

Transversity Target lab. Update

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for Yi Qiang, Joe Katich, Yi Zhang

Transversity Collaboration Meeting

2nd May 2008

Transversity Target

Chiranjib Dutta

Outline

Last meeting

Progress

Helium NMR

A new test

Water NMR

EPR

Oven/Optics

Characterization

Status/ Difficulties

Plan

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- Issues in the last collaboration meeting
- Progress till date
- Status/Difficulties
- Plans before the installation

Future Plan

- ▶ Our goal is to get ready to move into the Hall by the end of July, 2008.
- ▶ Before that, we need:
 - ▶ Water calibration: ~ 1 month;
 - ▶ Assembling new oven: ~ 1 month;
 - ▶ Cell characterizations: ~ 3 months;
 - ▶ EPR Coil test and final design: ~ 1 month;
 - ▶ Spin flip signal: ~ 2 month;
 - ▶ EPR lock-in tuning: ~ 1 month;
 - ▶ Optimization of Condition: ~ 1 month;
 - ▶ Software (Controlling, monitoring and AFP fail recovery): ~ 3 month;



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What we have done so far

Transversity Target

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- Oven assembly/Optics/Software

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- Helium NMR
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- EPR
- Oven assembly/Optics/Software
- **Density Measurements/Compass**

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Status/ Difficulties

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- Field sweep NMR never been a problem

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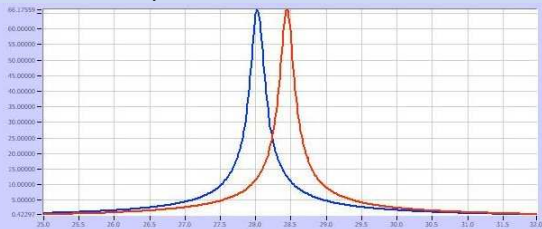
Characterization

Status/ Difficulties

Plan

- Field sweep NMR never been a problem
- Frequency sweep working after a software problem resolved

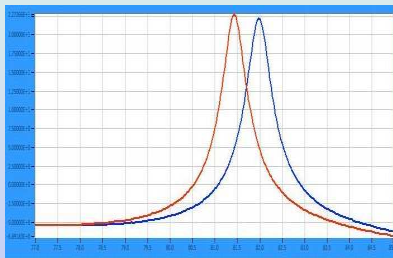
- Field sweep NMR never been a problem
- Frequency sweep working after a software problem resolved
- Nice field sweep in our lab.all the time



A test to know the spin state

Frequency sweep could be used to check the spin state of He^3

- Sweep UP-Sweep DOWN

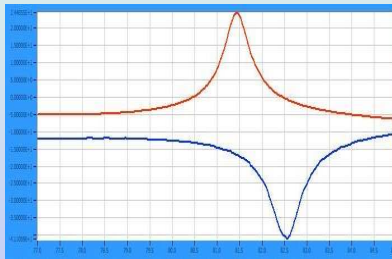


Once calibrated, the sign of the NMR frequency sweep signal could tell the spin orientation relative to the holding field.

A test to know the spin state

Frequency sweep could be used to check the spin state of He^3

- Sweep UP-Sweep DOWN
- Sweep UP-Sweep UP

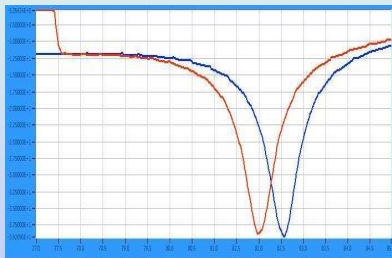


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A test to know the spin state

Frequency sweep could be used to check the spin state of He^3

- Sweep UP-Sweep DOWN
- Sweep UP-Sweep UP
- Sweep DOWN-Sweep UP

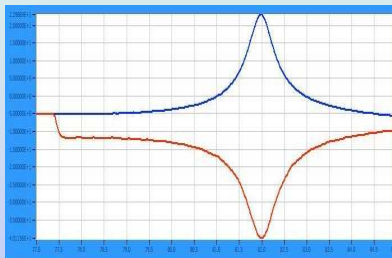


Once calibrated, the sign of the NMR frequency sweep signal could tell the spin orientation relative to the holding field.

A test to know the spin state

Frequency sweep could be used to check the spin state of He^3

- Sweep UP-Sweep DOWN
- Sweep UP-Sweep UP
- Sweep DOWN-Sweep UP
- Sweep DOWN-Sweep DOWN



Once calibrated, the sign of the NMR frequency sweep signal could tell the spin orientation relative to the holding field.

- Field sweep done after a bit of struggle

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- Field sweep done after a bit of struggle
- New adjustable pick up coils and a background subtraction clean the signal a lot

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- Field sweep done after a bit of struggle
- New adjustable pick up coils and a background subtraction clean the signal a lot
- Signal in 1 sweep

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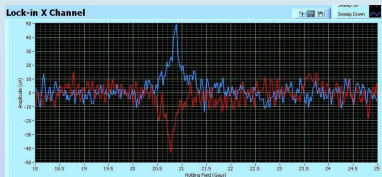
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Water Field sweep

- Field sweep done after a bit of struggle
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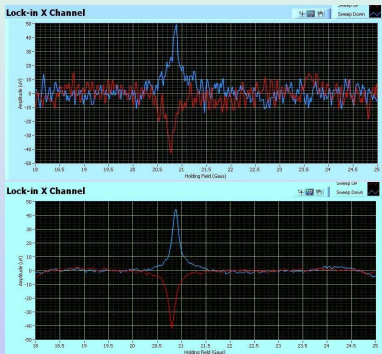
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- Field sweep done after a bit of struggle
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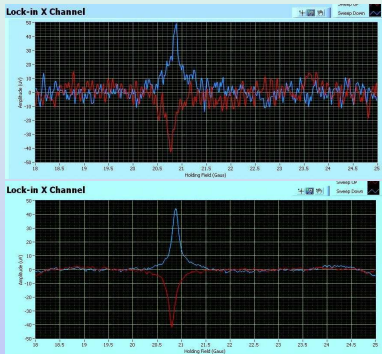
Oven/Optics

Characterization

Status/ Difficulties

Plan

- Field sweep done after a bit of struggle
- New adjustable pick up coils and a background subtraction clean the signal a lot
- Signal in 1 sweep
- Probably the best signal seen till now (on line)



More tests done for optimization

More tests to be done with the new high temp. wires (RF coil)

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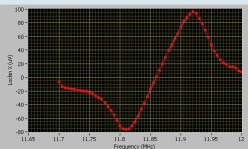
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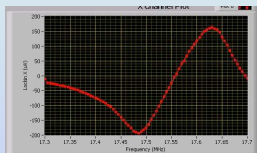
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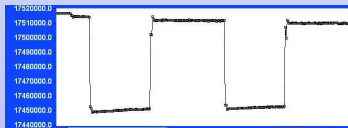
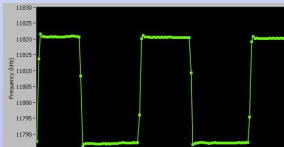
Plan



Rb^{85} -signal



K^{39} -signal



- New oven in house

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Plan

- New oven in house
- Ready and to be tested shortly

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Plan

- New oven in house
- Ready and to be tested shortly
- New pumping chamber NMR pick up coils on the way with the new high temp. wires

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- New oven in house
- Ready and to be tested shortly
- New pumping chamber NMR pick up coils on the way with the new high temp. wires
- All lasers tested

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Plan

- New oven in house
- Ready and to be tested shortly
- New pumping chamber NMR pick up coils on the way with the new high temp. wires
- All lasers tested
- One needs to be repaired/ to be sent next week

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Plan

- New oven in house
- Ready and to be tested shortly
- New pumping chamber NMR pick up coils on the way with the new high temp. wires
- All lasers tested
- One needs to be repaired/ to be sent next week
- All optics components in house(with at least couple of spares) and being assembled as a test (demo)

- 3 new cells measured (from WM)

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- 3 new cells measured (from WM)
- 2 of them exploded while in the oven

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- 3 new cells measured (from WM)
- 2 of them exploded while in the oven
- Reasons unknown yet ! Investigations going on

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- 3 new cells measured (from WM)
- 2 of them exploded while in the oven
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- Vertical compass being tested

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Plan

- 3 new cells measured (from WM)
- 2 of them exploded while in the oven
- Reasons unknown yet ! Investigations going on
- Vertical compass being tested
- New RTDs being made/ Temperature test to be done shortly

- **NMR system working properly (Both field/ frequency sweep)**

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- **NMR system working properly (Both field/ frequency sweep)**
- **EPR system working as well**

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- **NMR system working properly (Both field/ frequency sweep)**
- **EPR system working as well**
- **Optimization being done as we move along**

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- **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)**

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- **Unfortunately, 2 cells exploded and no definite reasons yet!**

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- Water NMR done ! (pretty good signals)

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- **2 pairs of new RF coils arrived. But of the same size !!! Order of a new pair is in process**

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- Vertical compass tested separately for horizontal and vertical field

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- The compass could not be tested precisely and fully until all the Helmholtz coils installed together in HALL

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- 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 VI s written and tested (NMR/EPR) with offline analysis codes being worked on

- **Temperature test right away**

Basically, we will try to characterize as many cells as we could with the new oven. This serves not only as a test for our new oven but also as a continuous check of our system and the polarimetry in the process of the preparation for the experiment before installation.

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- **Temperature test right away**
- **New oven installation and test**

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- **Temperature test right away**
- **New oven installation and test**
- **Keep on doing EPR/NMR with new cells in terms of characterization**

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- **Try to do optimization along with**

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- **Keep on doing EPR/NMR with new cells in terms of characterization**
- **Try to do optimization along with**
- **Cell density measurements**

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- Temperature test right away
- New oven installation and test
- Keep on doing EPR/NMR with new cells in terms of characterization
- Try to do optimization along with
- Cell density measurements
- Spin flip signal/ EPICS scheme to be implemented

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