

Tests at ^3He Target Lab

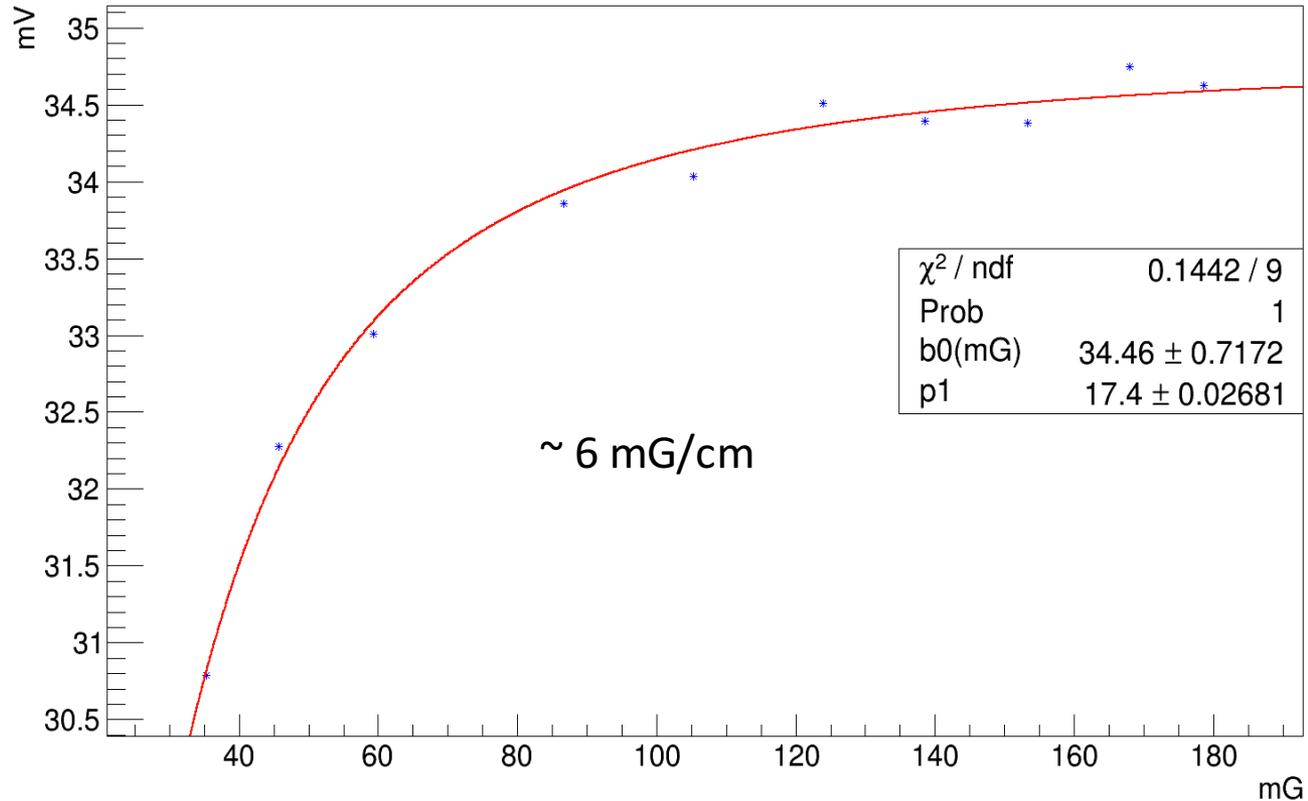
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Outline:

1. Field gradient measurement.
2. Convection speed test.
3. Characterize Prototec-I cell.
4. PNMR polarimetry:
 1. PNMR with oscilloscope.
 2. PNMR with DAQ
5. Diagram for ^3He target system inside Hall C.

Target chamber gradient

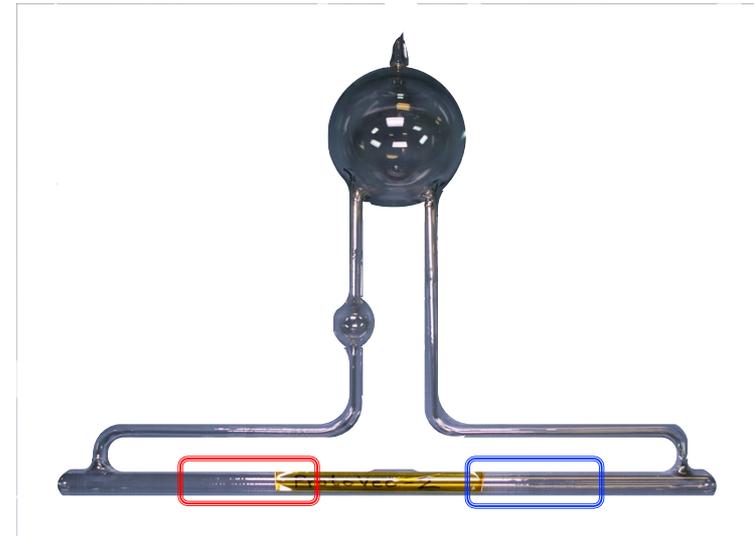
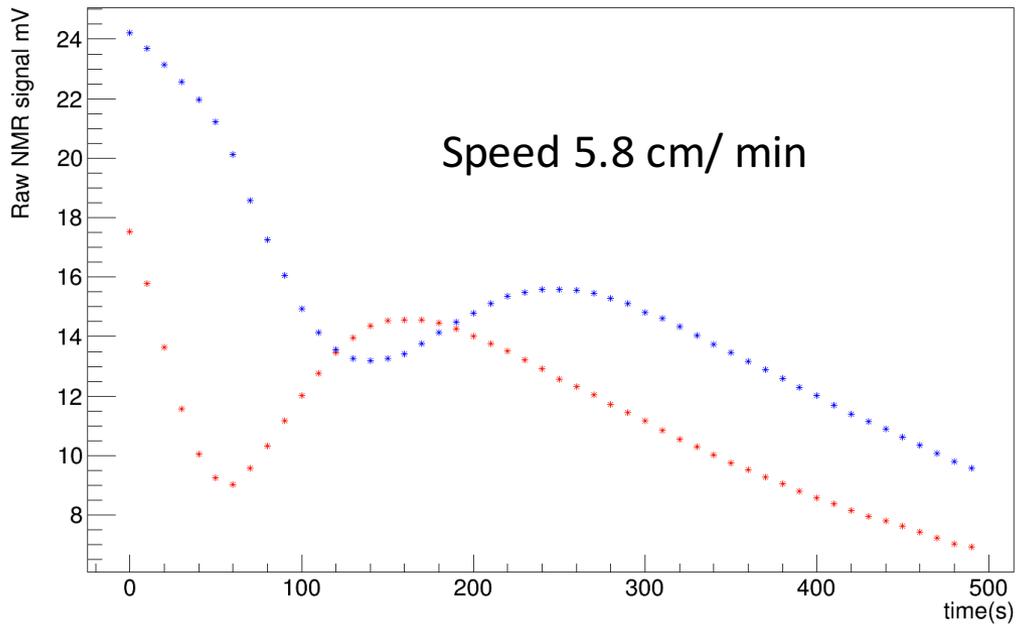
NMR scaled amplitude vs calibrated H1



- Measuring H1 as a function of NMR amplitude.
- Measured from Gaussmeter: $5 \text{ mG/cm} < \text{dB} < 10 \text{ mG/cm}$

Convection speed

Convection test w 2 pickup coils. Red (Blue): pc1(pc2)



With 13.0V heater. Total time is 15mins. Each sweep is 15s.
Transfer tube temperature 49°C & 92°C

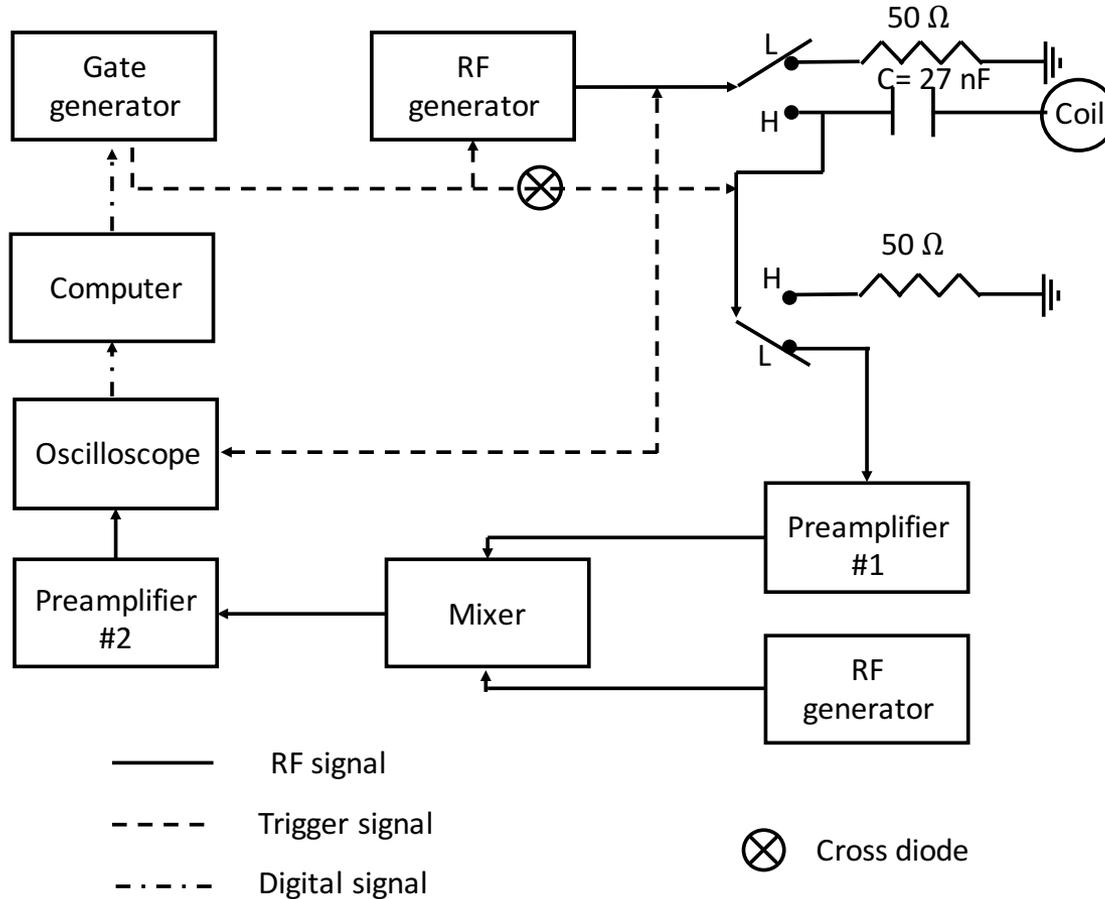
Spinup time, AFP loss and lifetime for protovec-1

AFP loss	Pumping chamber(%)	Target chamber(%)
Cool without convection	1.18	0.21
Hot without convection	0.95	0.37
Hot with convection	1.43	1.44

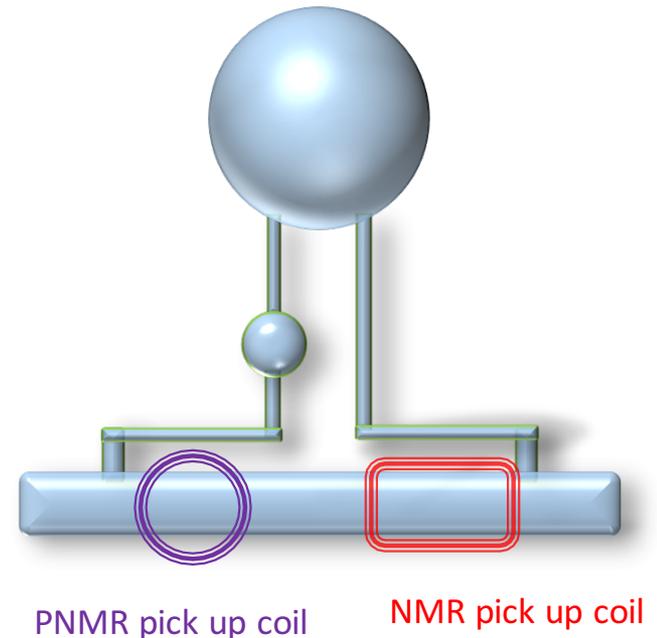
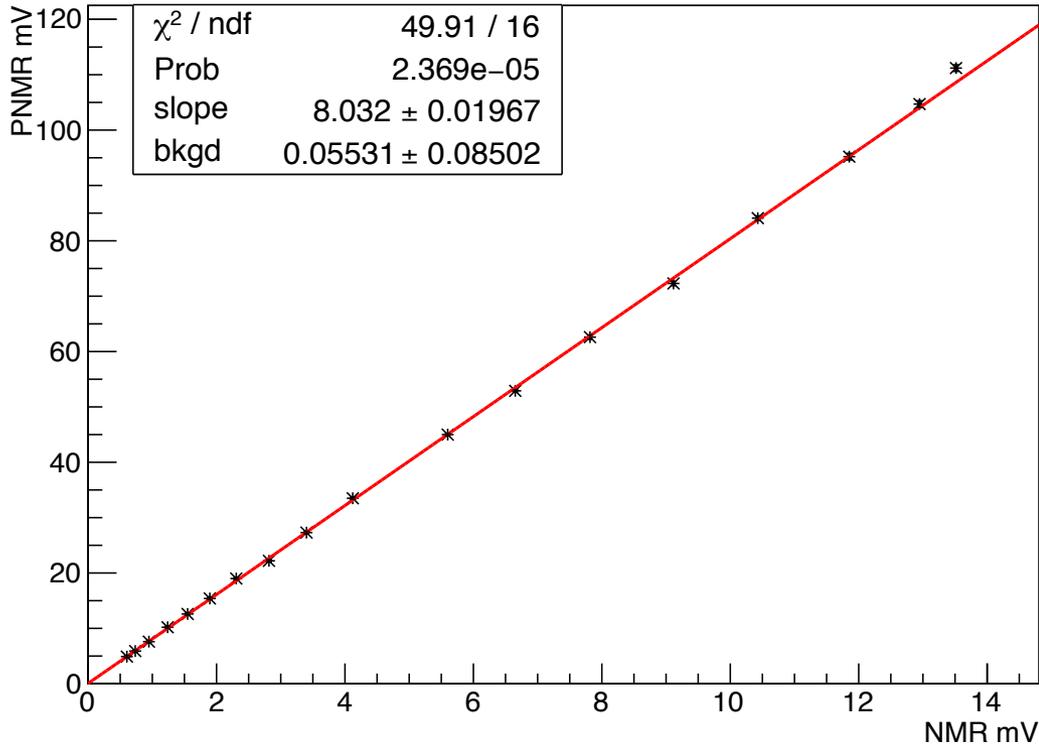
Lifetime	Pumping chamber(hr)	Target chamber(hr)
Cool without convection	26.57	23.11
Hot without convection	13.49	15.97
Hot with convection	14.56	14.54

Spinup time	Pumping chamber(hr)	Target chamber(hr)
	5.3	9.6

PNMR set up with oscilloscope



PNMR vs NMR in target chamber

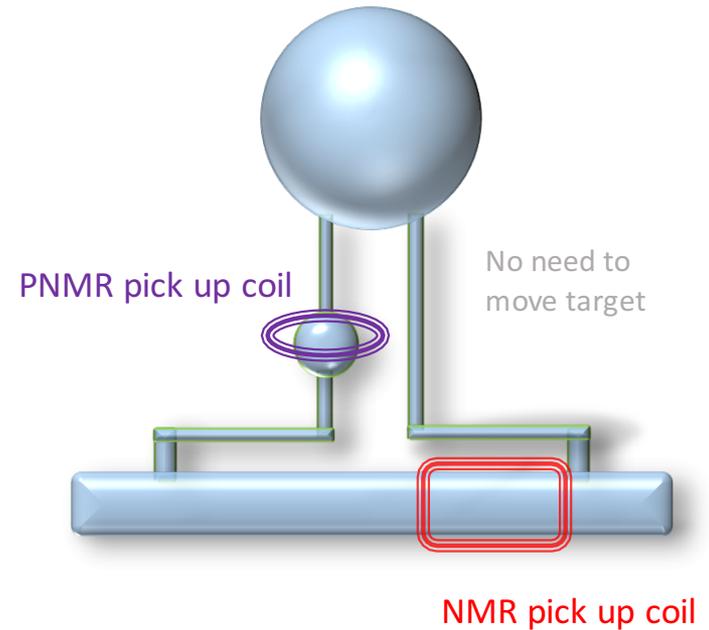
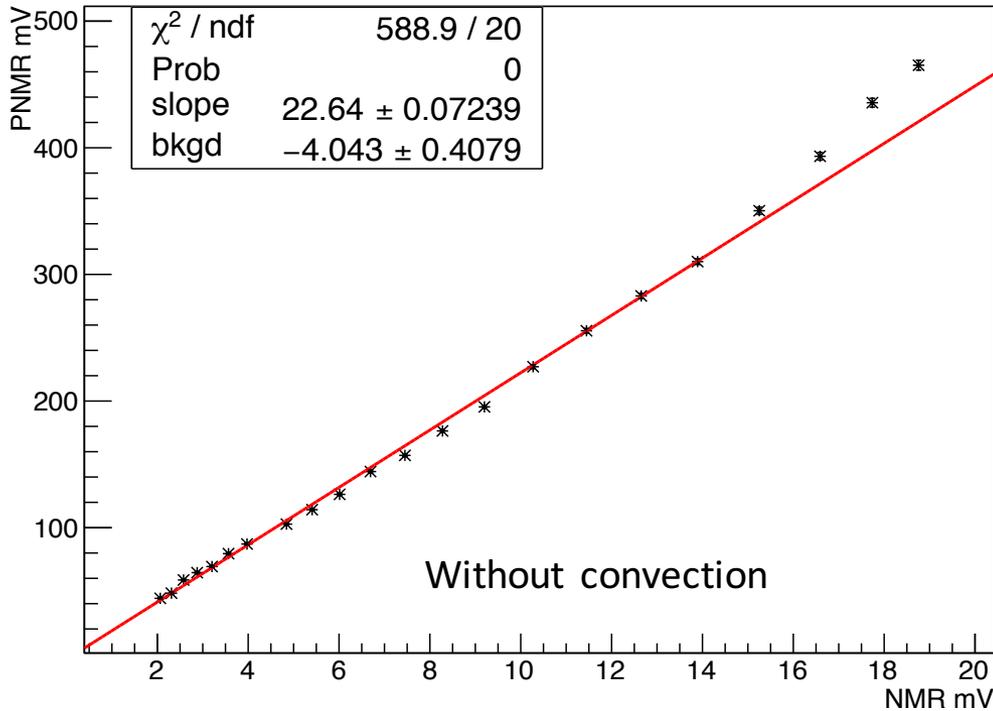


Hot spin down measurement (2hours). No convection.

Pulse NMR measure at target chamber. Pulse NMR works for spin up, hot spin down with and without convection.

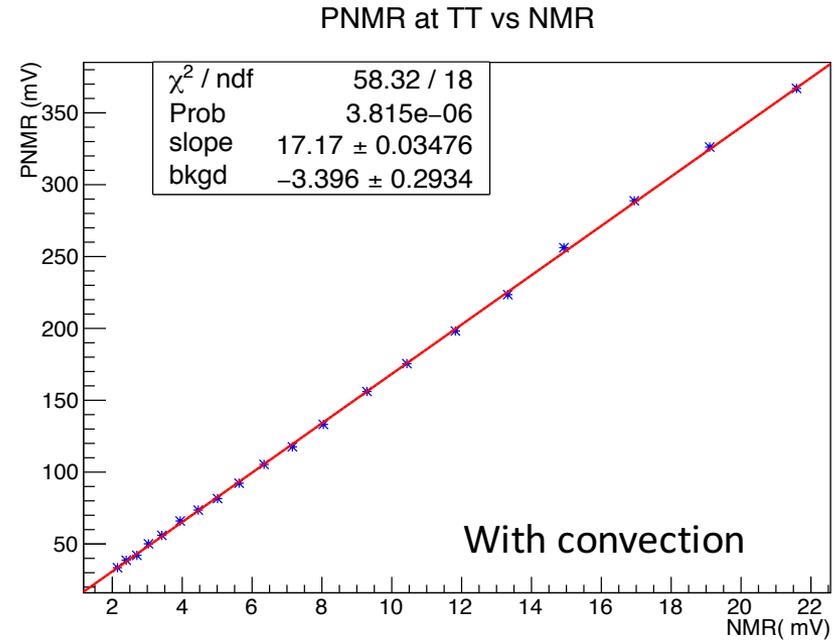
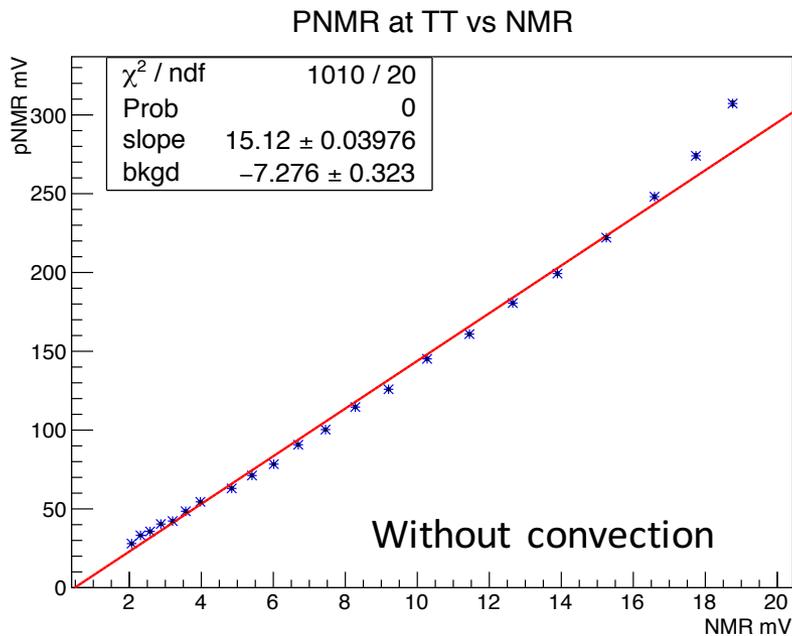
✓ Reach 1% uncertainty

PNMR (at transfer tube) vs NMR (at target chamber)



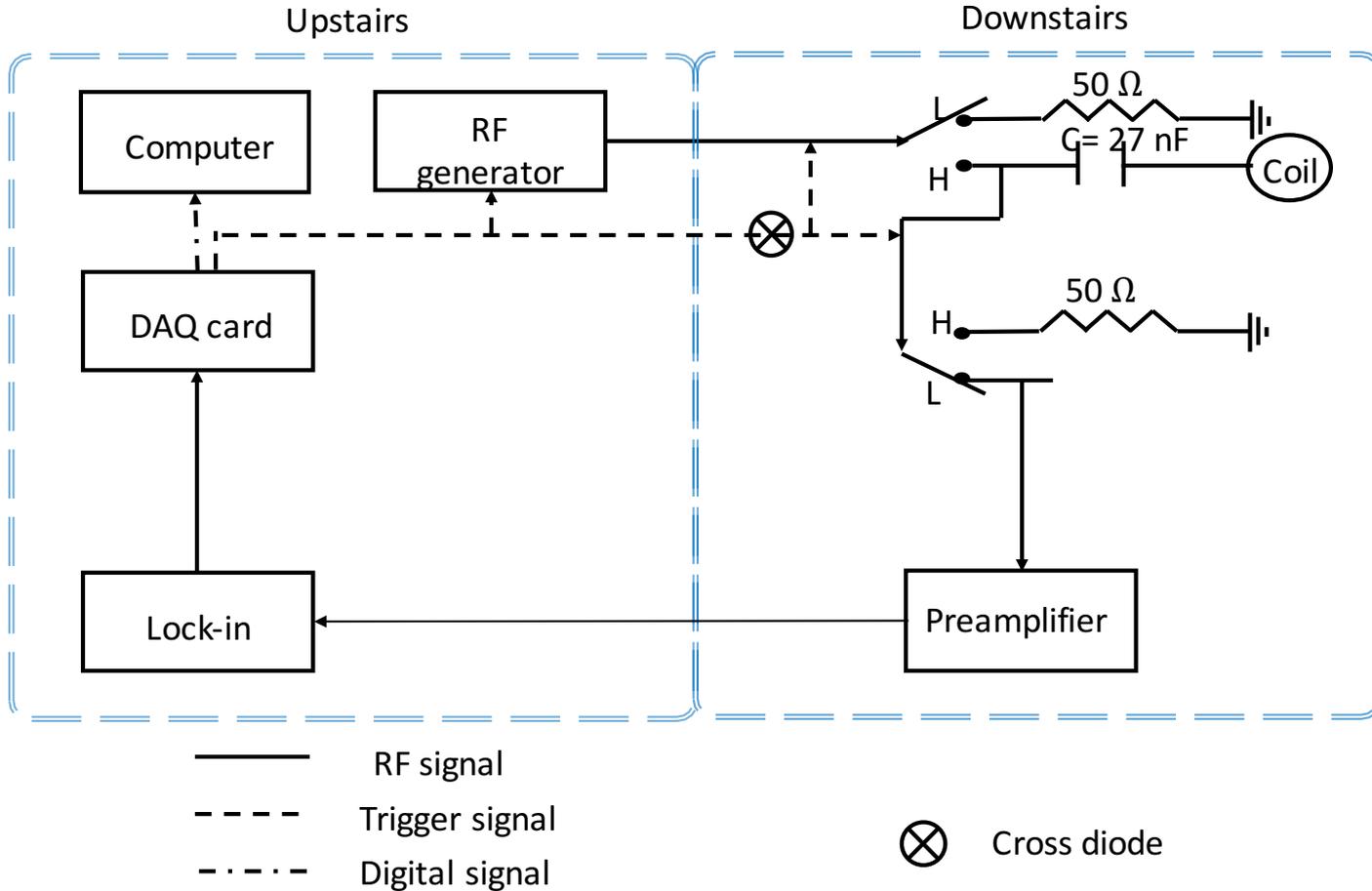
Hot spin down measurement (2hours). No convection.
Pulse NMR measure at transfer tube.

PNMR (at transfer tube) vs NMR (at target chamber)



- During cold spin down without convection, the first several points have strong diffusion effect. With convection on, the diffusion effect become smaller and we can get the linear curve.

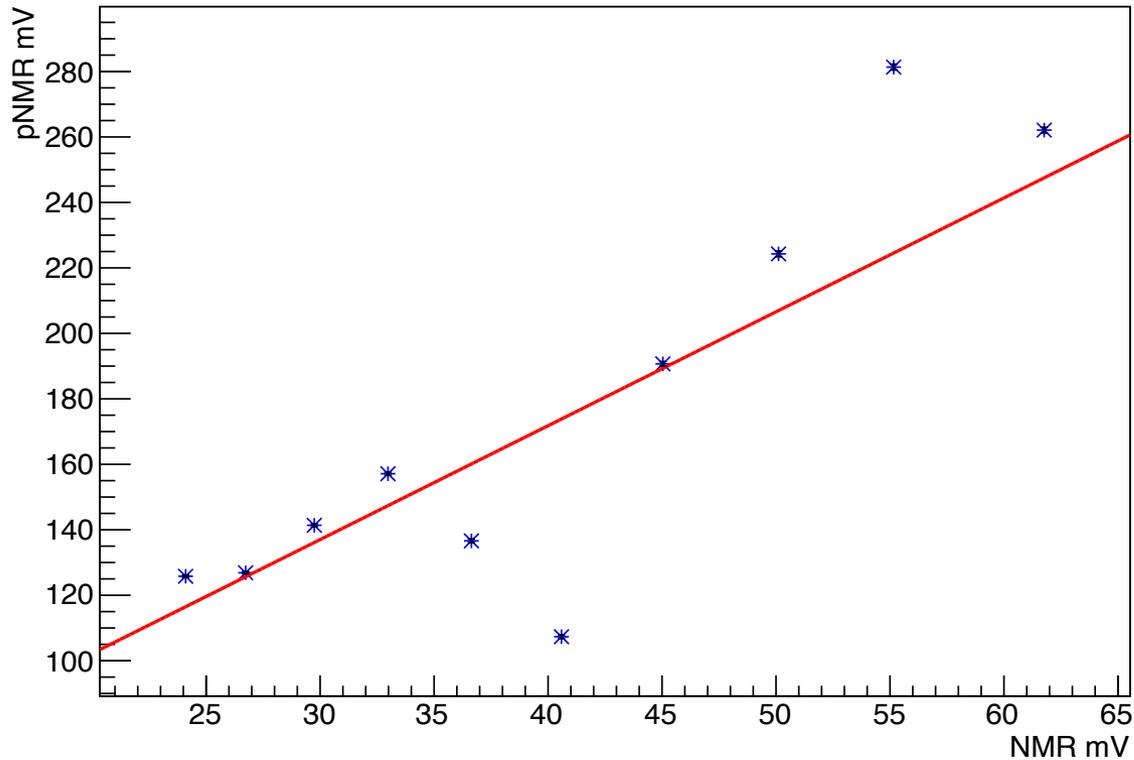
New setup with Lock-in Amplifier and fast DAQ card



System works but need to tune to get good signal

Test PNMR with NMR

Hot spindown with convection at transfer tube



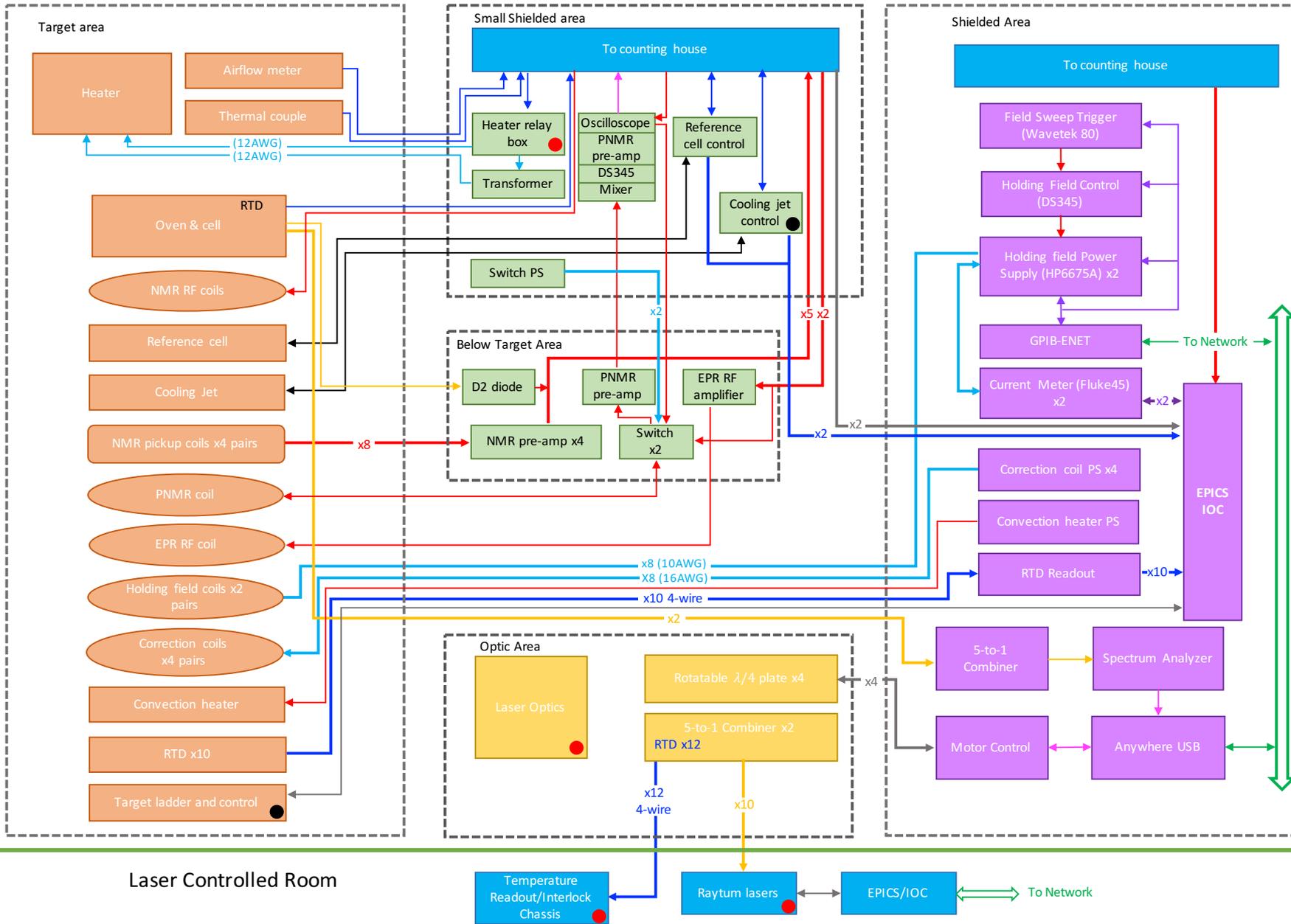
Further works:

- ❖ Optimize the system to get the right signal.

Target System inside Hall C

Nguyen Ton
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- GPIB
- Coaxial
- Wire
- Power wire
- USB
- Network
- Serial
- Fiber
- Other
- Interlock to laser
- Interlock to beam



Thank You