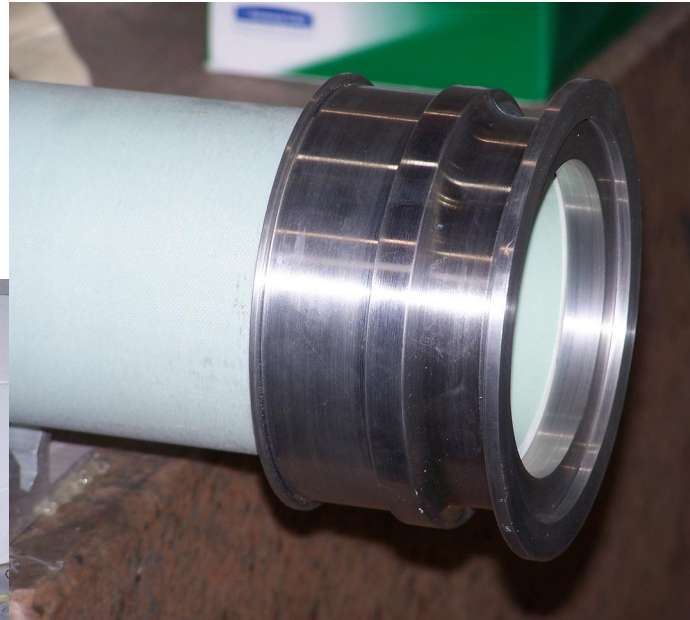


# UCN controls update/shutdown work

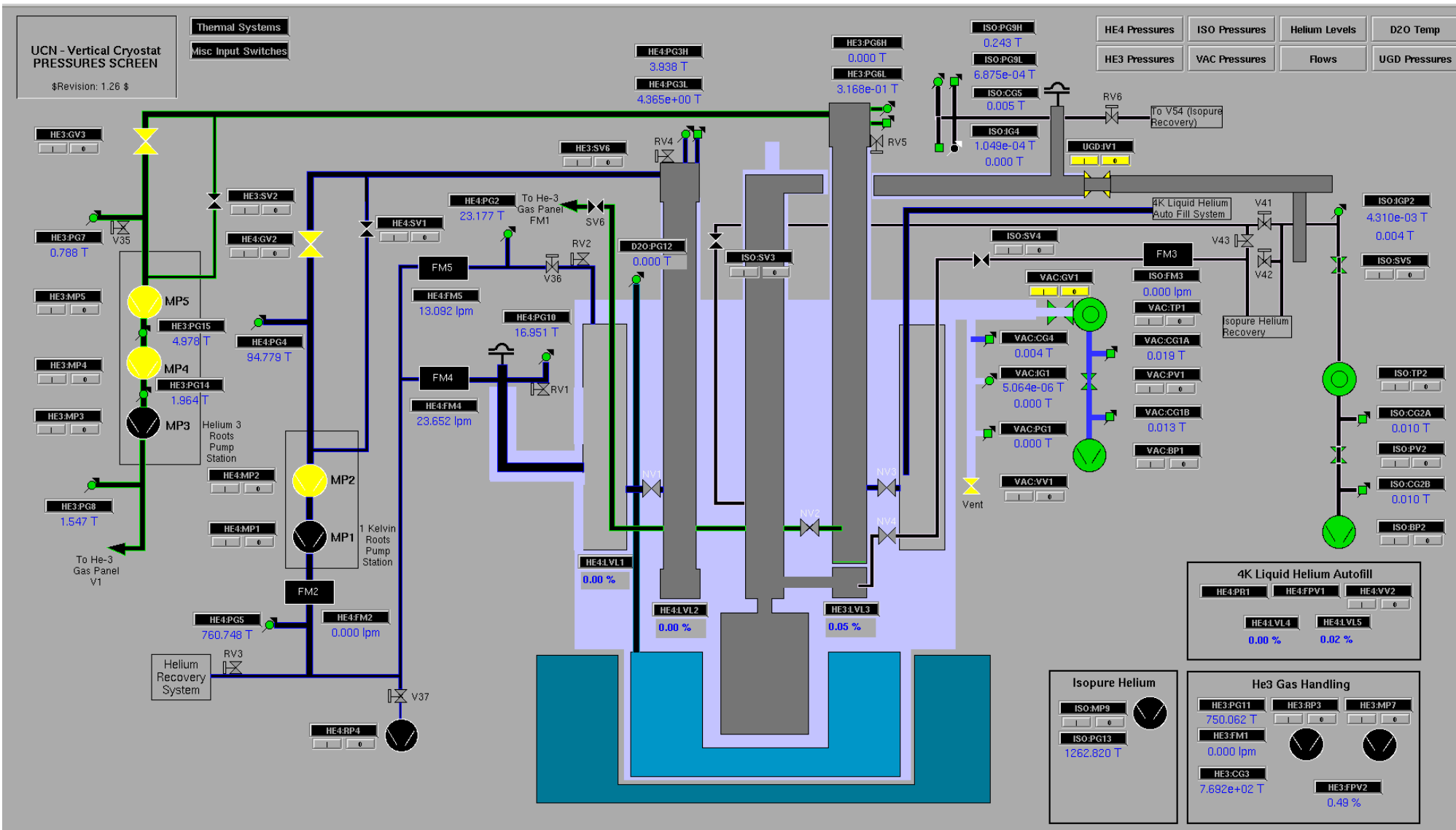
- UCN kicker tube replacement
- UCN source replaced devices, eg.
  - full-range vacuum gauges
  - 1K pot liquid level probe
  - valve btw He-II volume and isopure tank: now normally open
  - new heaters on He recovery lines
- UCN source added devices
  - pressure sensors between 3He pumps (MP3,4,5)
  - conductance control valve in 3He system
  - Flow controller for isopure filling
- Improved resolution of temperature sensor readout ~1mK
- UCN guide re-arranged and upgraded heaters

# UCN kicker tube replacement

- O-Ring seal failure
- Concerns about glasstube has high risk of breaking cyclotron catastrophically
- Two pieces of G10 tubes glued together
- Aluminium flanges glued to G10
- Vacuum tested
- Spares available

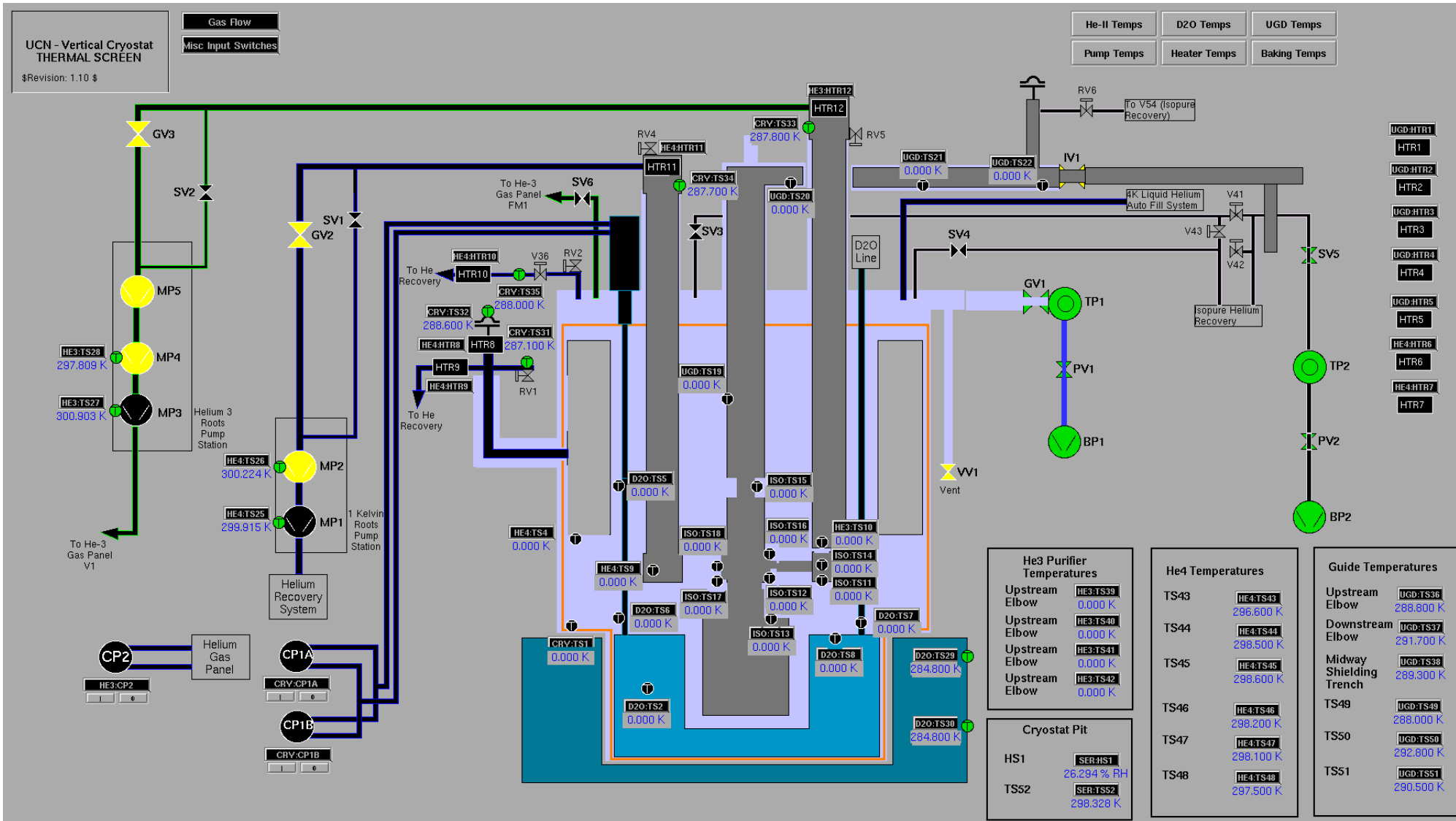


# UCN source control system



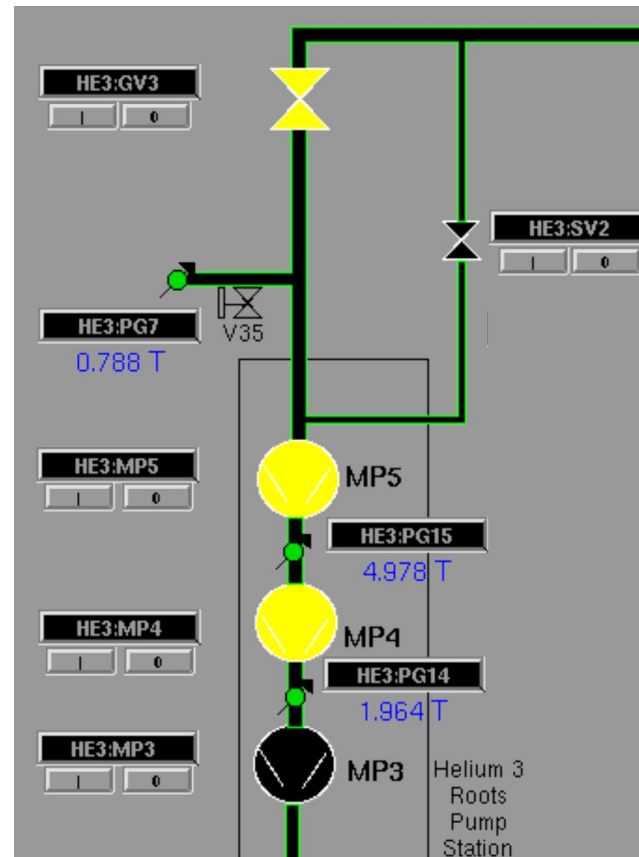
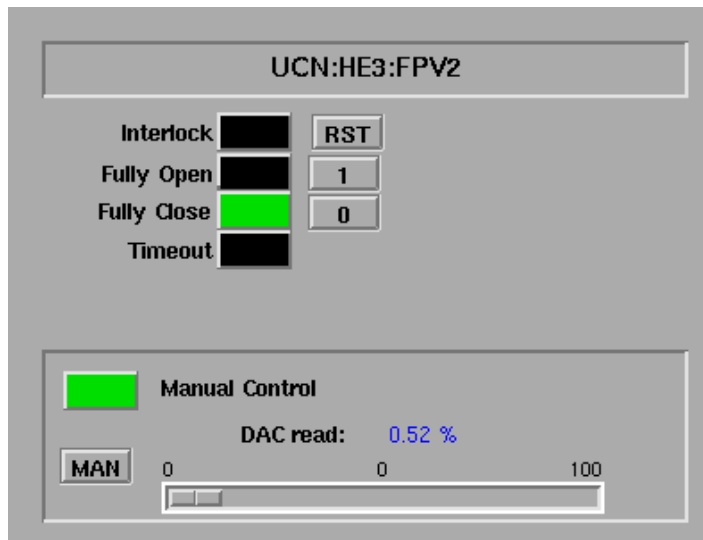
- 16 pressure gauges
- 14 valves
- 13 pumps
- 3 LHe levels
- 51 temperature sensors
- 12 heater channels
- 11 flow meters
- 3 cold-head compressors

# UCN source control system - Thermal



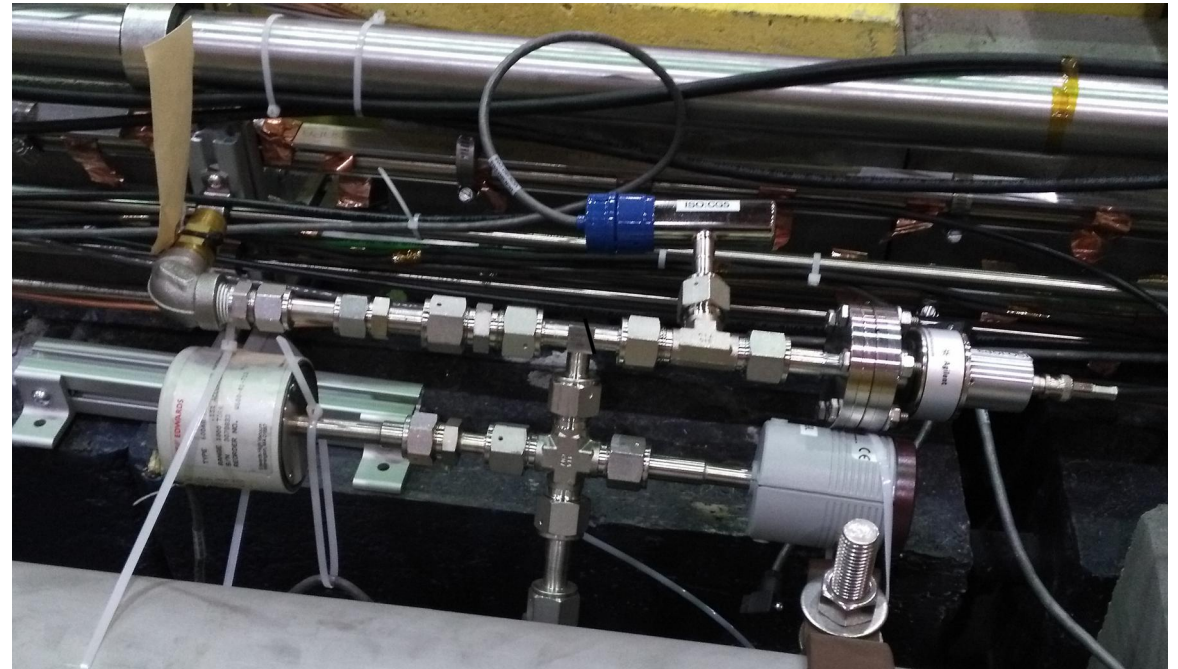
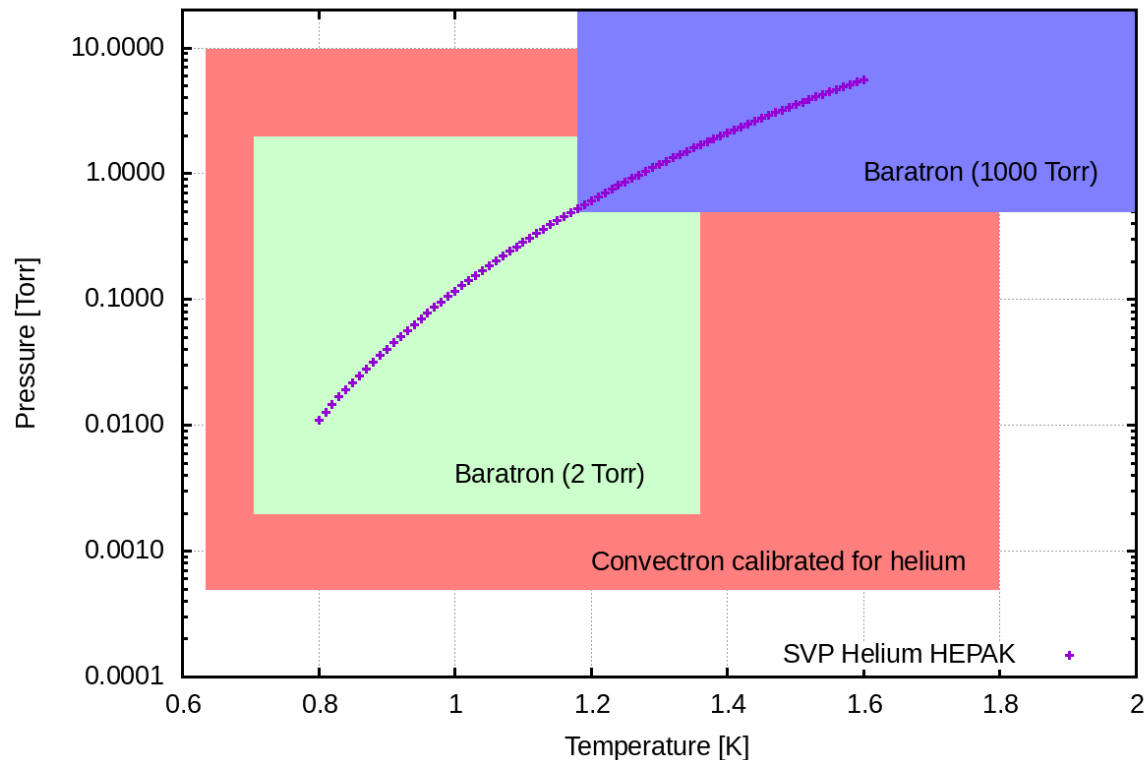
# UCN source control system – $^3\text{He}$ conductance control

- He-II at 0.84 K pumping through GV3
- He-II at 0.95 K pumping through KF25 bypass
- added conductance control valve for He-II temperature control
- larger diameter bypass (KF40 vs KF25)
- better control of He-II temperature via He3 flow



# UCN source control system – UCN guide/He-II pressure gauges

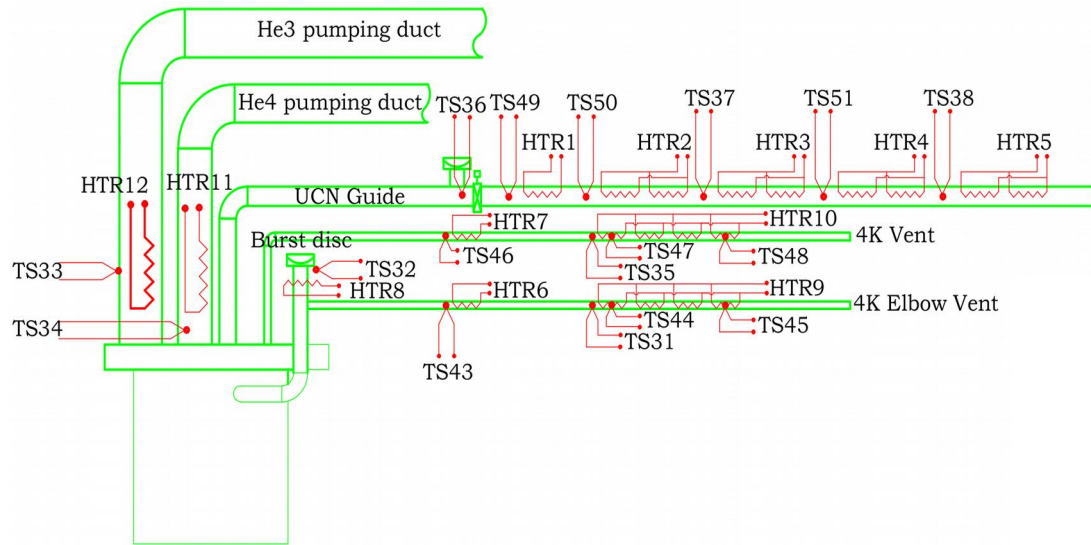
- $1e-7$  to  $1e-3$  Torr Cold-cathode
- $2e-3$  to 2 Torr Baratron
- 1 to 1000 Torr Baratron
- $1e-3$  to 1000 Torr Convector (Air/He)



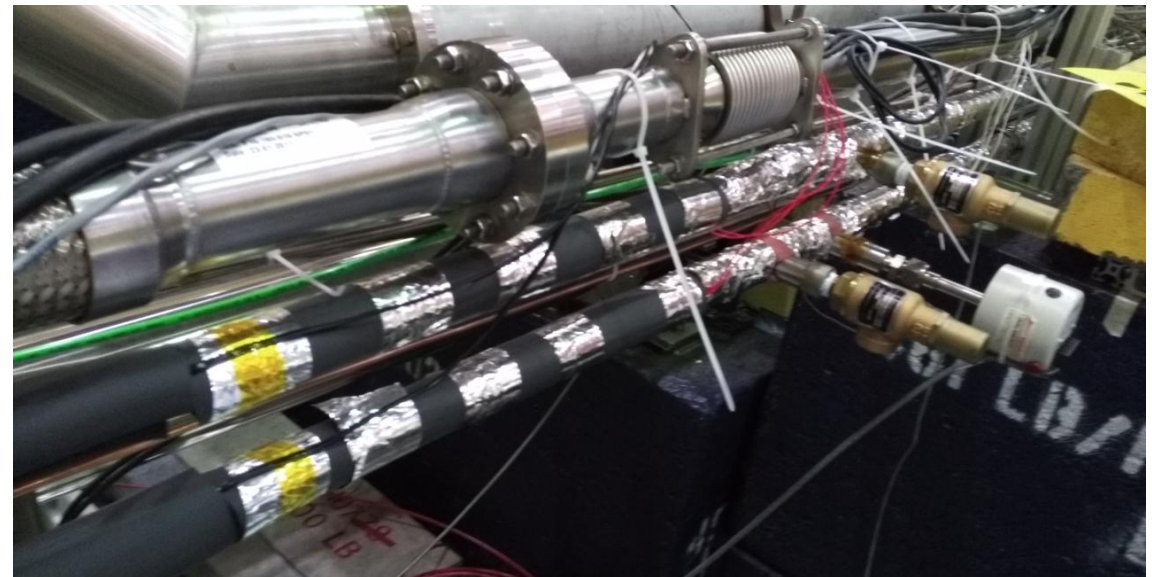
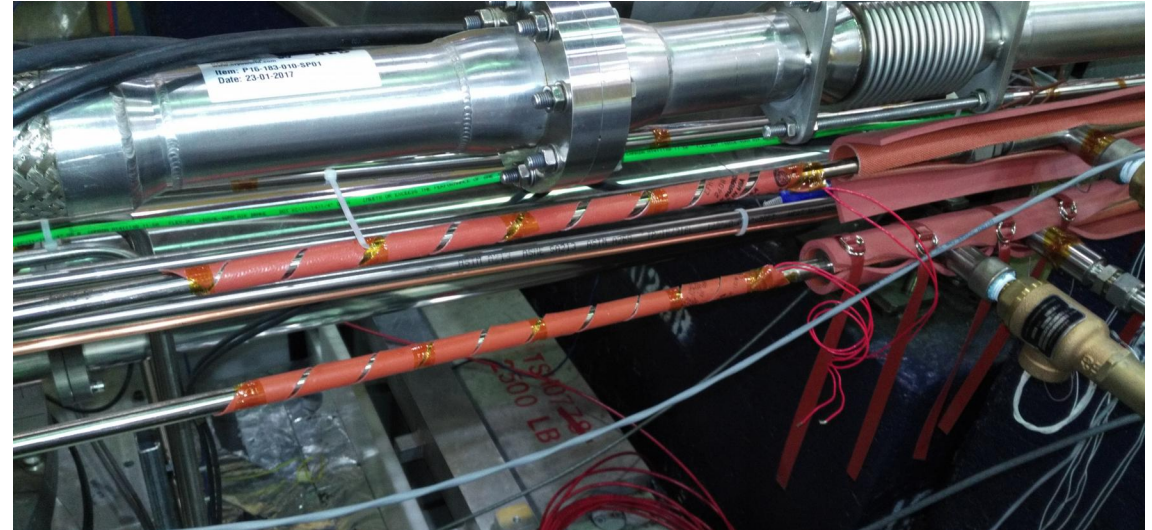
- more reliable vacuum measurements
- pressure measurement of He-II in UCN bottle during operation

# UCN source control system – Helium recovery heaters

- silicone heating jackets incl. foam insulation
- improved efficiency
- avoid freezing of lines and flow meters
- four thermocouples on each line
- ease of operation for shift crew



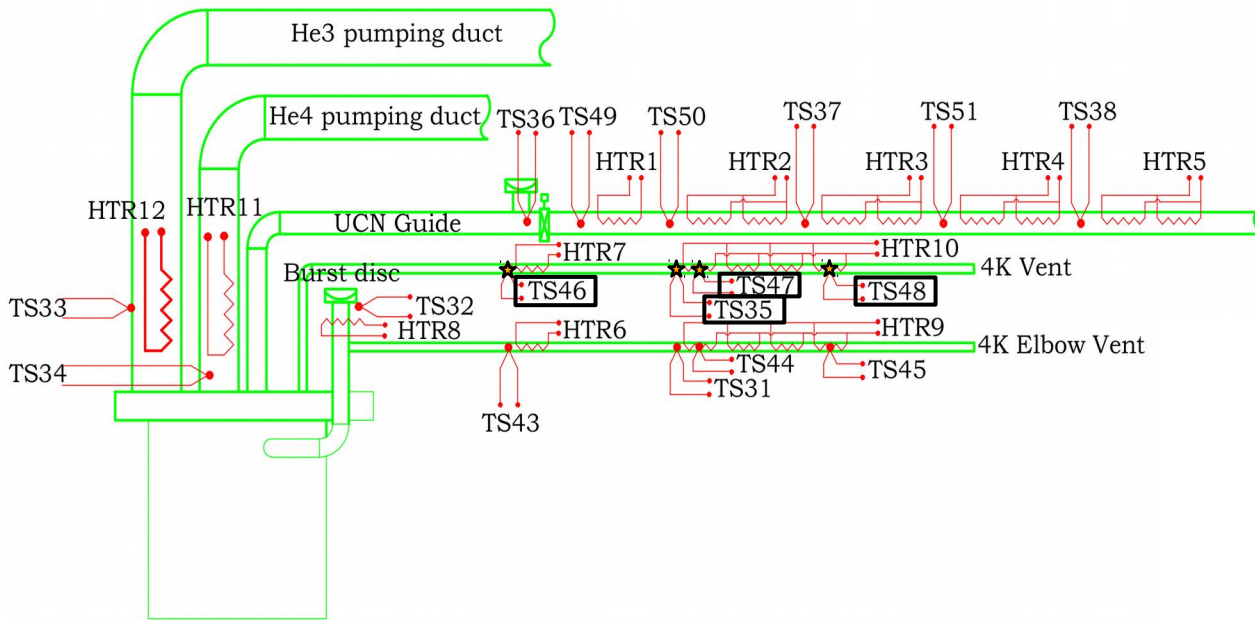
Vertical Source Cryostat



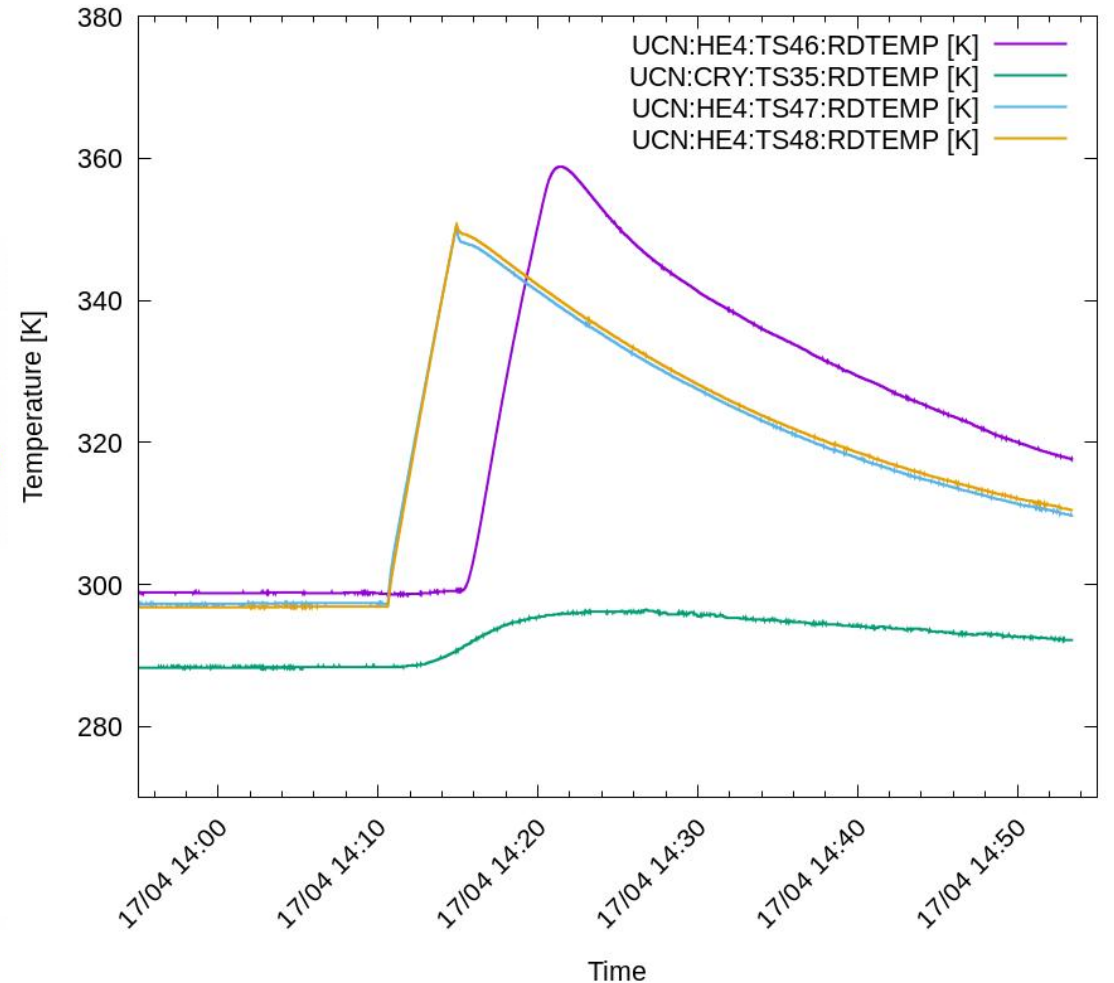


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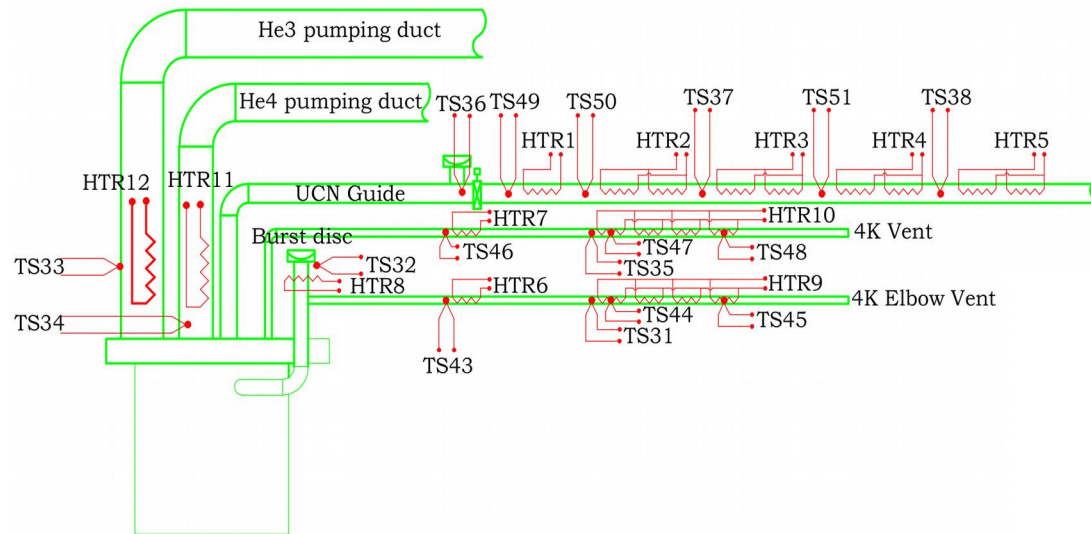


Test data of heater jacket on 4K vent

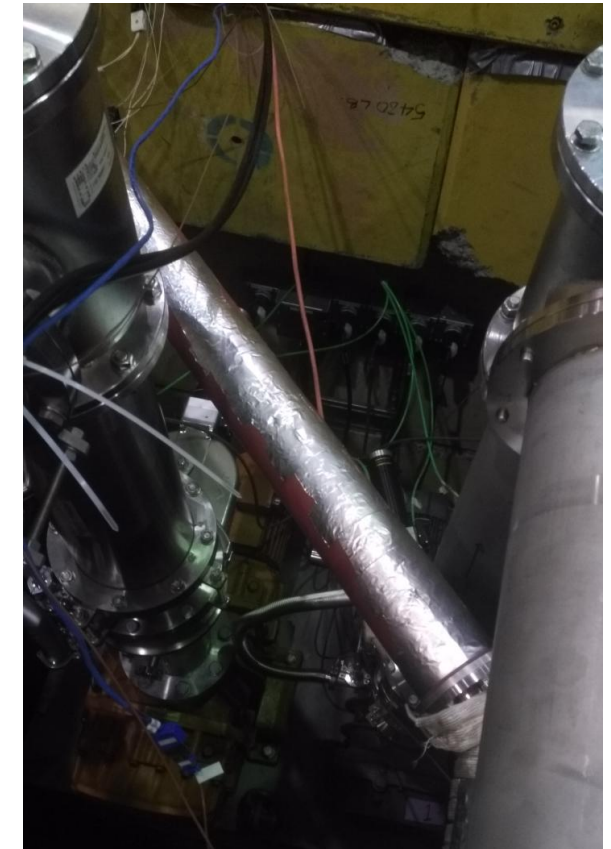


# UCN source control system – UCN guide heaters

- heater jackets fitting the UCN guides
- improved baking, less cold spots
- implemented in UCN source controls
- six thermocouples
- higher vacuum quality



Vertical Source Cryostat



Thank you  
Merci

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