

Target Lab Update

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for Transversity Collaboration Meeting

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Outline

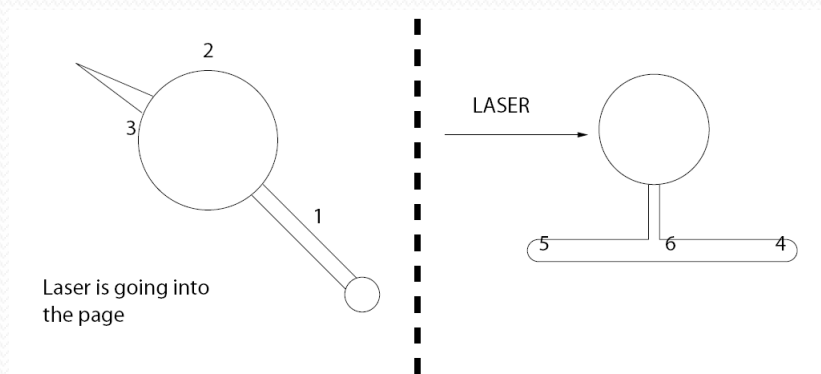
- Previous Meeting.
- Oven Temperature Test.
- Optics Alignment with 5 to 1 Combiner.
- Laser Power Test and Optimal Condition.
- New Oven System.
- Equipments to the Hall.
- Density/Wall Thickness Measurements.
- Future Plan.

Previous Meeting

- NMR system working properly (Both field/ frequency sweep)
- EPR system working as well
- Optimization being done as we move along
- Density set up working/ measurements done for 4 cells (3 new)
- Unfortunately, 2 cells exploded and no definite reasons yet!
- Water NMR done ! (pretty good signals)
- 2 pairs of new RF coils arrived. But of the same size !!! Order of a new pair is in process
- Vertical compass tested separately for horizontal and vertical field
- The compass could not be tested precisely and fully until all the Helmholtz coils installed together in HALL
- All new VIs written and tested (NMR/EPR) with offline analysis codes being worked on

RTD Setup for Temp Test

- Put 6 RTDs (3 inside oven, 3 outside) to monitor the temperature distribution of the cell.



- With 90W laser ON, the Surface temperature of pumping chamber is about 20 °C higher than the oven temperature and the internal temperature is estimated to be another 10-20°C higher.

Oven Temperature Test

- Cell: Gloucester (42.6% measured in W&M)
- Laser: 3 lines, 90W total power

| Temperature (°C) | Spin-Up Time (hrs) | Max NMR (mV) | Max Polarization (%) |
|------------------|--------------------|--------------|----------------------|
| 220 | 11.1 | 395 | 42 |
| 230 | 8.4 | 415 | 45 |
| 240 | 6.4 | 420 | 45 |
| 250 | 4.7 | 421 | 44 |

After New Oven Installed

- Cell: Wendy (51.8% measured in W&M)
- Laser: 3 lines, 90W total power

| Temperature (°C) | Spin-Up Time (hrs) | Max NMR (mV) | Max Polarization (%) |
|------------------|--------------------|--------------|----------------------|
| 230 | 5.3 | 46.33 | 52 |
| 240 | 3.4 | 44.49 | 49 |
| 250 | 1.8 | 39.68 | 43 |

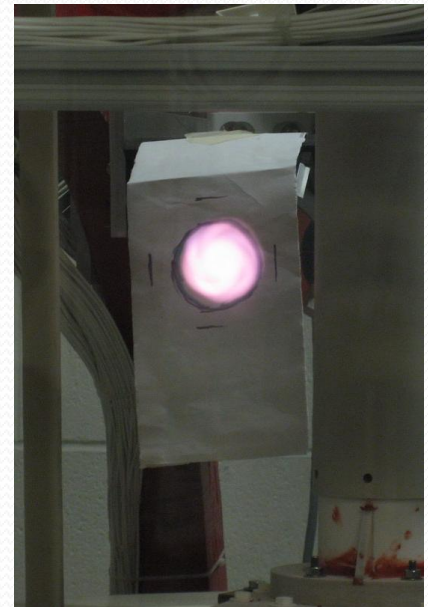
Oven Temperature Test

- Cell: Rockport (59.5% measured in W&M)
- Laser: 3 lines, 90W total power

| Temperature (°C) | Spin-Up Time (hrs) | Max NMR (mV) | Max Polarization (%) |
|------------------|--------------------|--------------|----------------------|
| 200 | 8.9 | - | 41.6 |
| 210 | 7.9 | - | 43.6 |
| 220 | 6.6 | - | 44.4 |
| 230 | 5.3 | - | 47.2 |
| 240 | 4.1 | - | 39.9 |

Optics with 5 to 1 Combiner

- Used new 5 to 1 combiner.
- Power lost in connection < 1.5 W with 30 W laser power.



Laser Power Test

- Cell: Rockport
- Oven Temperature: 240°C

| Temperature (°C) | Laser Power (W) | Spin-Up Time (mV) | Max Polarization (%) |
|------------------|-----------------|-------------------|----------------------|
| 240 | 100 | 5.0 | 35.7 |
| 240 | 125 | 4.6 | 37.6 |
| 240 | 150 | 4.0 | 39.4 |

Laser Power Test

- Cell: Boris
- Oven Temperature: 240°C

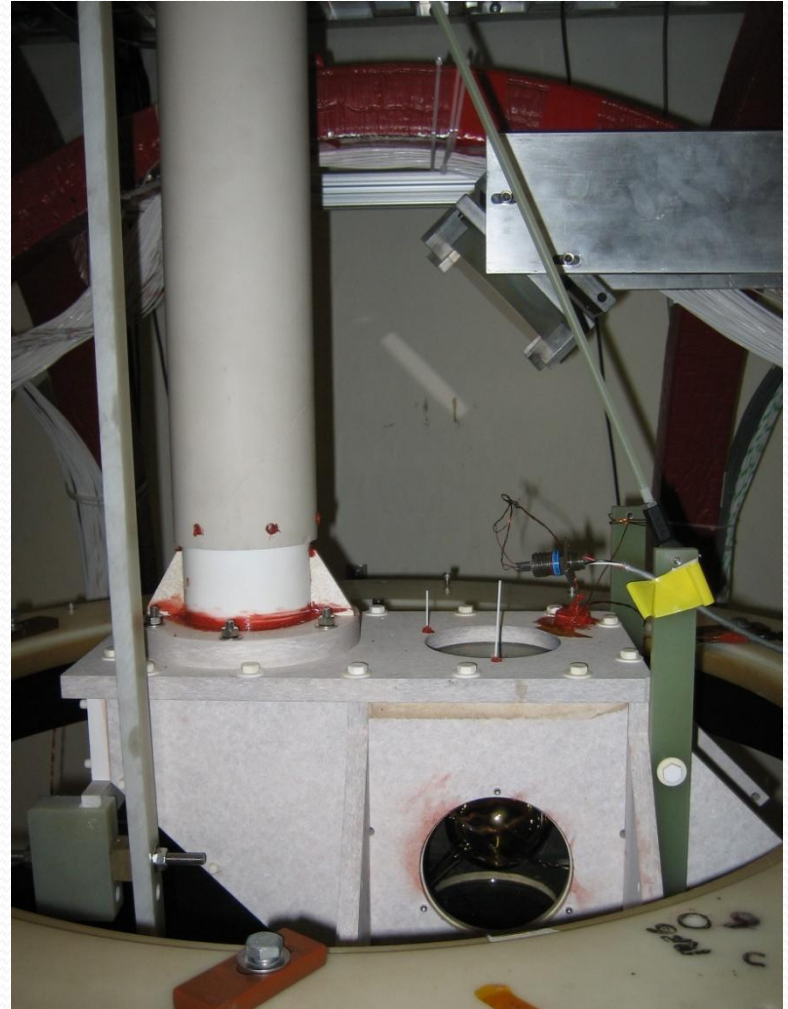
| Temperature (°C) | Laser Power (W) | Spin-Up Time (mV) | Max Polarization (%) |
|------------------|-----------------|-------------------|----------------------|
| 240 | 90 | 3.7 | 35.8 |
| 240 | 100 | 3.8 | 40.1 |
| 240 | 125 | 3.6 | 44.6 |
| 240 | 150 | 3.5 | 42.5 |

Optimal Condition

- Oven temperature: 230°C
- Laser Power: 100-125W

New Oven System

- New material: CS85 Structural Insulation.
- Better insulation, less weight (29 lb. compared with previous one ~ 45 lb.).
- Black interior painting.
- One is in use, another one is being assembled.
- A new tube was designed and is being manufactured



Equipments to the Hall

- Started to move to the Hall after July 5.
- All instruments in counting house now.
- Preparing/connecting cables now.



Density/Wall Thickness Measurement

- Yi Zhang is continuing the density measurement of the cells (5 cells were measured).
- Latest result from BORIS: 8.2 amg compared to the 8.0 amg filling density.
- Wall thickness measurement system has been set up and is under test now.

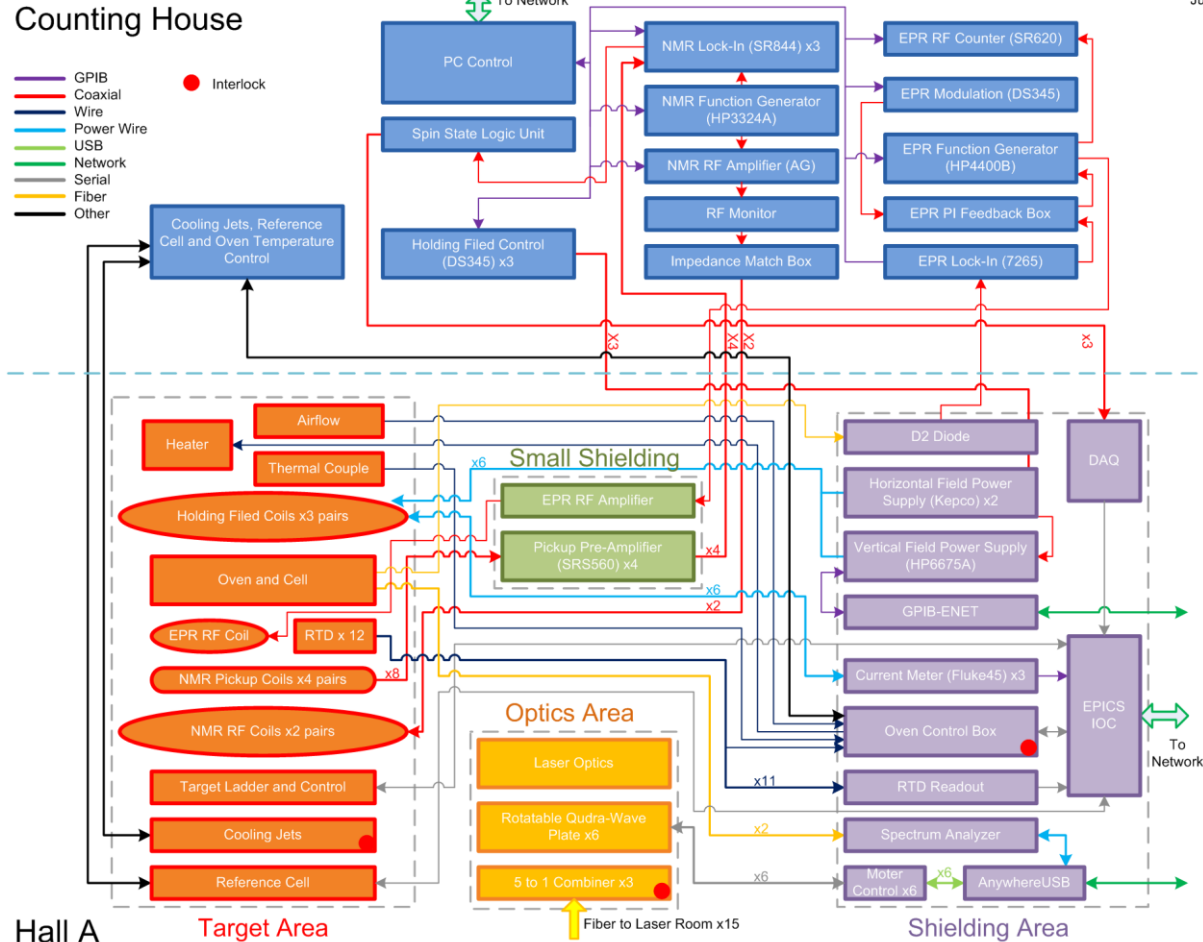
Future Plan

- Finish equipment connection by mid Aug.
- Test the new tube.
- Field Mapping in early Aug.
- Finish EPICS setup (control and variables).
- Update and test all control/measurement software.
- Test all equipments, make sure good spares exist.
- Complete fail safe strategies.
- Prepare procedures and documents.
- Continue density/wall thickness measurements.
- Install target and get ready for the experiment.

Target System Diagram

Hall A He3 Polarized Target Diagram

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Thank you

