2022 Projects Update

QIANG (ALAN) YE
SEPTEMBER, 2022

List of activities

Safety/Lifting documents
- Big Blue cryostat, SD55 cryostat, Oxford Dilution Refrigerator Insert - close to finish
- All five superconducting magnets (3T, 7T, 9T, 10T, 11T, 15T) – testing the manuals
- Need to get Experimental Control Procedures (ECP) documents done

Cross training with other staff member
- Cross training 9T with Cedric and Donna from 7/5-7/15. – finished!

Procurements
- New compressors for HFBS and NSE TLCCR
- 9T repair and 15T maintenance

Maintenance of equipments
- **9T**: 4G-150 power supply fixed. Found short between the terminals and ground ~300 Ohm at room T. Now getting quotes from Cryogenic Limited.
- **10T**: New lakeshore 336 installed. Installing a smaller LN2 trap in the helium circulation loop for future automatic liquid nitrogen refill, will assemble everything and start a new test. Getting quote of a new TLCCR inside 10T.
- **15T**: Working fine during last test. Oxford will fix the lambda fridge pumping line, repair the loose current leads, leak test everything and replace the old magnet power supply with newer mercury version. AMD processing.
- **SANS orange cryostat** indium seals replacement
- Test **automatic gas loading cart** with Juscelino on different beamlines, BT1, HFBS, SANS…
- New **LIPPS** Labview program after a new control box made by Juscelino – finished!

List of activities - continued

Specialty projects

◦ Labview **automatic NV control** with Yegor – finished!

◦ A setup to **combine Orange cryostat with Titan magnet** so users are able to reach below 2K in Titan magnet – finished!

◦ Design and make new **silicon tail** for Candor CCR – finished!

◦ Get labview to work under **Linux** system so that it can be used like a compactRIO

◦ Sergiy's low T **goniometer communication** with NICE

◦ **3-syringe-pump** system programming

◦ **Time stamping** of the SE equipments using compactRIO, everything working, server/client, automatically detect COM ports

Misc.

◦ plug-and- play SE with Krzywon, Maliszewskyj and Peter Beaucage.

◦ Keep reviewing new 7T/12T drawings

◦ Help Mads to get the potentiostat working on the CCR and programming – finished!

◦ Work with Rebecca Dally to design sample holders – finished!

◦ Successfully established communication between Eurotherm 2404 temperature controllers and PC using modbus – finished!

◦ Keep updating all sample environment webpages including all equipments in all the labs

◦ New compressors for HFBS and NSE TLCCR waiting to be installed and tested

◦ Remote control of compressors at PBR

◦ Labview version controls and documentations.

Safety/Lifting documents

◦ Big Blue cryostat, SD55 cryostat, Oxford Dilution Refrigerator Insert

◦ All five superconducting magnets (3T, 7T, 9T, 10T, 11T, 15T) – testing the manuals

◦ Need to get Experimental Control Procedures (ECP) documents done

Cross training with other staff member

◦ Cross training 9T with Cedric and Donna in July, 2022

◦ Successfully cool down the 9T to 4K.

◦ Labview control programs

Procurements

◦ New compressors for HFBS and NSE TLCCR
◦ Will test them ASAP

◦ 9T repair – processing
◦ 15T maintenance – processing

Maintenance of equipments

- **9T** 4G-150 power supply fixed. Found short between the terminals and ground ~300 Ohm at room T. Now getting quotes from Cryogenic Limited.
- **10T** New lakeshore 336 installed. Installing a smaller LN2 trap in the helium circulation loop for future automatic liquid nitrogen refill, will assemble everything and start a new test. Getting quote of a new TLCCR inside 10T.
- **15T** Working fine during last test. Oxford will fix the lambda fridge pumping line, repair the loose current leads, leak test everything and replace the old magnet power supply with newer mercury version. AMD processing.
- **SANS orange cryostat** indium seals replacement
- Test **automatic gas loading carts** with Juscelino on different beamlines, BT1, HFBS, SANS…
- New **LIPPS Labview** program after a new control box made by Juscelino – finished!

Maintenance of equipments

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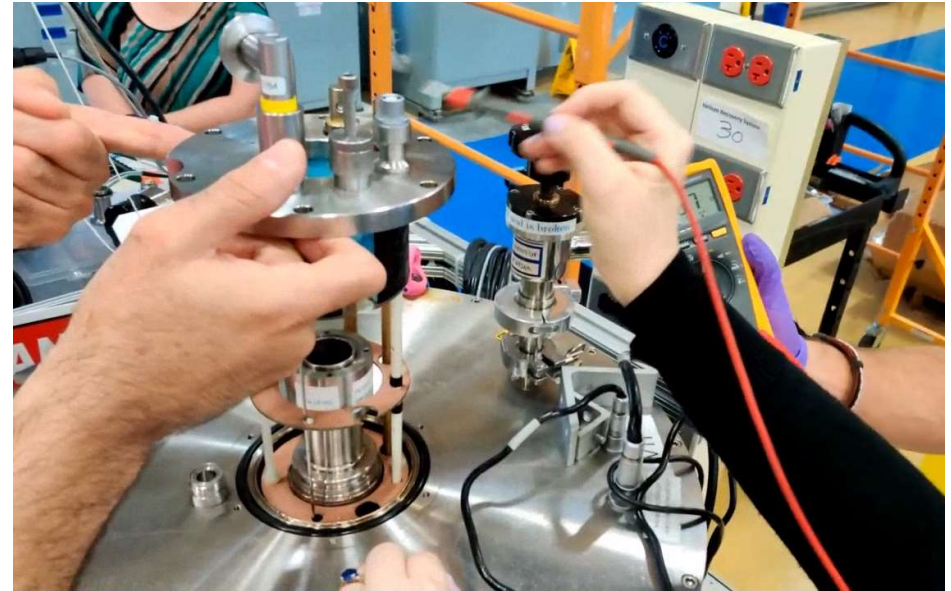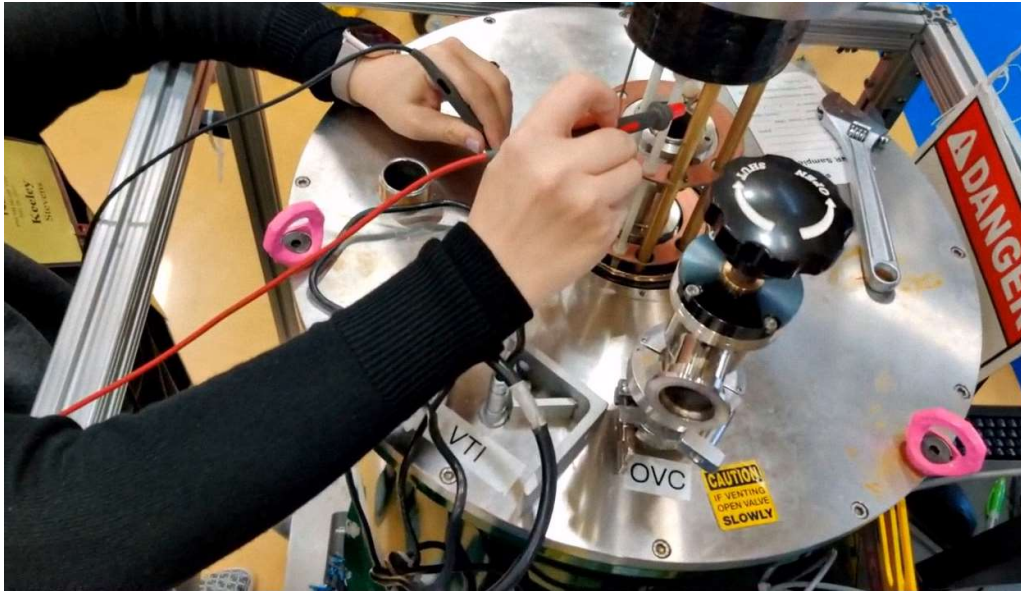
Maintenance of equipments

◦ **10T** New lakeshore 336 installed.

◦ Installing a smaller LN2 trap with a bigger opening in the helium circulation loop for future automatic liquid nitrogen refill

◦ Will assemble everything and start a new test

◦ Getting quote of a new TLCCR inside 10T.
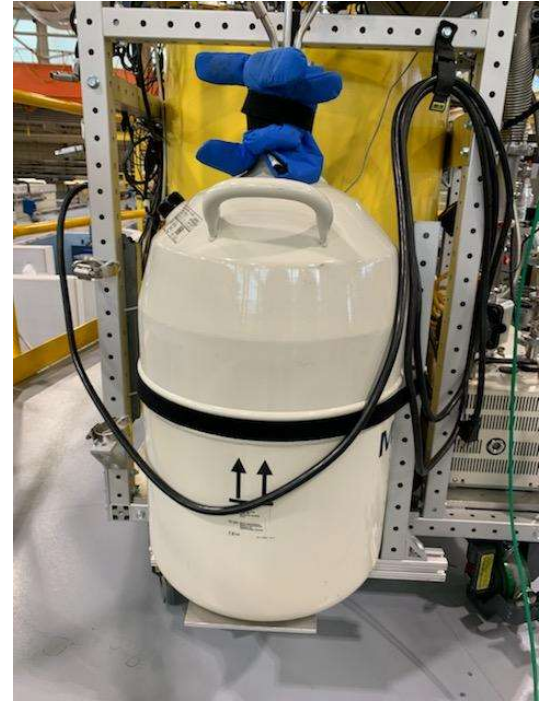
Maintenance of equipments – 15T

- Working fine during last test in February, 2022
  Tvti=1.50K, Tsample=1.51K
  B field ramp up to 14T and back to zero.
- Oxford will fix the lambda fridge pumping line
- Repair the loose current leads
- Leak test everything
- Replace the old magnet power supply IPS120-10 with the new mercury PS
- AMD processing

Maintenance of equipments – SANS OC

◦ SANS orange cryostat indium seals replacement
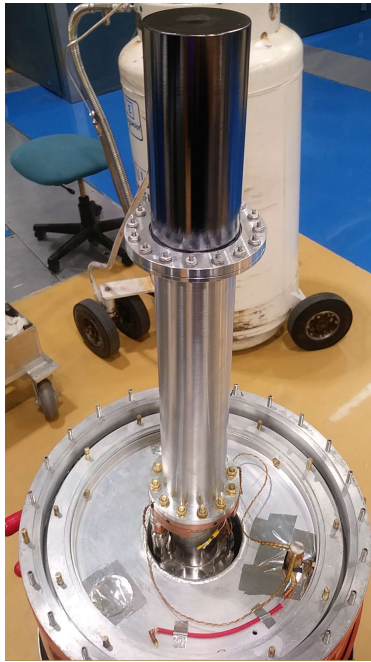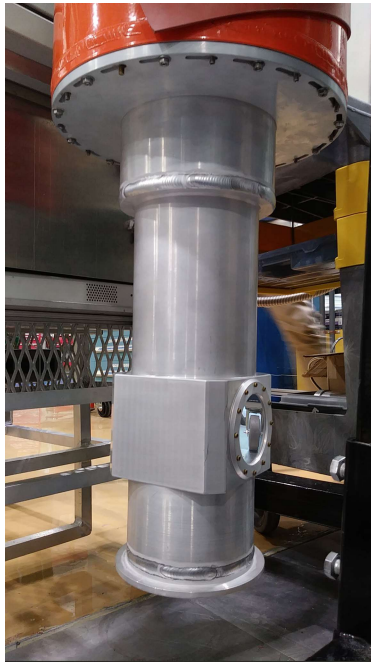
Maintenance of equipments – Gas Loading Carts

◦ Working with Juscelino to test the automatic gas loading carts on BT1, HFBS, SANS…
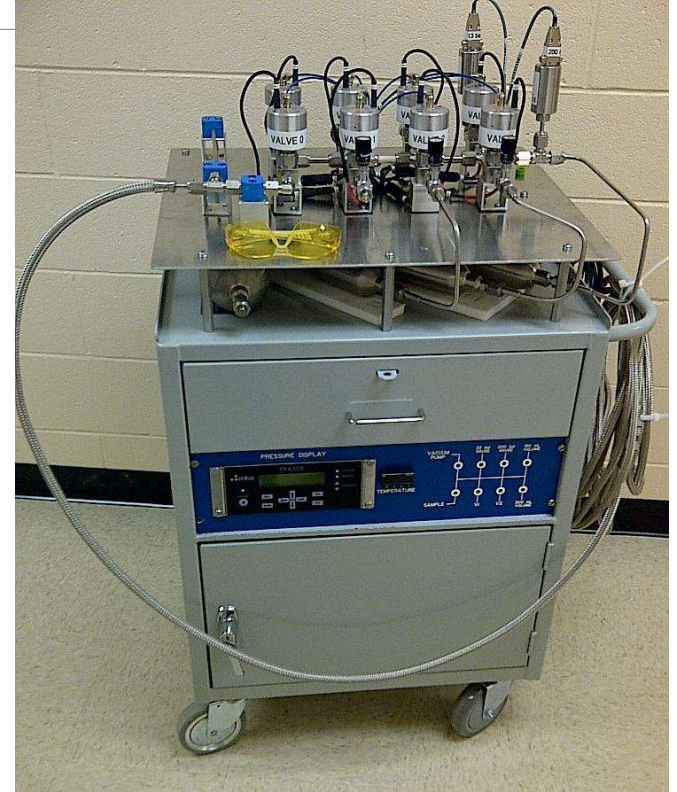
Maintenance of equipments – LIPPS labview program (finished!)

- A new control box made by Juscelino installed
- Updates on the hardware - Cedric
- New LIPPS Labview program
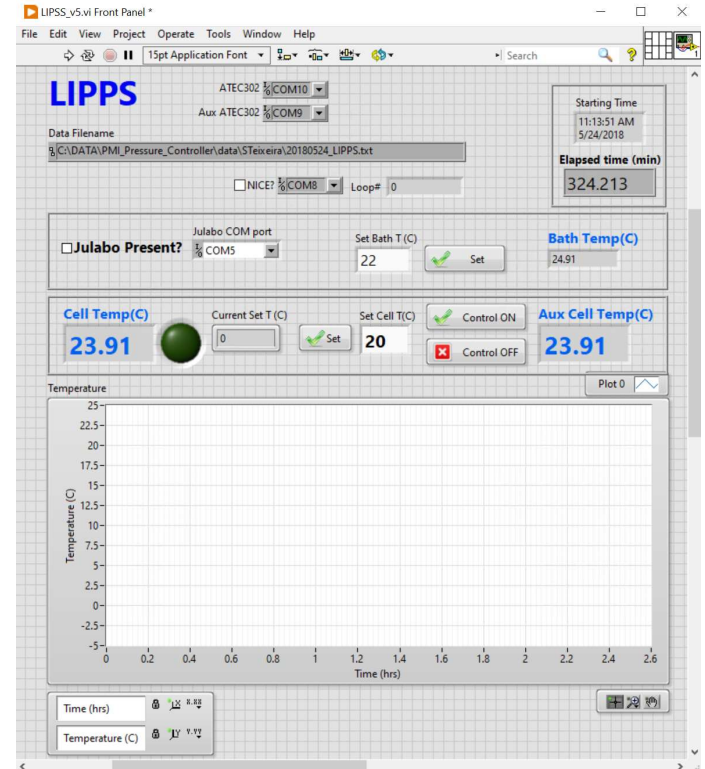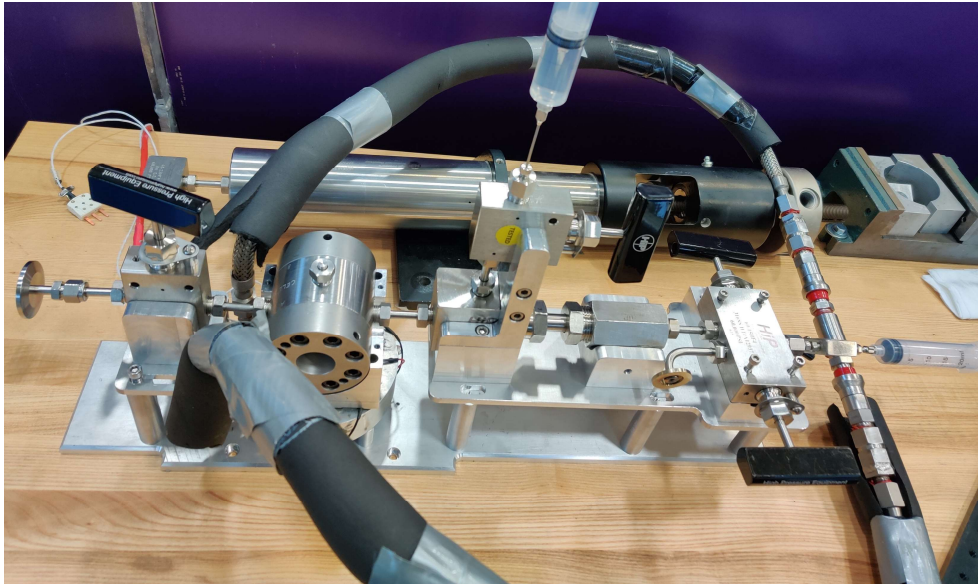
Specialty projects

◦ Labview automatic NV control with Yegor – finished!

◦ A setup to combine Orange cryostat with Titan magnet so users are able to reach below 2K in Titan magnet – finished!

◦ Design and make new silicon tail for Candor CCR – finished!

◦ Get labview to work under Linux system so that it can be used like a compactRIO

◦ Sergiy's low T goniometer communication with NICE

◦ 3-syringe-pump system programming

◦ Time stamping of the SE equipments using compactRIO, everything working, server/client, automatically detect COM ports

Specialty projects

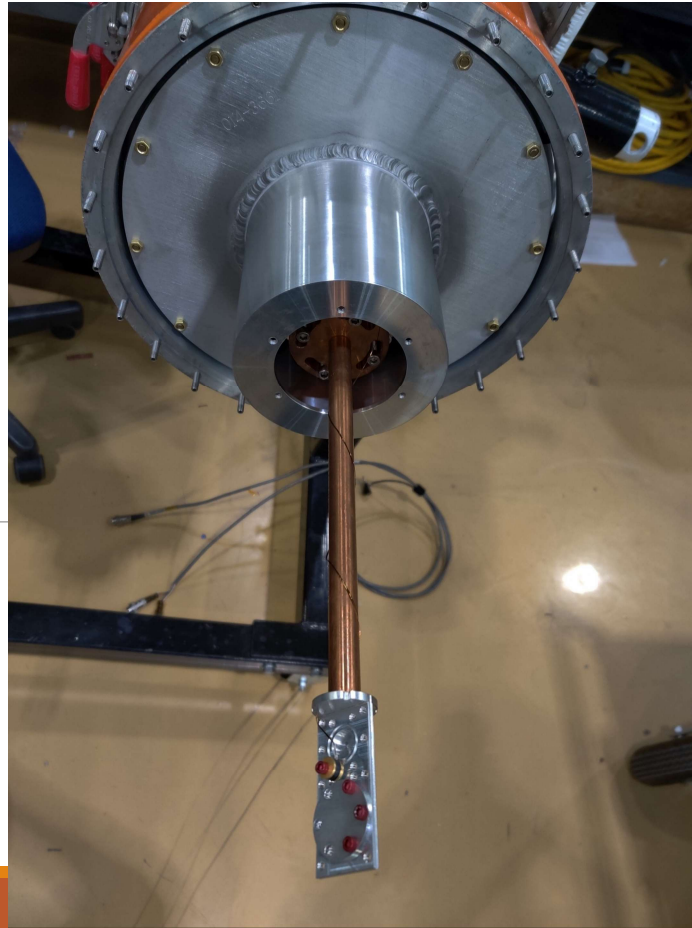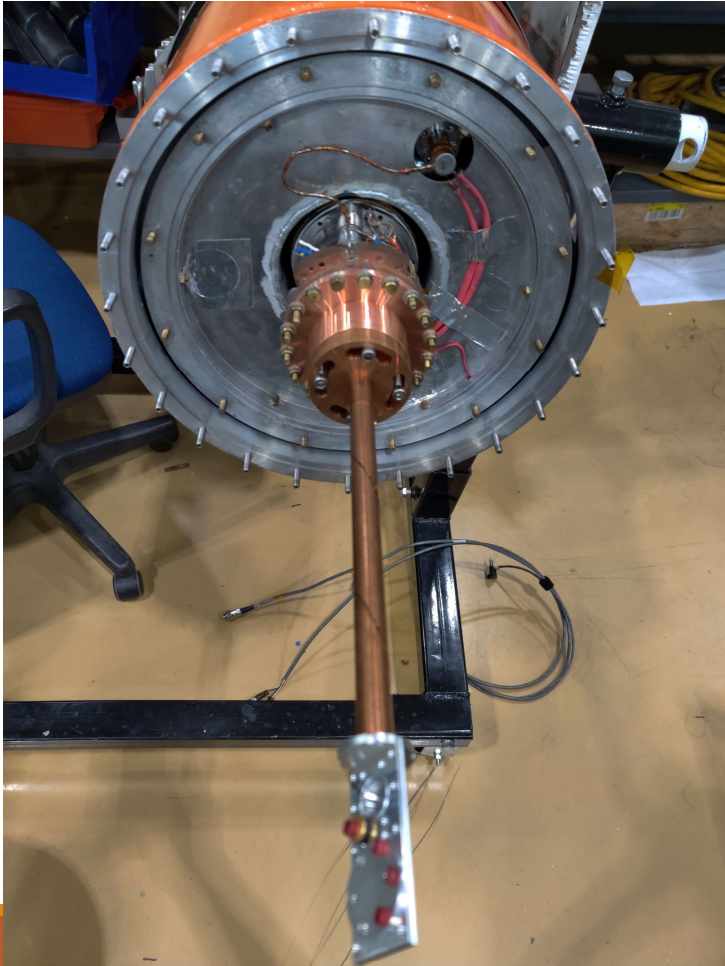◦ Labview automatic NV control with Yegor – finished!
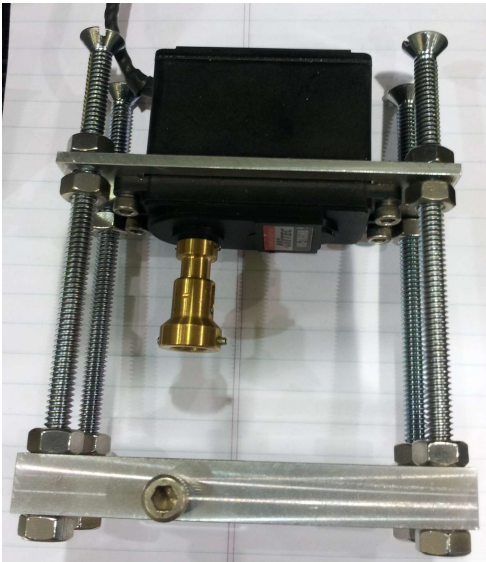
Old vesion
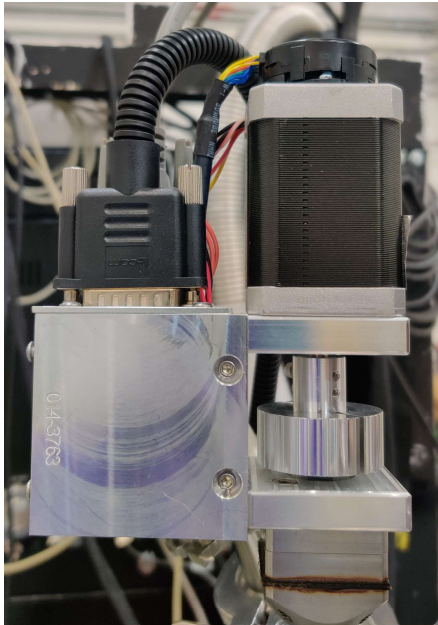
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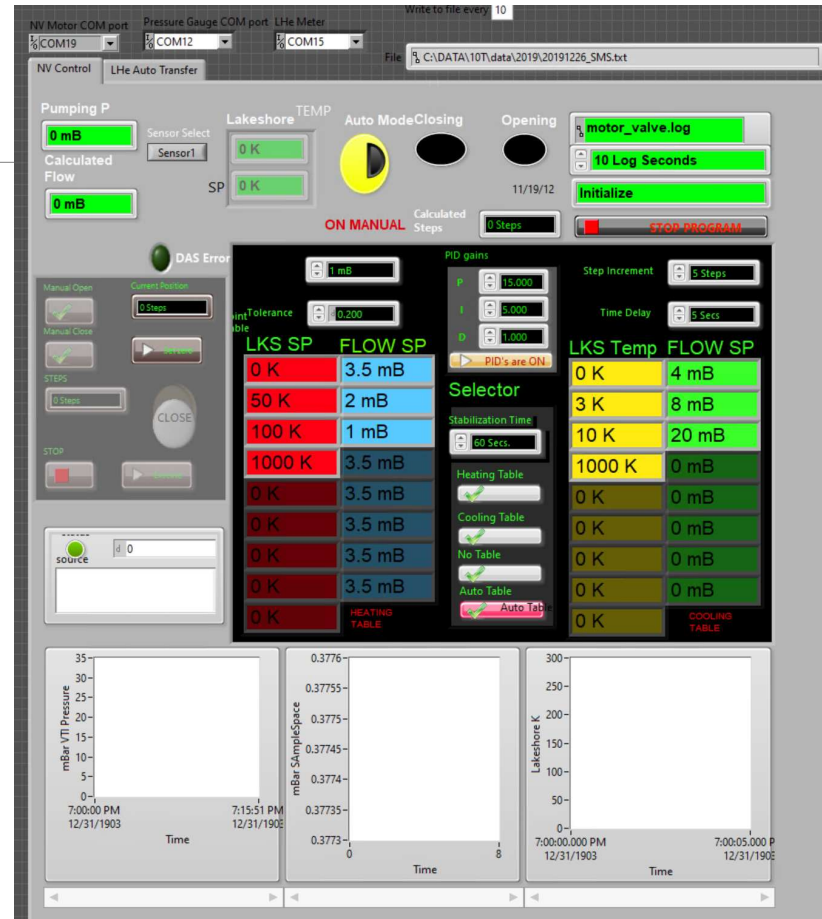
Specialty projects

◦ A setup to combine Orange cryostat with Titan magnet so users are able to reach below 2K in Titan magnet – finished!
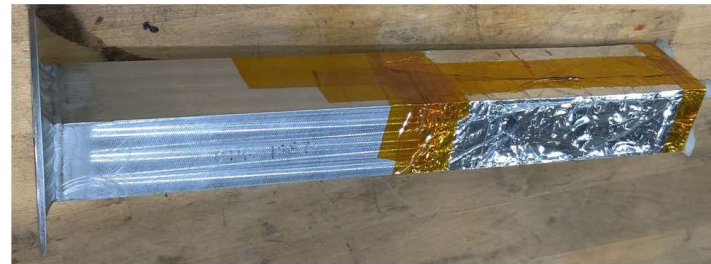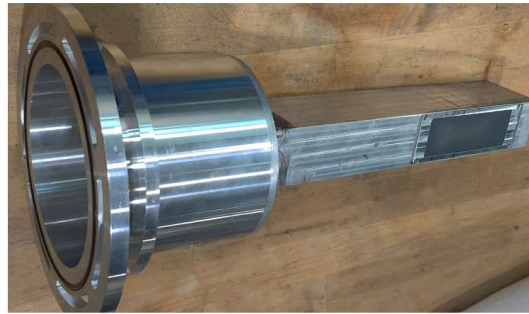
Titan magnet's tail set #1 with OC & two sample changer

Sensor A: on the end of the copper extension sample position: x142486   Sensor B: on the OC 1Kpot: x127072
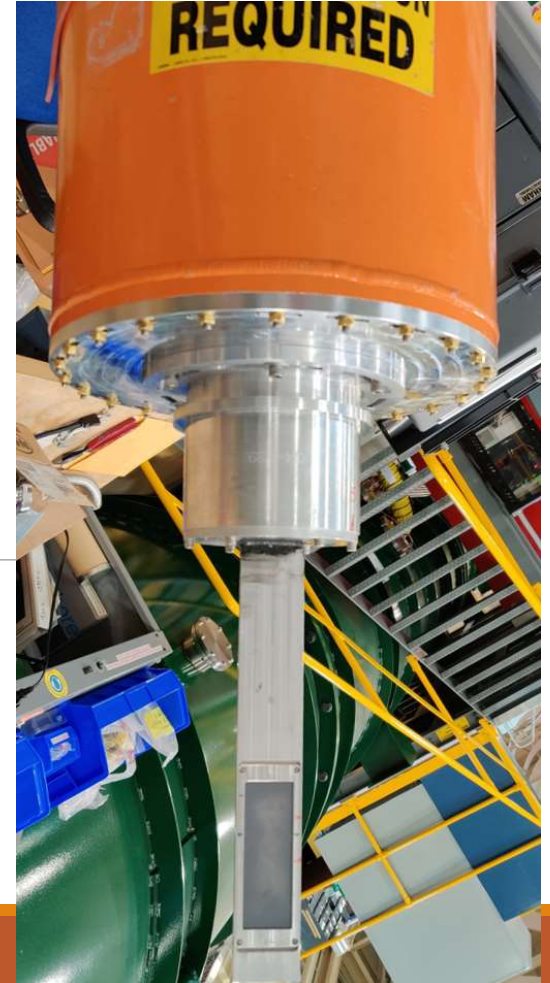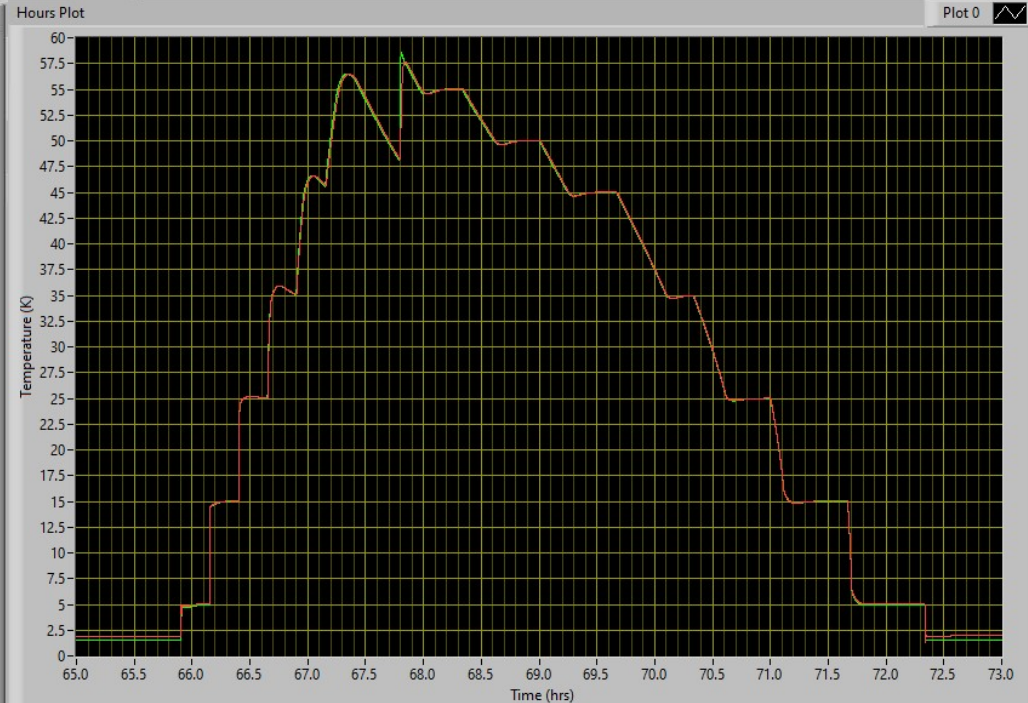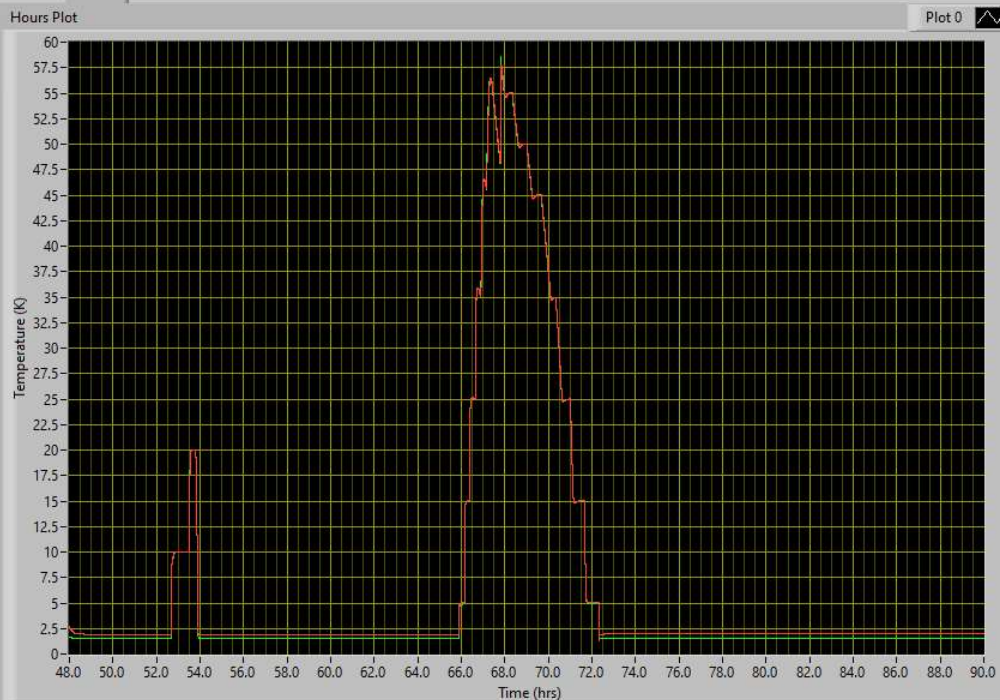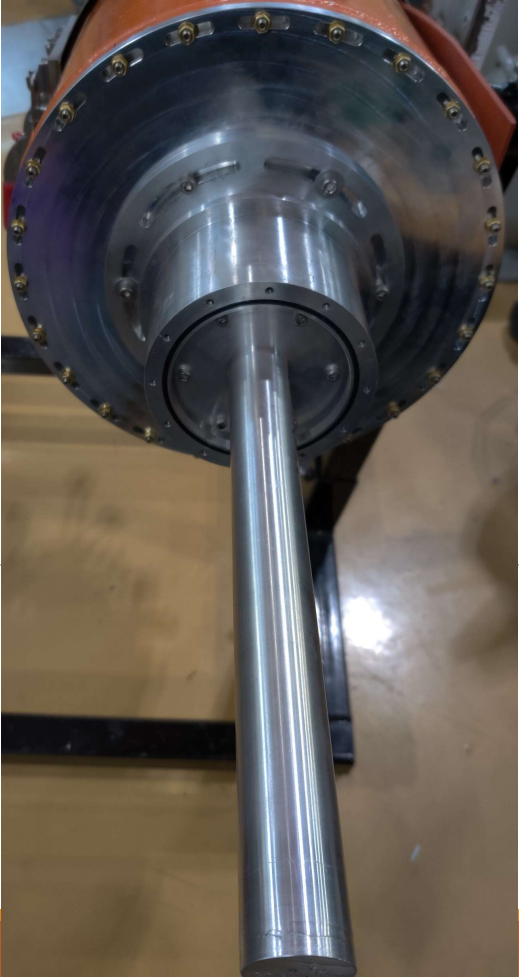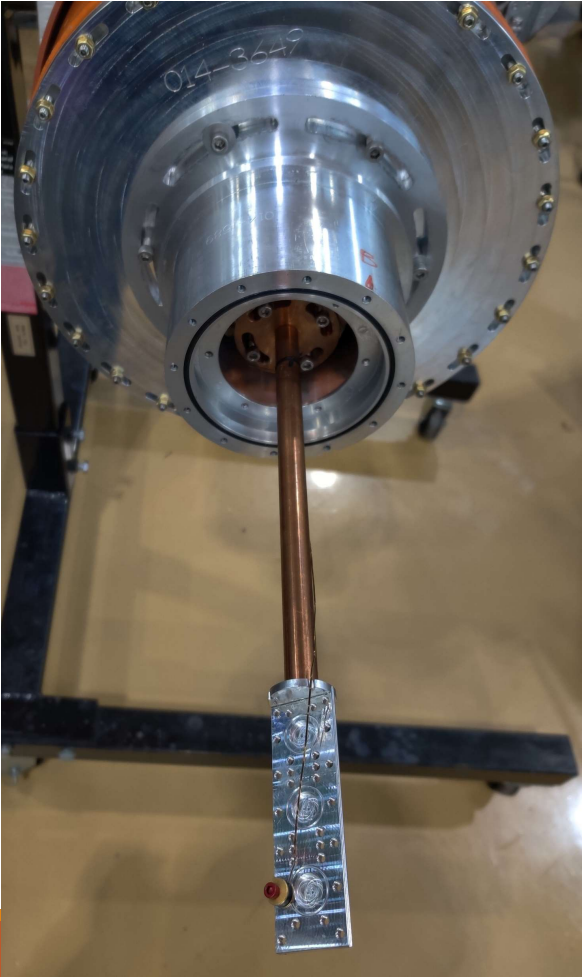
Performance

Base T_{1kpot}=1.535K, Tsample=1.95K

Can hold at base T for 46 hours with one helium refill

Temperature change without any problems

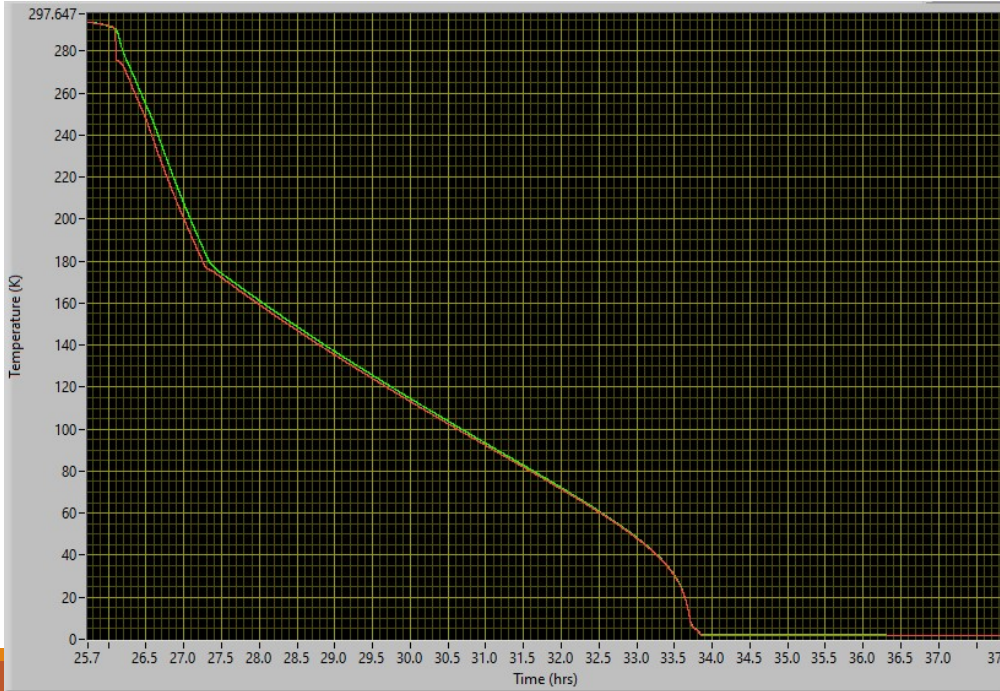# Titan magnet's tail set #2 with OC & three sample changer

Performance

Base T_{1kpot}=1.515K, Tsample=2.03K

Temperature change without any problems

Results

3-sample holder base T (2.03K) is 0.08K higher than the 2-sample holder base T(1.95K)

Pros:
- Can reach lower T (~2K) than CCRs (~5k)
- Other SANS tails can also fit on this OC.

Cons:
- You have to warm up the entire OC for a sample change, turn around time is around 12 hours min.
- Need the vacuum chamber pumped by turbo at all times.
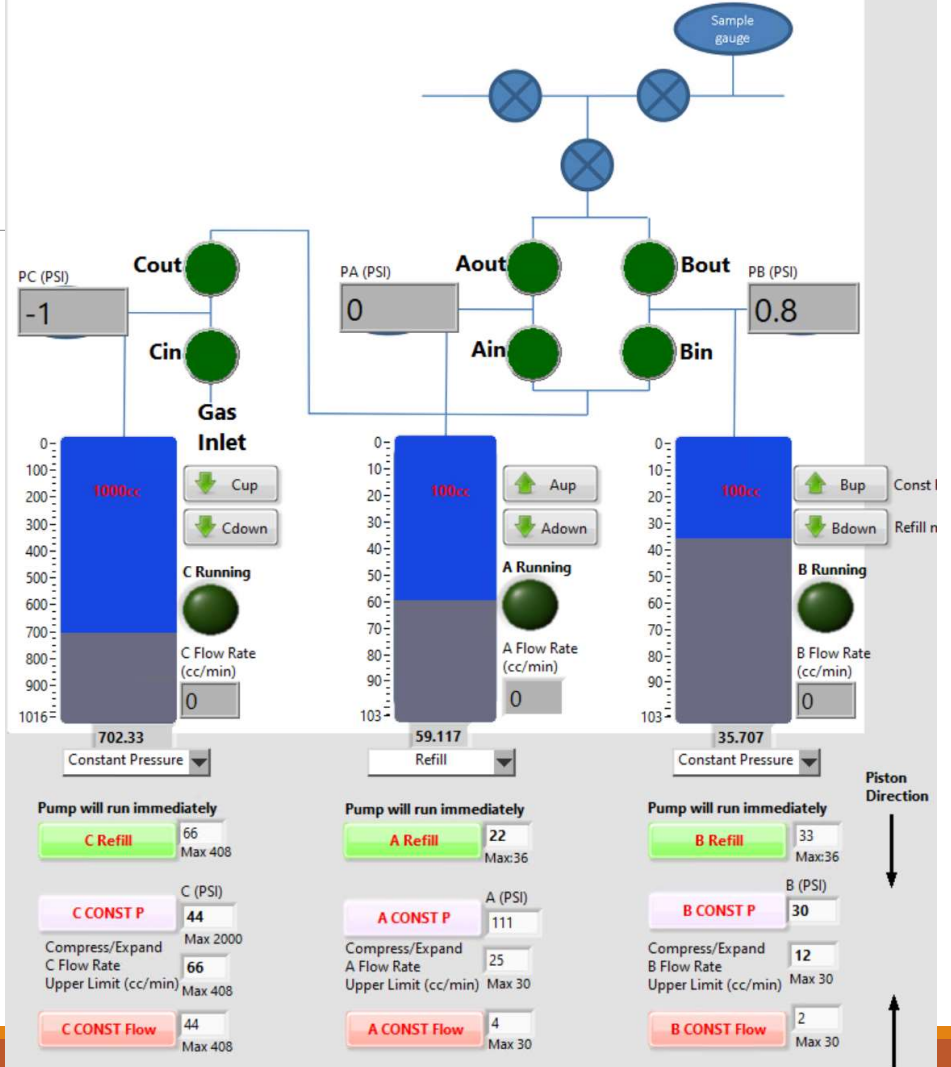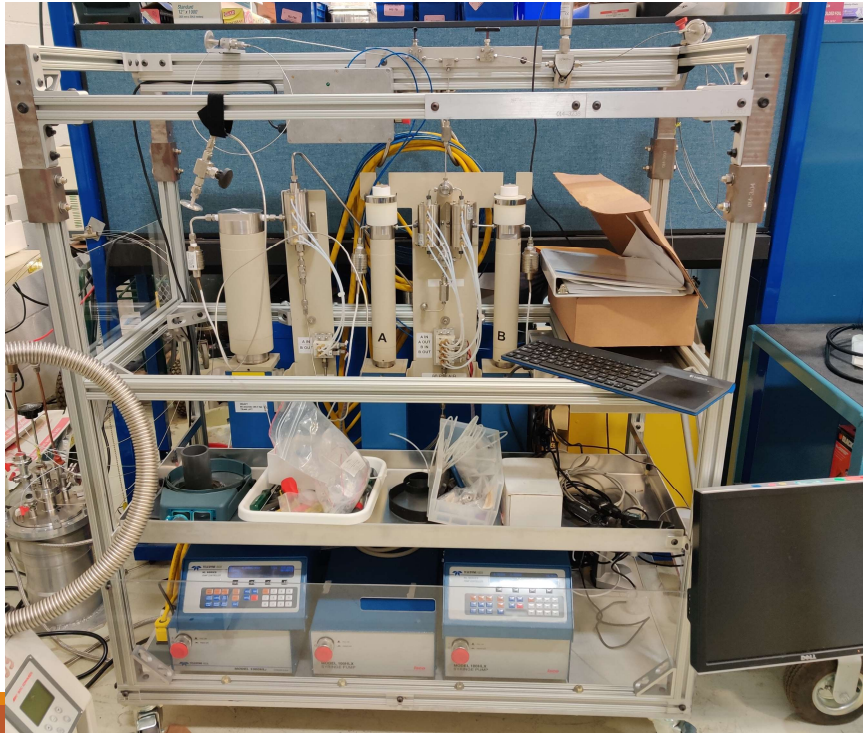- More support structure on top of Titan

Specialty projects

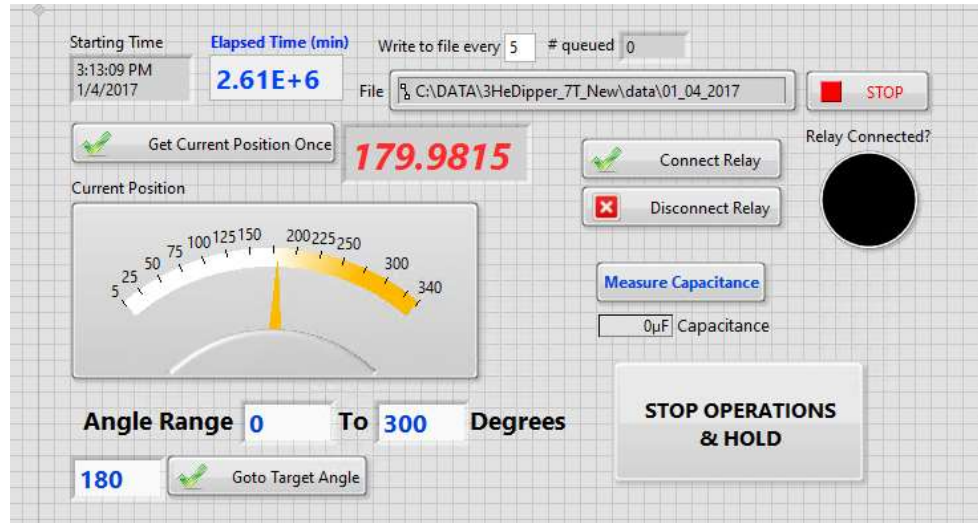◦ Design and make new silicon tail for Candor CCR – finished!
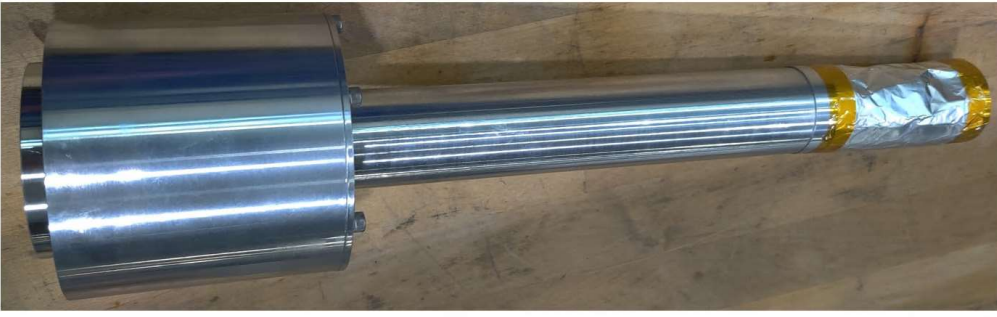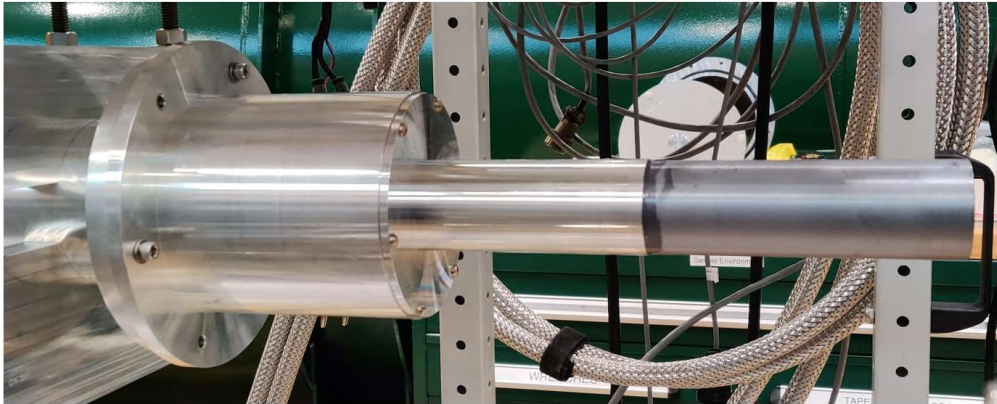
Specialty projects

◦ 3-syringe-pump system programming

Specialty projects

◦ Get labview to work under Linux system so that it can be used like a compactRIO

◦ Sergiy's low T goniometer communication with NICE

◦ Time stamping of the SE equipments using compactRIO, automatically detect COM ports

NICE will be able to get/set the parameters:
1) get rawPosition
2) set rawPosition
3) resetRawPosition
4) negLimit
5) posLimit
6) Busy?
7) Stop

Misc.

- Help Mads to get the potentiostat working on the CCR and programming – finished!
- Work with Rebecca Dally to design sample holders – finished!
- Established communication between Eurotherm 2404 temperature controllers and PC using modbus. NICE team will be making the driver. – finished!

- plug-and-play SE with Krzywon, Maliszewskyj and Peter Beaucage
- Keep reviewing new 7T/12T drawings
- Keep updating all sample environment webpages including all equipments in all the labs
- Remote control of compressors at PBR
- Labview version controls and documentations.

Thank you for your time!

Questions?