

He3 Target Lab Update

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for *C. Dutta/J. Katich/Y. Zhang/J. Huang*

Transversity Collaboration Meeting

March 17, 2008

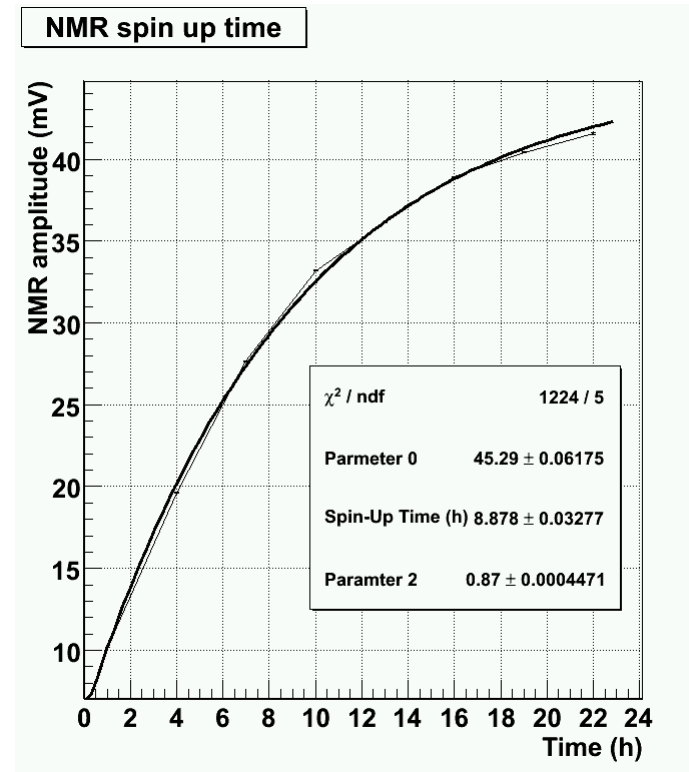
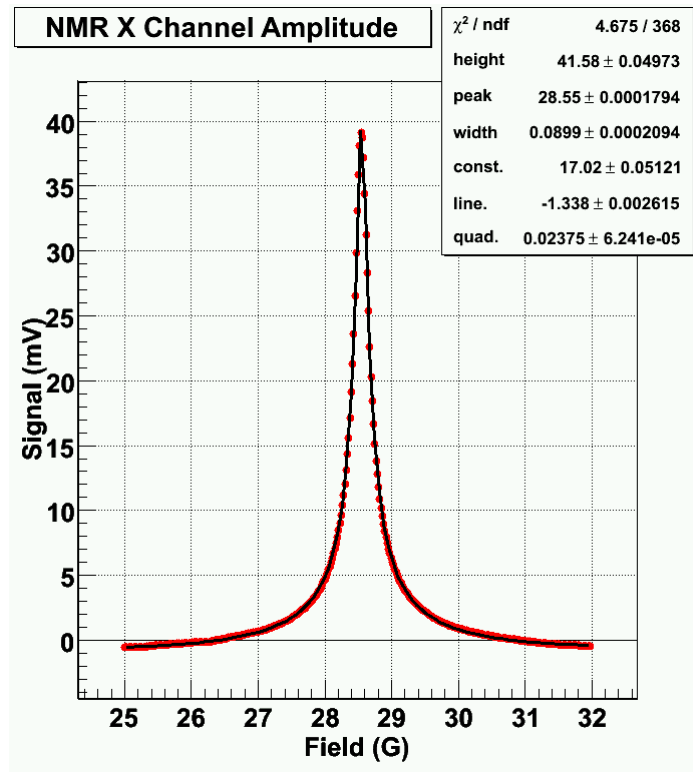


Since Last Collaboration Meeting

- ▶ A 3 inch cell (Gloucester) was placed in the oven.
- ▶ NMR was working w/o problem.
- ▶ EPR Finally worked.
- ▶ New oven pieces arrived. Still waiting for the tube.
- ▶ All 20 cells were made, waiting for characterization.
- ▶ Cell density measurement on its way (More details in *Yi Zhang* s talk).
- ▶ Design of Target flip signal on the way (More details in *Jin Huang* s talk).

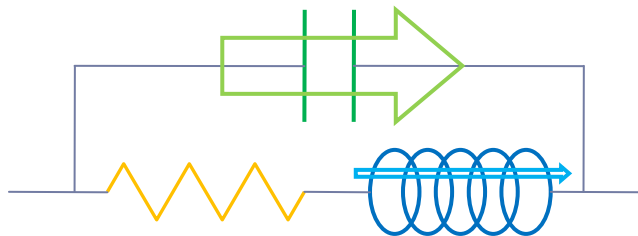
NMR Polarimetry

- ▶ 2 Lines of Lasers (29W each).
- ▶ Spin-up time: 8-9 hours.



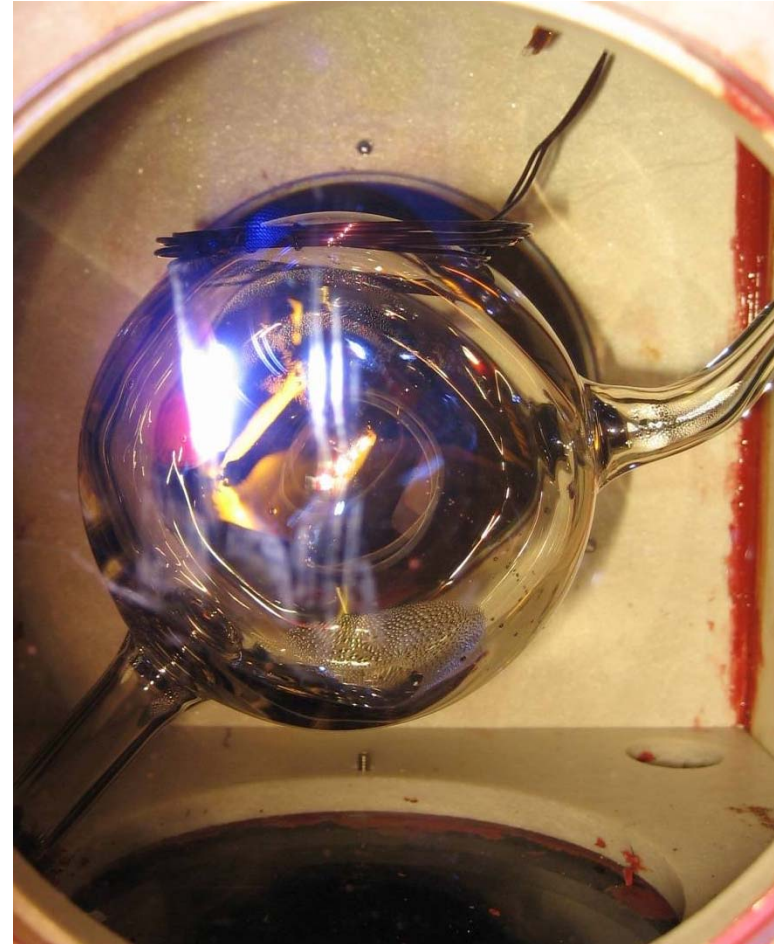
EPR Polarimetry

- ▶ No EPR signal at the beginning.
- ▶ Problem was identified to be the insufficient EPR RF power:
 - ▶ Coil is far far away from the cell (10-15 cm compared to previous <5 cm);
 - ▶ Impedance mis-match introduced quite large power reflection;
 - ▶ Thin wire of coil brought low capacitance and lead no power dissipation in the inductance.

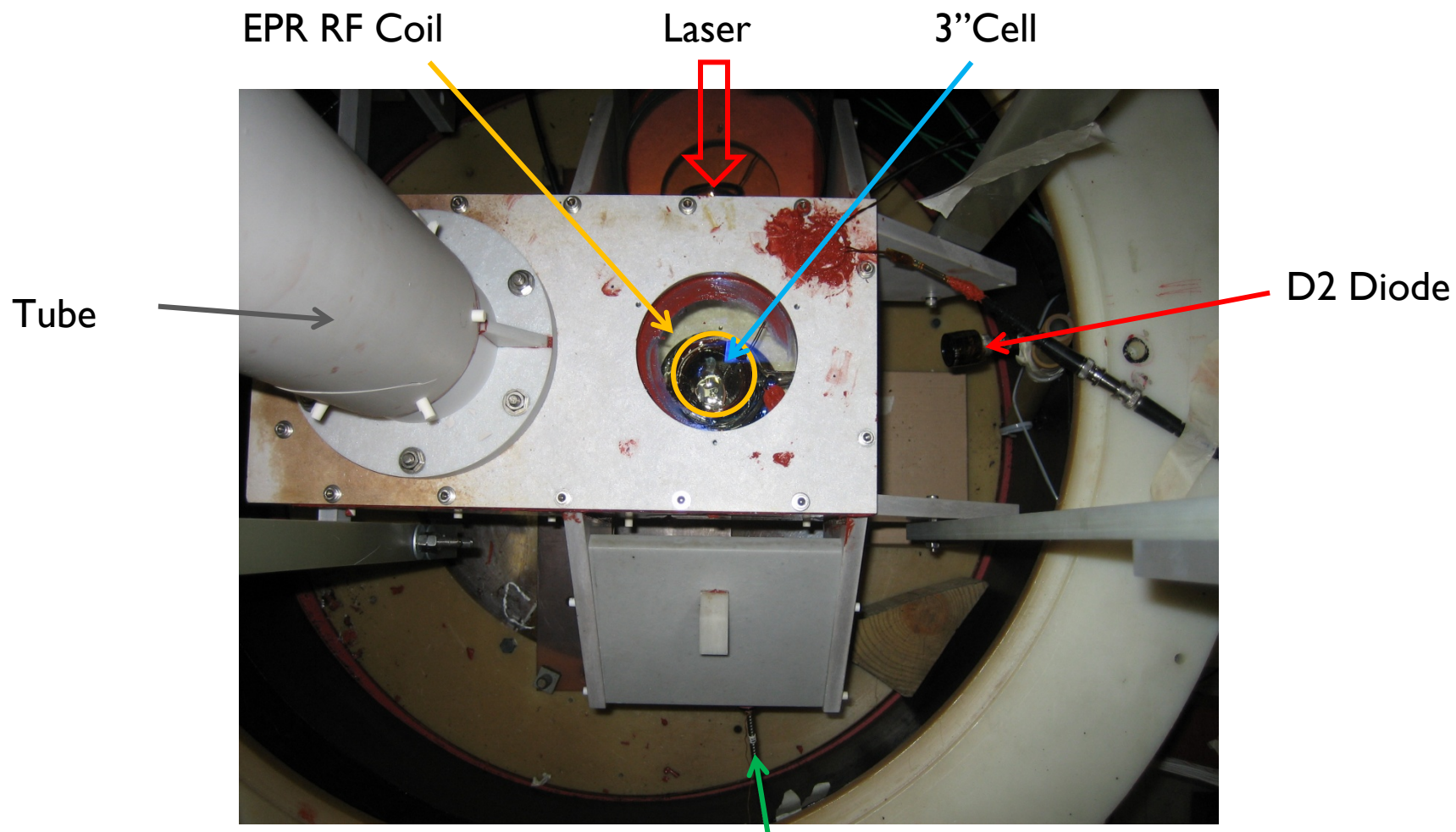


Increase EPR RF Power

- ▶ Put the coil inside the oven.
 - ▶ A first 10 turn coil was made of normal gauge magnetic wire (180C). Oven temperature was reduced to 170 C. Clean EPR signal was observed.
 - ▶ A second coil was made of high temperature magnetic wire (Gauge 250C) recently. Oven temperature was increased to 240 C.



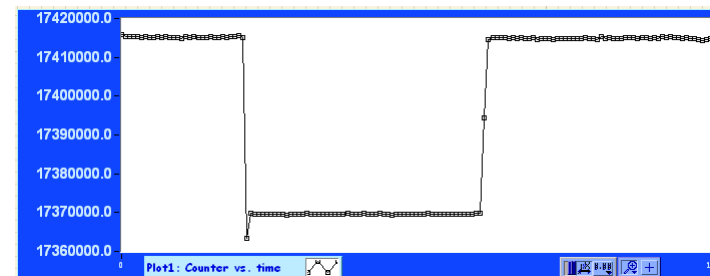
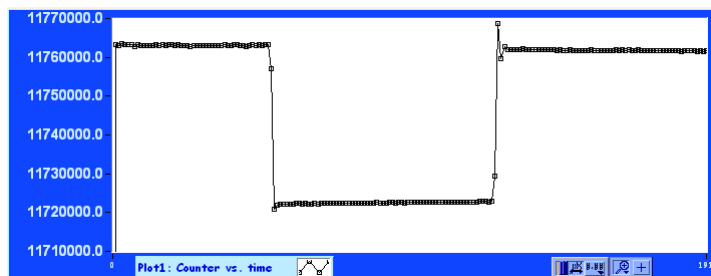
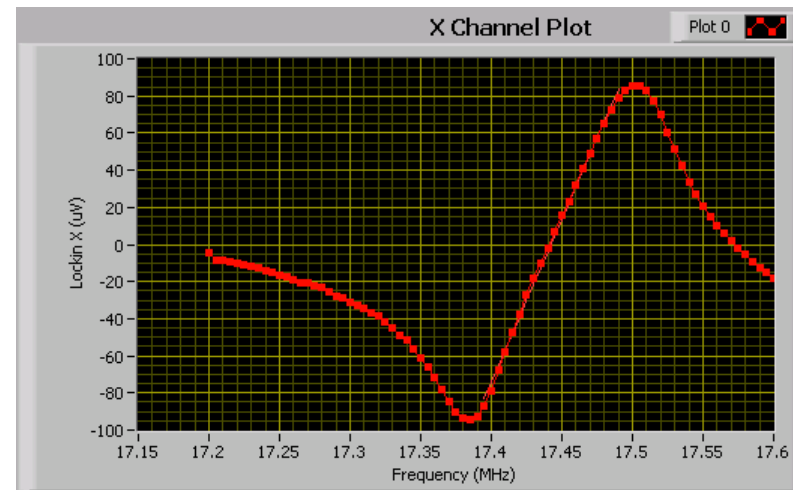
EPR Setup



Fiber to Spectrometer

EPR Measurement

- ▶ Both **Rb** and **K** EPR line shapes can be seen at either 170 or 240 C.



⁶⁵Rb

B=24.5G, Polarization~46%

³⁹K

More Work with EPR Coil

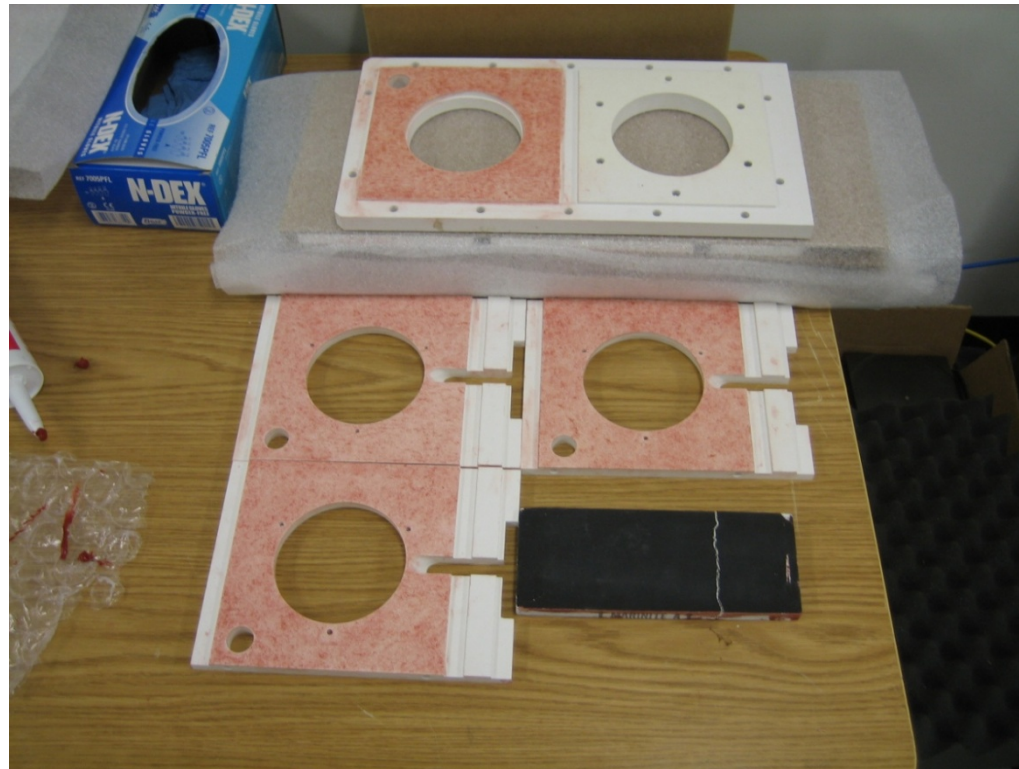
- ▶ Need a formal (permanent) design to put coil inside.
- ▶ High temperature aging test.
- ▶ A better impedance match (provide us stronger EPR RF signal with current pre-amplifiers). This work gets help from *John Musson*.

New Oven

- ▶ Pieces arrived last week. Joe is working on painting and assembling.
- ▶ 1/2 of the weight of current one (~20 lb.).
- ▶ New security features.
- ▶ Interior will be painted black to reduce reflections.
- ▶ EPR RF coil can be mounted inside with some modifications.
- ▶ 2 ovens will be made.

New Oven

- ▶ Oven pieces in process:
 - ▶ Red RTV first, then black spray.



Lasers and Optics Components

- ▶ **FAP Lasers**
 - ▶ In lab and working: 5 Singles and 2 Duos;
 - ▶ Being repaired: 1 Singles and 1 Duo (both by Coherent).
- ▶ **Long Optic Fibers**
 - ▶ In the Hall.
- ▶ **Optic Component**
 - ▶ All parts are in lab now;
 - ▶ Need to be tested;
 - ▶ Three lines in total;
 - ▶ Each component has at least 2 spares.

Cells

- ▶ All 20 Cells have been made
 - ▶ 10 from W&M and 10 from UVA.
- ▶ 1 water cell is being filled in W&M.
- ▶ Target density measurement is under way.
- ▶ Other characterizations will start soon: density, polarization, spin-up/relaxation time, AFP loss...

Compass

- ▶ In the process of finishing up the determination of the "moment of inertia (MOI)" of the compass.
- ▶ Resolution verified to be 0.09 degrees.
- ▶ Plan to achieve 0.05 degrees.
- ▶ Customization to be done when it arrives at JLab.



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;

Thank You!