Testing HDice NMR Control Rack 2 with HDice target

The Control Rack 2 was finally tested with an HDice target (eHD target cell, solid HD at 4.3Kelvin) in PD1 yesterday. Here is what I saw so far:

The proton NMR signals were taken for totally 384 sweeps overnight and data, including NMR signal, Dewar temperature and helium level, were stored correctly. Congratulations!

The attached NMR plots shown the comparisons of two NMR control racks with both absorption and dispersion signals. The quick look at the results shown the Rack 1 (old) data is in blue and Rack 2 (upgraded) data is in red. The signal sizes of both racks are similar, but the noise and baseline drifting of red lines seems to be smaller than the blue. Congratulation again!

This is just a start. More comparison data will be taken in the next few weeks.

A few problems, which need to be addressed very soon, were found yesterday during the test.

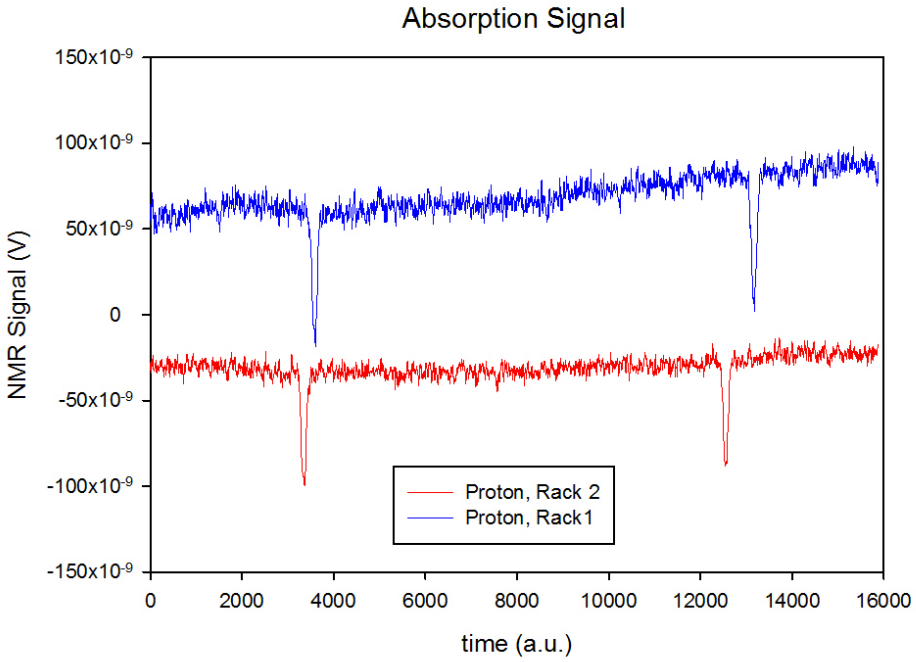
1. The Pause button was not functioning properly. After un-pause the run, the program ramp the field down to 0 and hung up.
2. After killed the program and run CLOSE VESA vi several times, the program started running again. But this time the field display was abnormal: The field reading lost gradually, as shown in the attached pictures.
    a. The field reading jumped before and after the 1st scan (Picture 1).
    b. The field reading jumped before the scan and failed to ramp up on the 2nd scan (Picture 2).
    c. The field ramp did not start on the 3rd scan (Picture 3, Picture 4).

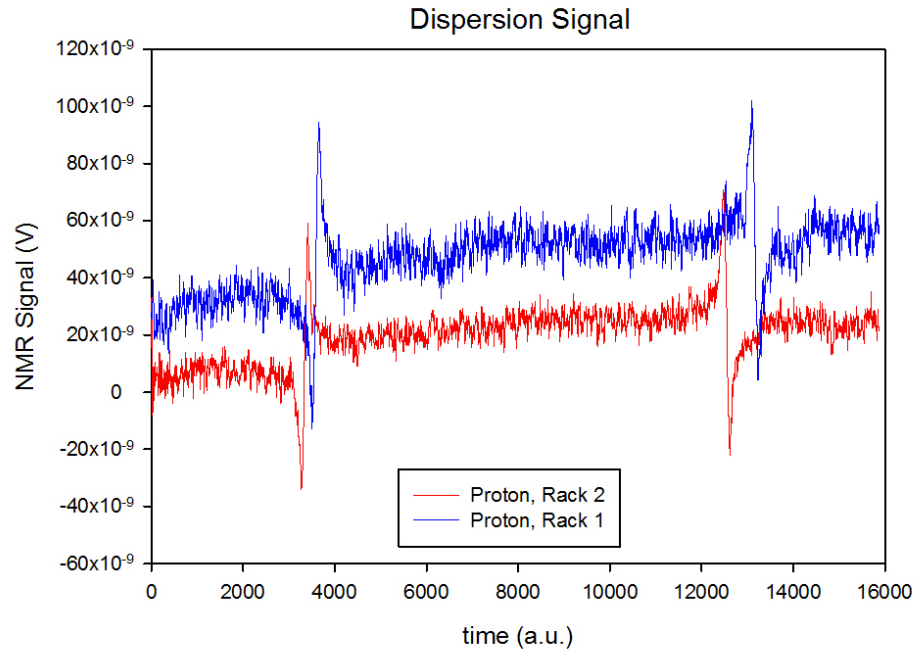
    I stopped the run by push the run and later closed the vi.

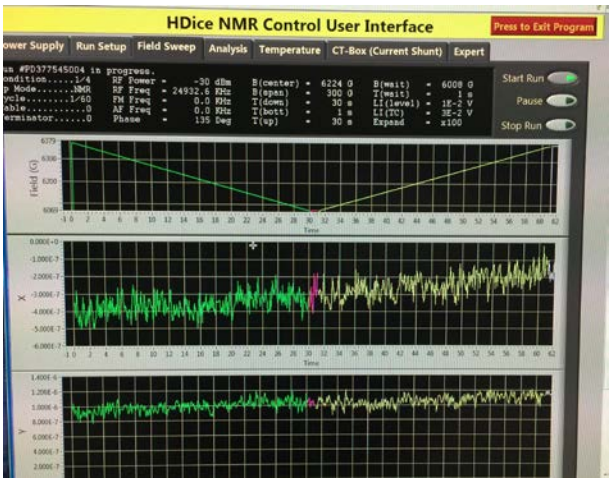
    d. The second restart the program got the same results as a., b, and c.
    e. During the third try the vi hung up right before the 1st scan.

3. I closed down the program, power-off all hardware on the rack, disconnect and reconnect USB cables, and reboot the computer. After try these twice, the program ran through the night, and the NMR data, red curves shown at the beginning, were finally taken.

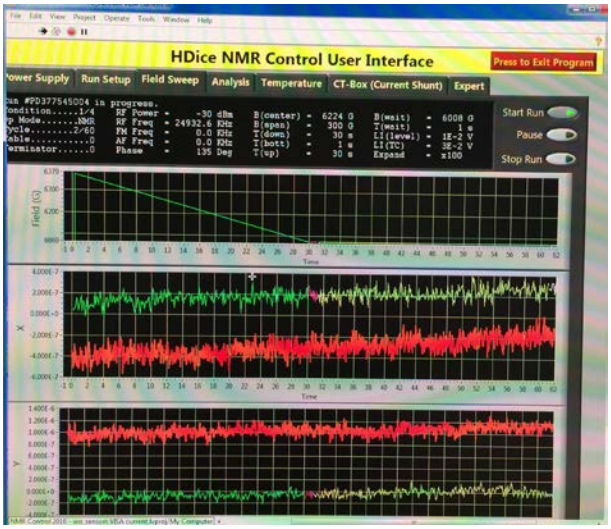
It looked to me that the program is somehow functioning but more work on the program is needed to make it robust. The “pause” button has to be fixed.


Absorption Signal
150x10-9
100x10-9
50x10-9
0
-50x10-9
-100x10-9
-150x10-9
NMR Signal (V)
0
2000
4000
6000
8000
10000
12000
14000
16000
time (a.u.)
Proton, Rack 2
Proton, Rack1

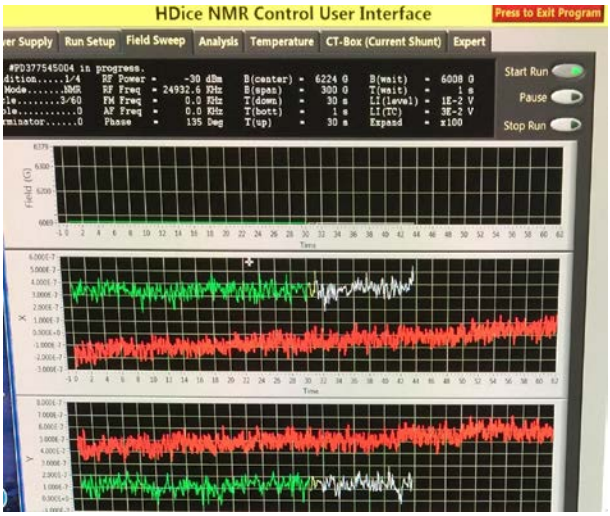

Dispersion Signal
120x10-9
100x10-9
80x10-9
60x10-9
40x10-9
20x10-9
0
-20x10-9
-40x10-9
-60x10-9
NMR Signal (V)
0
2000
4000
6000
8000
10000
12000
14000
16000
time (a.u.)
Proton, Rack 2
Proton, Rack 1



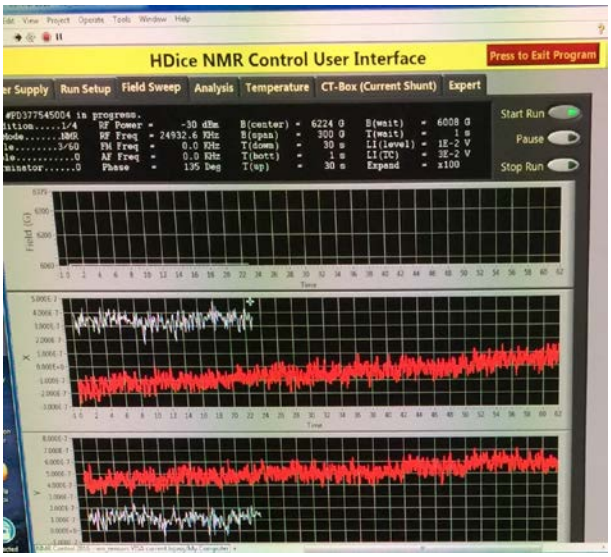
Picture 1.



Picture 2.



Picture 3.



Picture 4.