Updates

1. Slow control data monitor
   - The Sea/SpinQuest NFS disk was mounted on target computer:
     - Status & procedure: https://confluence.its.virginia.edu/display/twist/Target+Computer+setup+at+NM4
     - Will discuss better configuration of user/group/permisson with network group
   - Astrid & Paul are reconfiguring EPICS/Archiver servers
   - Will bring up GUIs in control room in early December?
2. NMR computer
   - Sort out configurations and files, in preparation for rack move
3. PDP
   - Succeeded at adding new BNC channel to PDP front panel
4. MCC USB-202 with thermocouple (TC)
   - Made the same noise measurement as done for MCC E-TC last week
   - Propose to use two MCC E-TCs for all (16) TCs in cave

2. NMR Computer

- Network
  - Was connected to “eduroam” Wi-Fi
  - Now connected to NM4 LAN, using 192.168.24.191
- VNC server
  - Installed last week
  - Accessible from target computer (and home via `e1039gat1`)
- Login user & disk space
  - Now using Microsoft account & OneDrive of Anchit
  - Propose to use local user (`ptgroup`) & local disk
  - Any configurations/files that we need migrate??

3. PDP

- Multiple versions
  - `C:\Users\anchi\OneDrive\Documents\PDP`
    - We have been using this
    - Slow and user dependent (as on OneDrive)
  - `C:\PDP\e1039-target-controls-master`
    - Created on 2021/Feb/25
  - GitHub

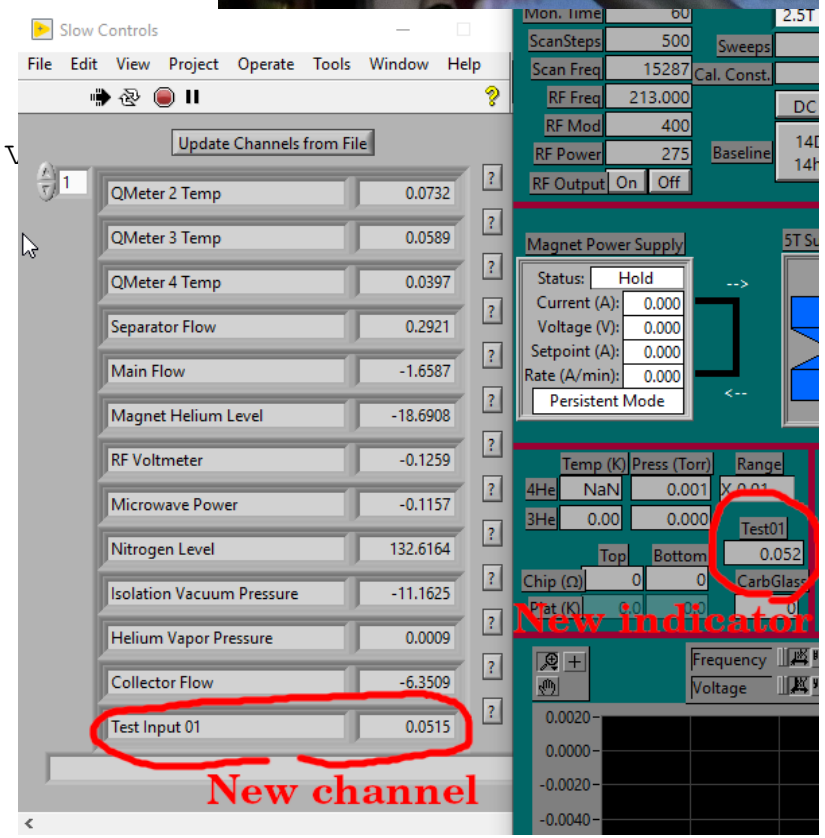
    `https://github.com/uva-spin/e1039-target-controls/tree/master/PDP`
    - Last updated 3 years ago
  - Propose to unify these versions for future development
    - Clone GitHub into `C:\uva-spin\e1039-target-controls\PDP`?
    - Import any key changes from other versions?

- Addition of new BNC channel to PDP front panel
  - One of the remaining tasks:

    https://confluence.its.virginia.edu/display/twist/To-do+list+at+NM4
  - For readings of MKS 670, MKS 946, etc.
  - Succeeded
    - Added new line to `B28_Slow_Controls.txt`

```
4 11 1 1 -11    1  VacPress   Isolation Vacuum Pressure
4 21 1 1 0      1    He4Press   Helium Vapor Pressure
4 13 1 1 0.0 400. Collector  Collector Flow
4 22 1 1 0      1    Test01   Test Input 01
```

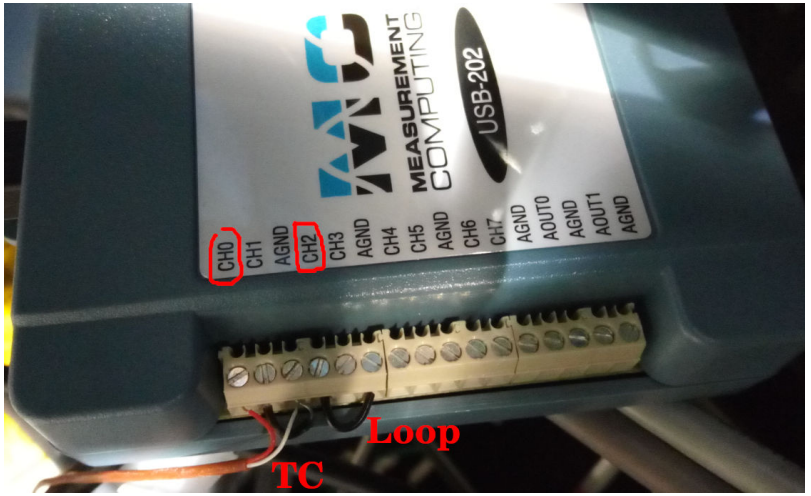
    - Added a new sequence frame to `PDP-Polarization_Display_Panel/PDP.v`
  - To be documented in GitHub repository
- Other changes
  - Changed the default value of `TPS Base Path` in `TPS Global.vi` so that `SCM.vi` can run standalone



MCC USB-202 with Thermocouple

- Aim: Evaluate the measurement accuracy
  - With long TC cable
  - Better or worse than MCC E-TC?
- Setup
  - MCC USB-202
  - Channel 0 = TC
    - A short (7 ft) TC sensor +
    - One of three existing extension cables (50 ft?)
  - Channel 2 = Short loop
    - For reference

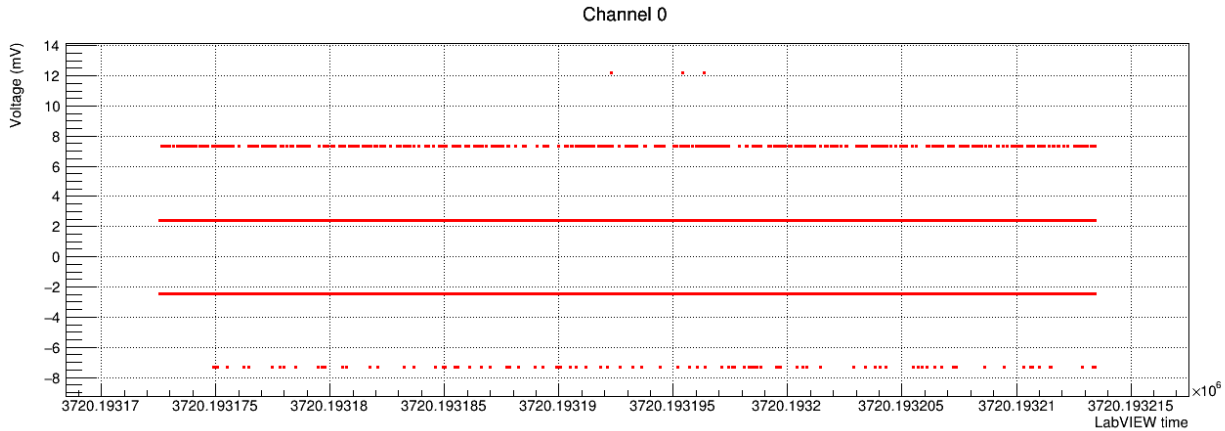
MCC USB-202 @ slow-control rack



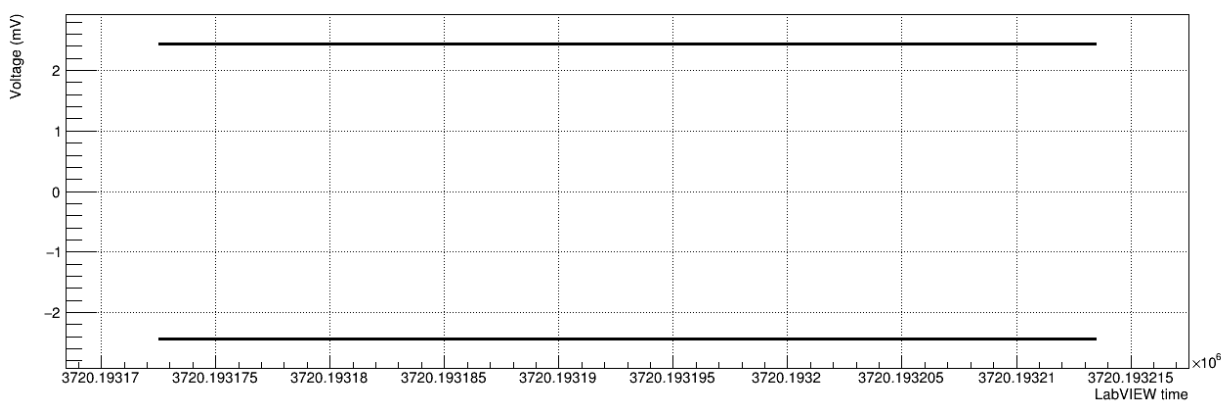
TC junction @ target cave

- Measurement
  - 40 seconds, 10 kHz
  - Voltage, not temperature — 2.4 mV = 1 ADC bit
  - Raw values (cf. +1 mV at +25 °C)

Channel 0 = TC

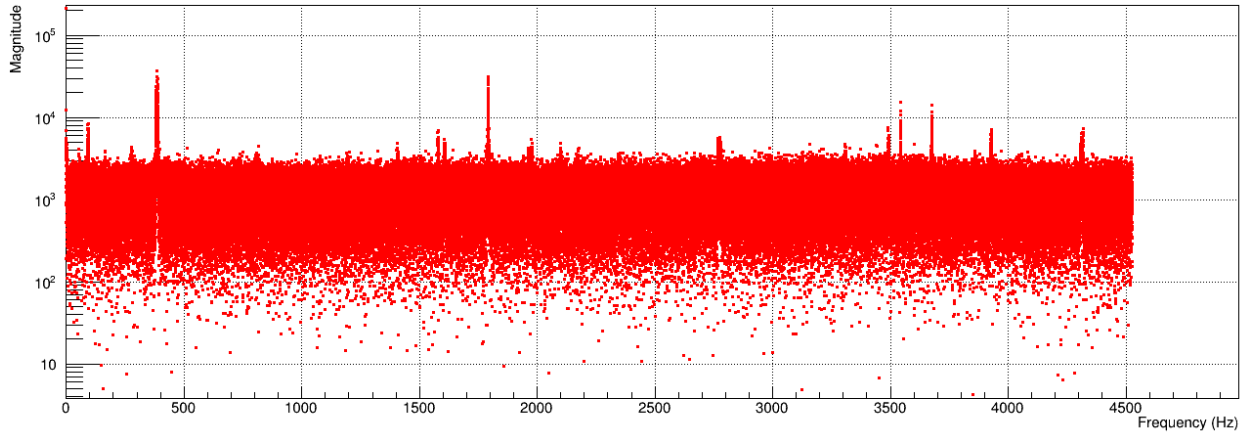


Channel 2 = Short loop

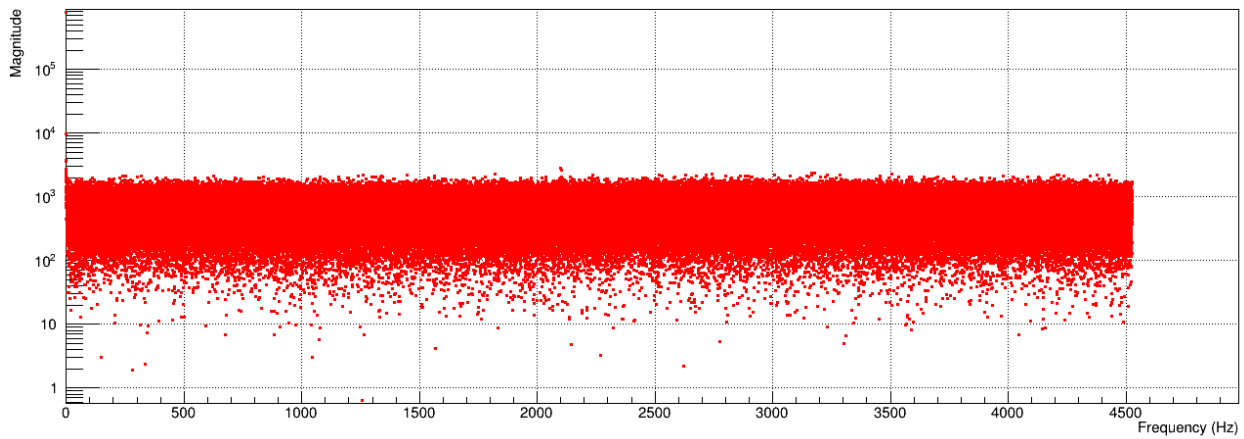


▷ FFT

Channel 0 = TC



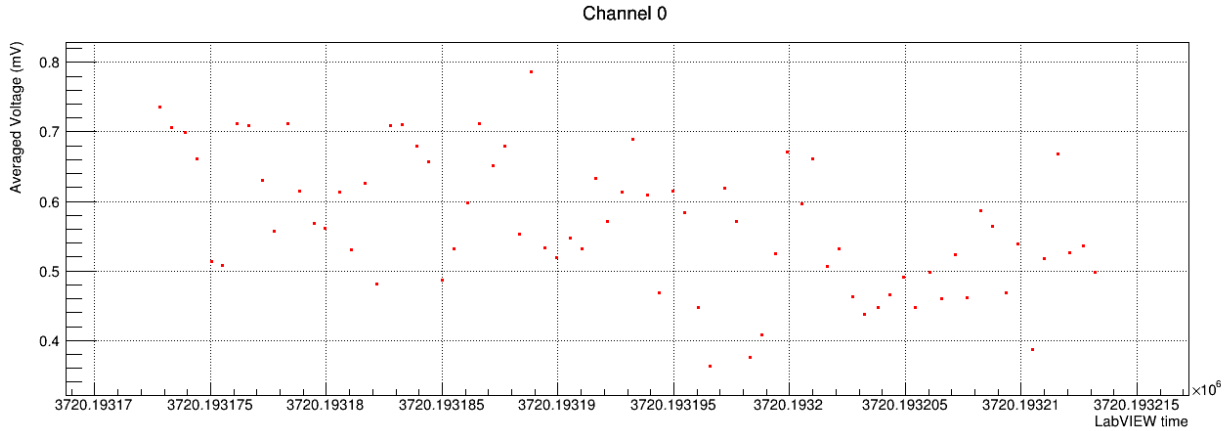
Channel 2 = Short loop



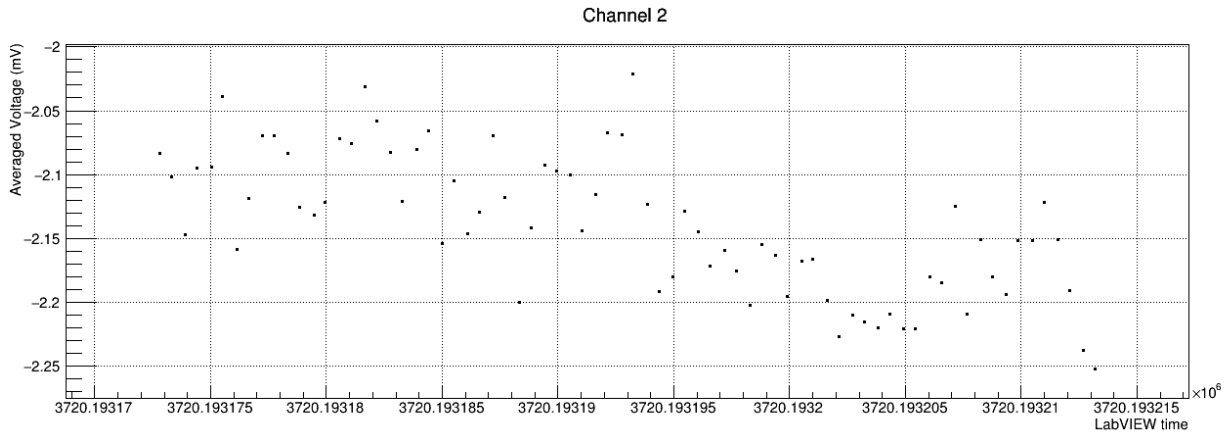
▷▷ High-frequency noise only on channel 0

- Averaged values — per 0.5 seconds (= 5000 points), same rate as MCC E-TC

Channel 0 = TC



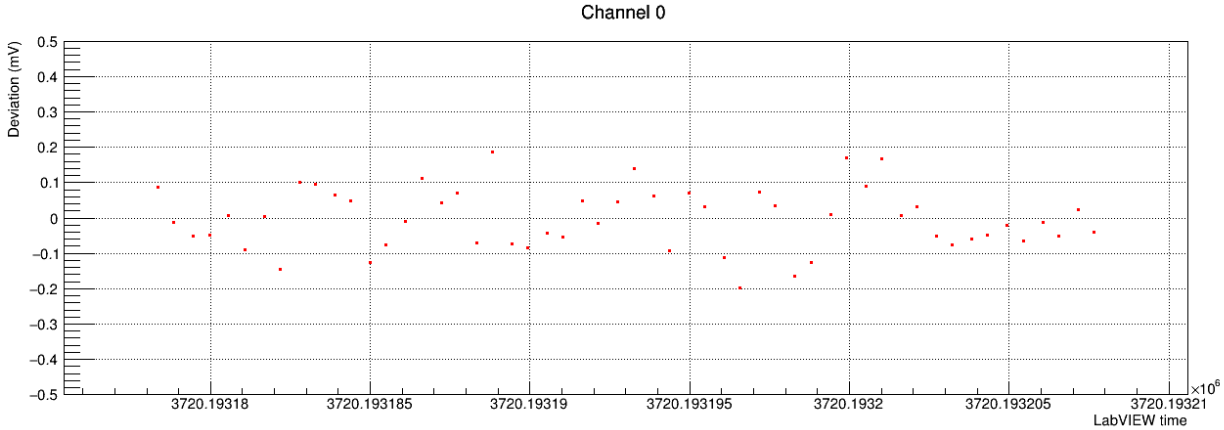
Channel 2 = Short loop



  - Large offset ($\mathcal{O}$(mV)) on channel 2
  - The offsets of channels 0 & 2 were shifting in another 2-day measurement

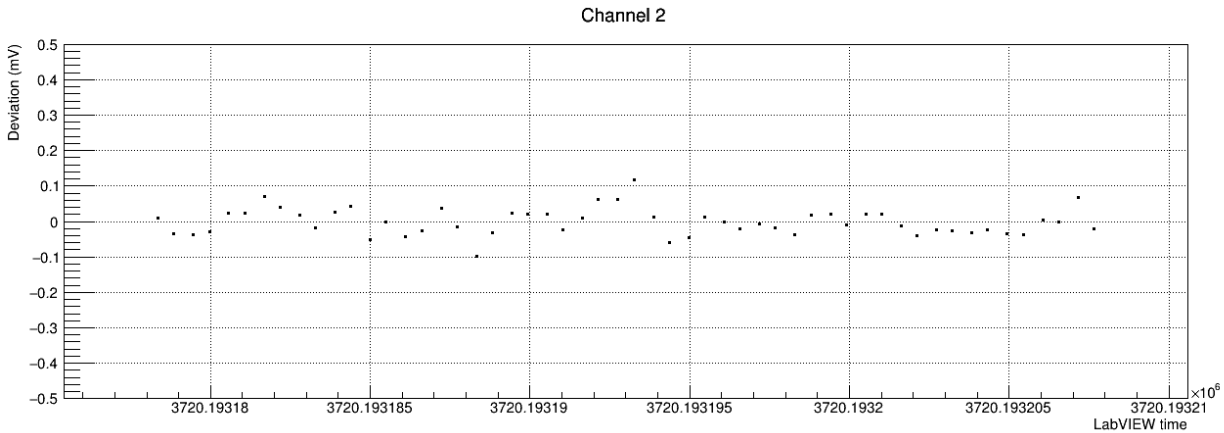
- Deviation $\delta_i^T \equiv T_i^{avg} - \sum_j^{i-10\cdots i-1,i+1\cdots i+10} T_j^{avg}/20$

Channel 0 = TC



$\sigma = 0.09$ mV

Channel 2 = Short loop



$\sigma = 0.04$ mV

- MCC E-TC: $\sigma = 0.3\ \mu$V

Voltage Attenuation

- Aim: Estimate of voltage drop (V_{drop}) along the TC extension cable
- TC with extension cable from slow-control rack to target cave
  - $R_{TC} = 190\ \Omega$ — measured by multimeter
  - Typically $V_{TC} = +1$ mV @ $+25\ ^\circ$C
- With MCC E-TC
  - Input impedance: $Z_{in} = 40\ \mathrm{M}\Omega$ — spec sheet
    - Impedance ratio: $R_Z \equiv R_{TC}/Z_{in} = 190/40\mathrm{M} = 5\text{e-}6$
    - $V_{drop} \equiv V_{TC} \cdot R_Z = 1\ \mathrm{mV} \cdot 5\text{e-}6 = 5\ \mathrm{nV}$
  - Input current: $I_{in} = 1$ nA, with open TC detection disabled — spec sheet
    - $V_{drop} \equiv R_{TC} \cdot I_{in} = 190\ \Omega \cdot 1\ \mathrm{nA} = 190\ \mathrm{nV}$
  - In both cases V_{drop} is smaller than the device accuracy (300 nV)
- With MCC USB-202
  - Input impedance: $Z_{in} = 1\ \mathrm{M}\Omega$ — spec sheet
    - $V_{drop} \equiv V_{TC} \cdot R_Z = 1\ \mathrm{mV} \cdot 190\ /\ 1\mathrm{M} = 190\ \mathrm{nV}$
  - Input bias current: $I_{in} = 2\ \mu$A @ 0 V, 12 μA @ 10 V
    - $V_{drop} \equiv R_{TC} \cdot I_{in} = 190\ \Omega \cdot 2\ \mu\mathrm{A} = 380\ \mu\mathrm{V}$
  - V_{drop} is possibly too large