Target Polarization analysis 2002

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1 TE Calibration

To get calibration constants, all area units analysed by Jaakko, Yuri, and Kaori at both temperature (1.01 K and 1.33 K) were included for Curry law fitting.

The average of errors of these points is about +/- 2%, and I would like to take this value rather than fitting errors which is extreamly small.

TE area units at 1 K are as follows:

coil	area	fitting error
1	-8770.8	82.13
2	-8393.25	111.42
3	-7093.89	329.24
4	-10278.4	90.92
5	–	–
6	-2469.91	56.66
7	-10334.8	58.45
8	-8113.43	57.08
9	-7515.11	45.72
10	-8771.38	65.84

Table 1: calibration constants

2 YaleCards gain factors

TE signals were measured with higher gain in Yale cards. Here are ratio of gain for TE signals to gain for enhanced signals. They were measured after unloading target material.

coil	gain factor
1	213.55
2	211.99
3	210.74
4	213.05
5	-
6	209.77
7	211.47
8	212.06
9	212.99
10	211.10

Table 2: YaleCards gain factors

3 Retuning

We did retuning just after the runtime at frozen mode. TE calibration was done after retuning. Areas are changed as follows at the same polarization:

coil	area befor retuning	area after retuning	correction factor
1	856674	762087	0.889588105
2	684181	711815	1.040389897
3	765563	629116	0.821769077
4	867581	890293	1.026178535

Table 3: retuning correction factors

All areas in runtime should be divided by these retuning factors.

4 Field Rotation Correction

Retuning and TE calibration were done at positive magnetic field. Then polarization data at positive field are reliable. Polarization data taken at negative field spread widely, but these can be corrected by positive field polarization data because polarization just before and after field rotation should be the same.

Correction factors are decided with fitting data before and after a field rotation. When polarization orientation reversal by microwave frequency was made, these correction factors are changed.

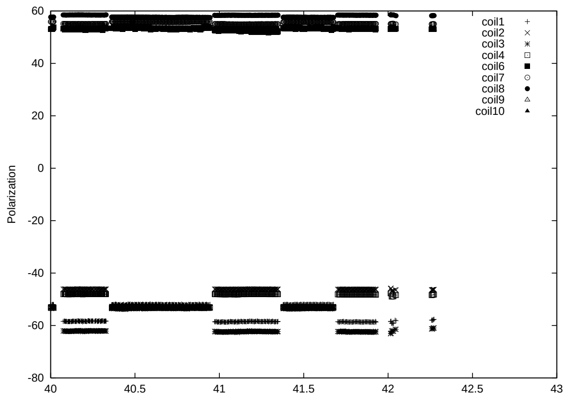

Figure 1: Polarization plot before field rotation correction

coil	upstream pos. pol.	upstream neg. pol.
1	0.889090	0.901680
2	1.143768	1.120637
3	0.858934	0.877625
4	1.105449	1.084647
5	-	-
6	1.023330	1.010755
7	1.014688	1.013136
8	0.987024	0.989991
9	1.001024	1.000239
10	0.990566	0.992114

Table 4: Correction Factor to negative field data

5 Correction to Interference with Thermometers

There were interaction between thermometers and NMR coils. When microwave power was put, NMR signals were effected through thermometers.

As TE calibration was done under no microwave power, polarization data taken without microwave input should be trusted. Data with microwave input was corrected by using data without microwave input. Data during transition period were thrown away.

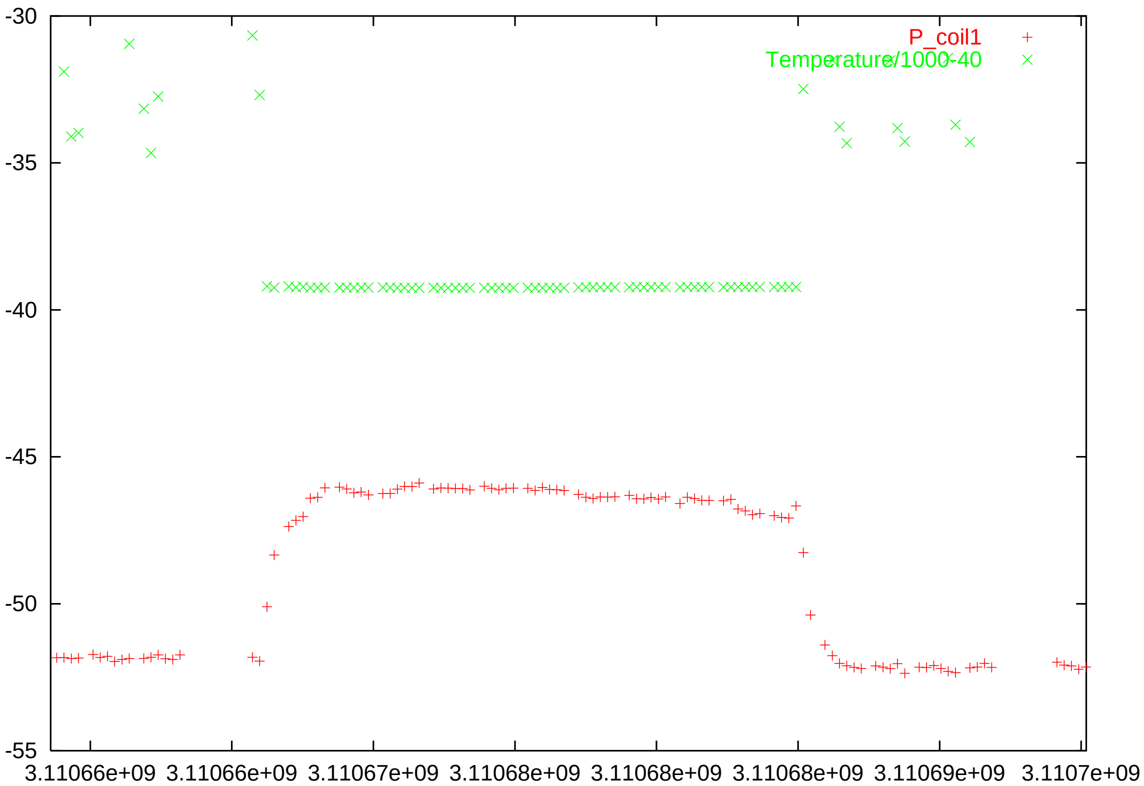

Figure 2: speer up and polarization of coil 1

6 Error Estimation

These are rough values. They are still under consideration.

source	upstream (rerative)%	downstream(rerative)%
TE constants	2.0	1.5
field rotation	2.0	0.5
temperature	–	–
theremoreter intereference	1.0	0.5

Table 5: Errors