

Polarization results of 2002 run

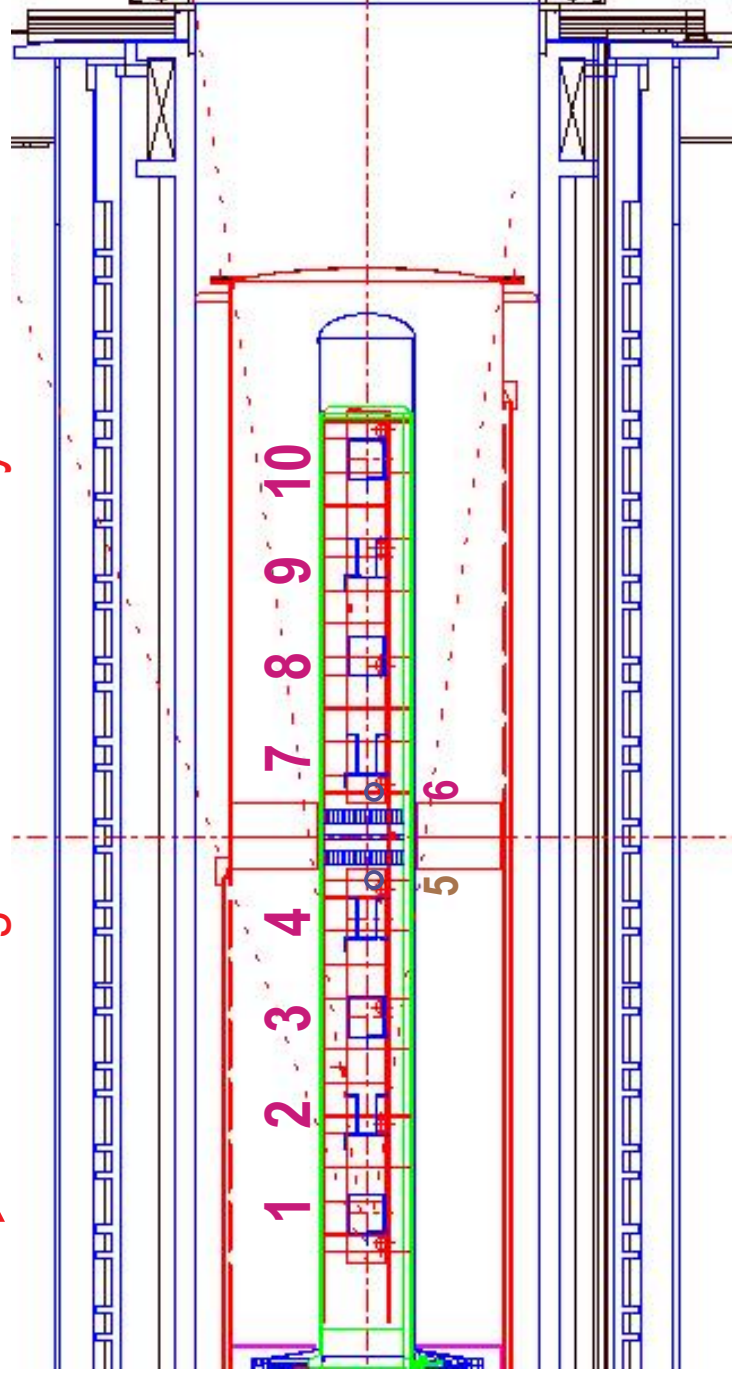
Kaori KONDO

Polarization Measurement

NMR coils

- Both upstream and downstream cell has
 - 4 big saddle shaped coils outside the cell
 - 1 small coils inside the cell

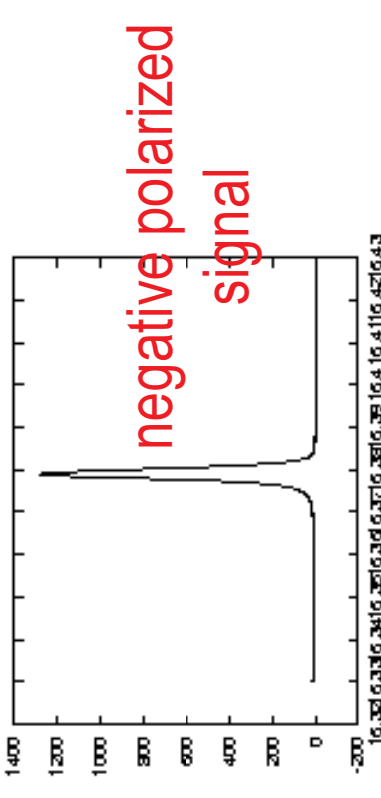
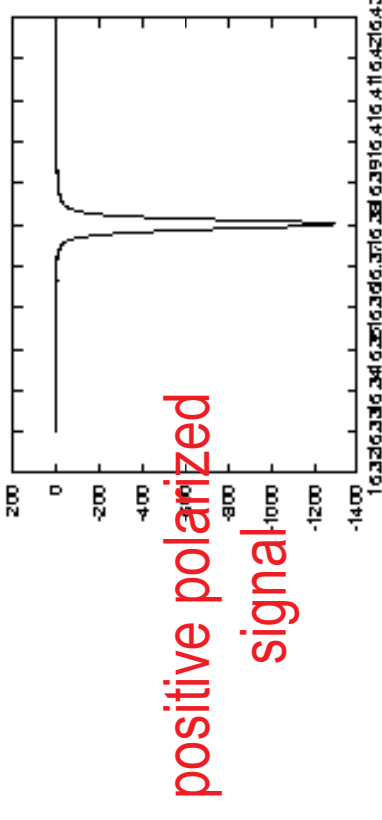
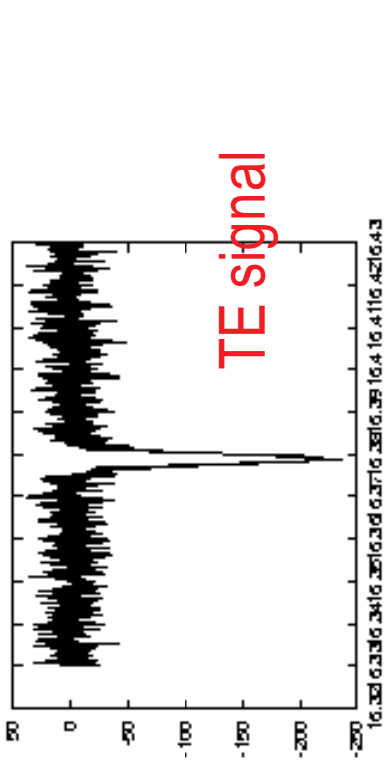
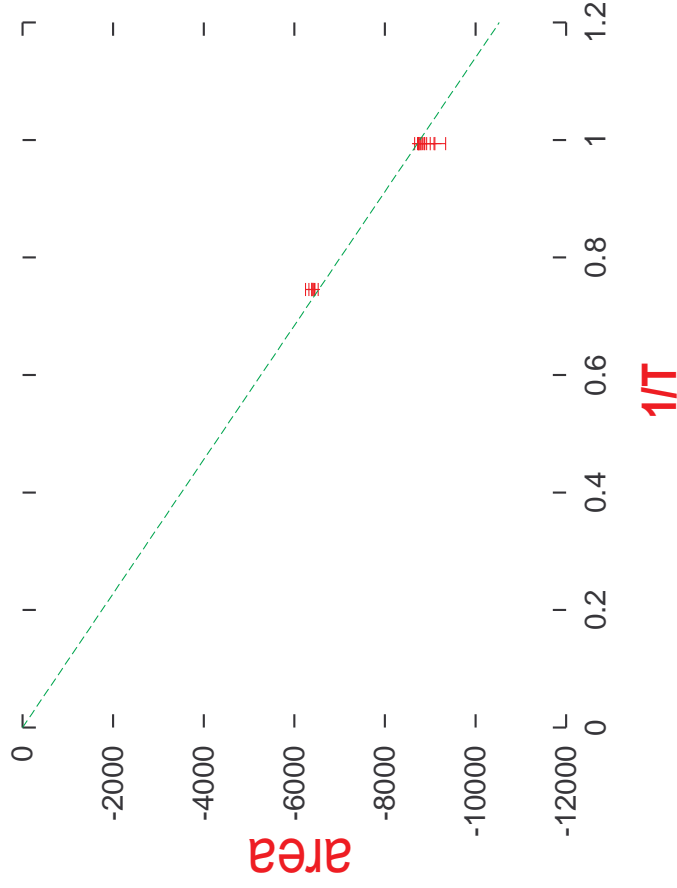
→ Packing factor increased by 10 %



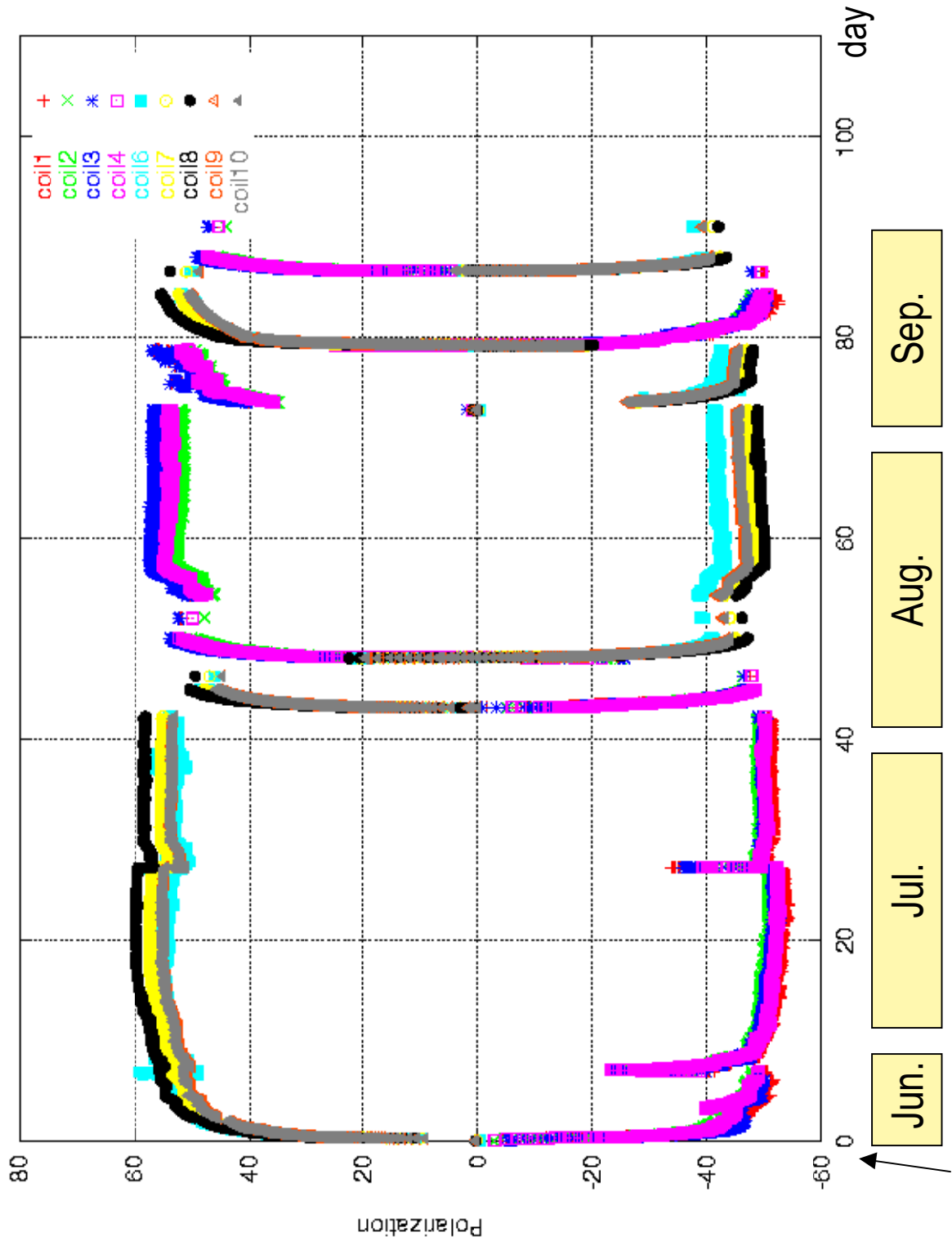
TE Calibration

- $P = S / S_{TE} * P_{TE}$
- $P_{TE} = \frac{4 \tanh(\frac{\mu_d H_0}{k_B T})}{3 + \tanh^2(\frac{\mu_d H_0}{k_B T})}$

- $H_0 = 2.5 \text{ T}$
- $T = 1.01 \text{ K} \& 1.33 \text{ K}$



Deuteron Polarization 2002



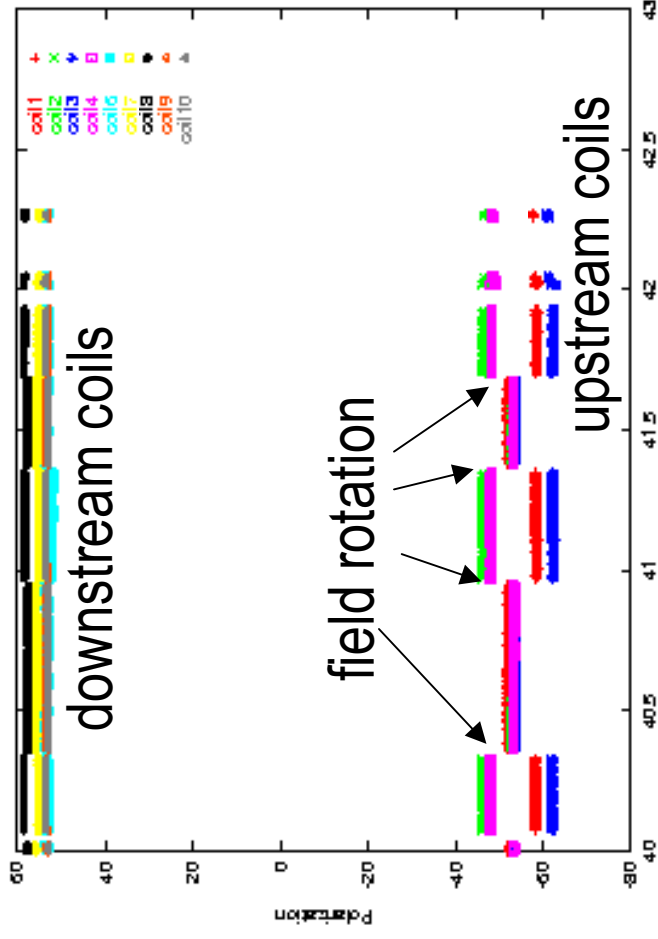
19 June 2002

Corrections to Polarization Values

- Effect of Field Rotation

Big jumps were made in polarization value in upstream coils.

TE calibration was done at positive field, so polarization values at positive field are true.

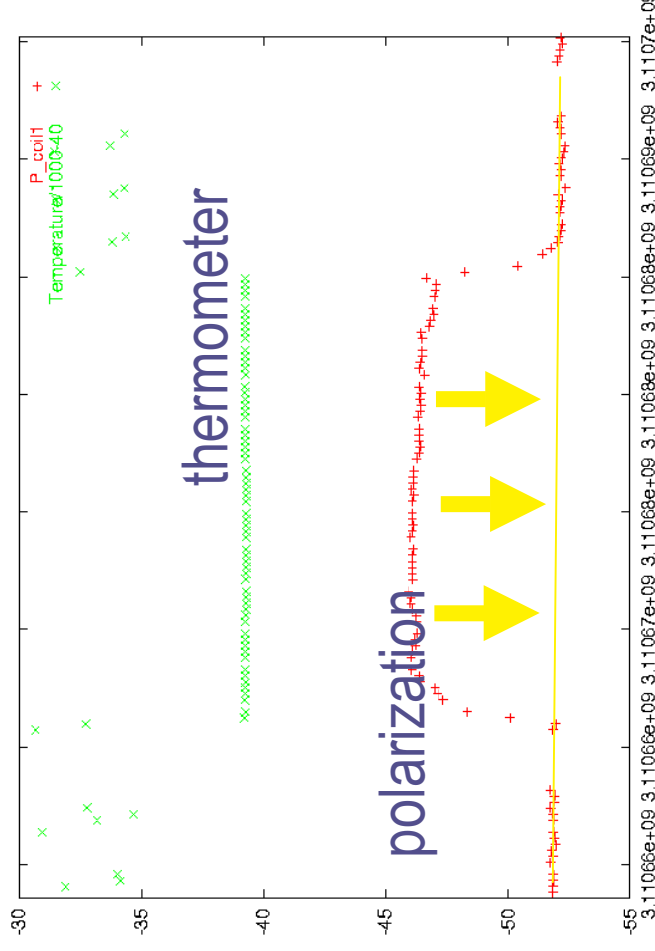


Corrections to Polarization Values

- Effect of microwave

Measurements were influenced by microwave ON/OFF states.

Polarization values when microwave was ON were corrected.

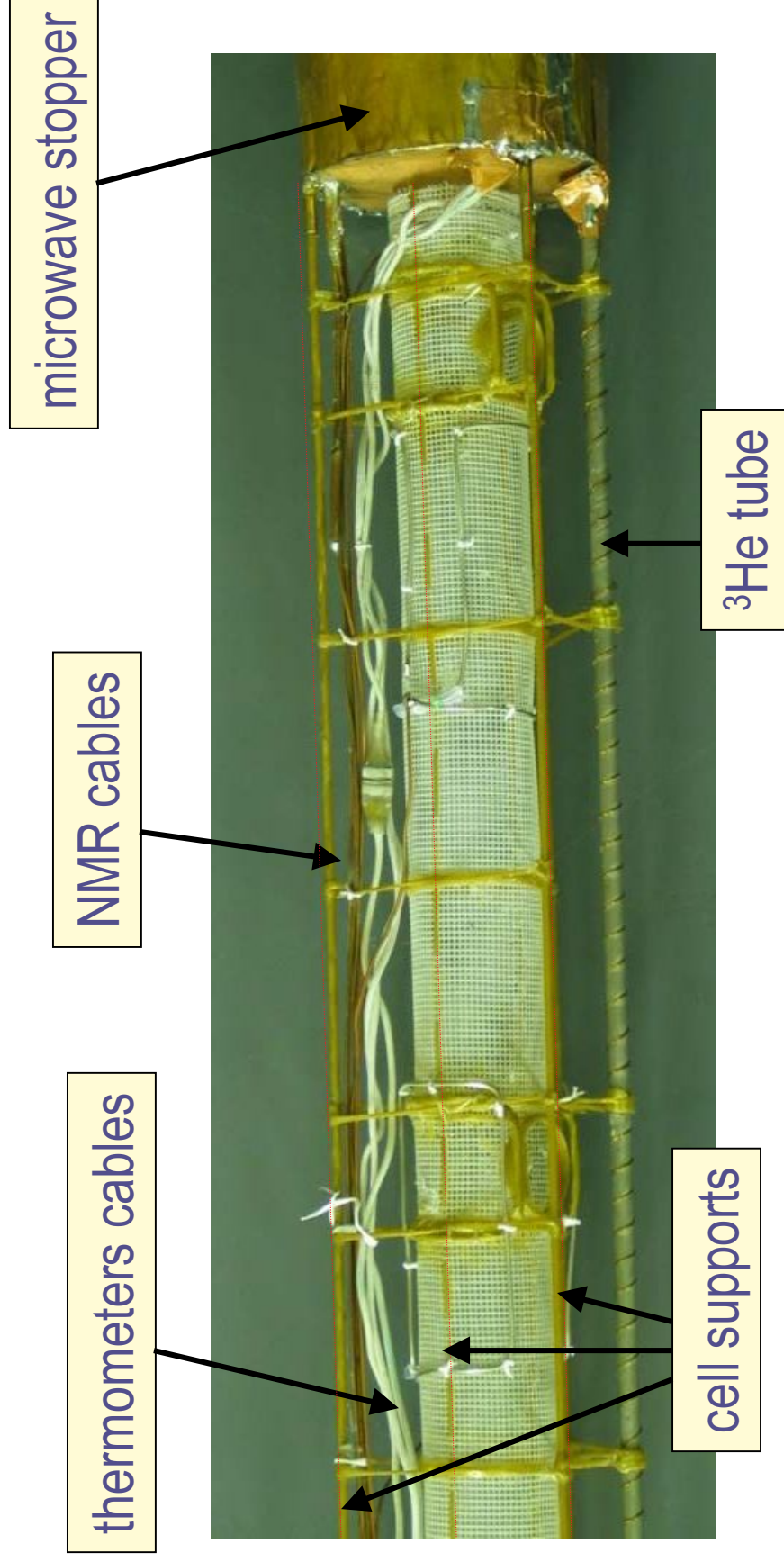


Corrections to Polarization Values

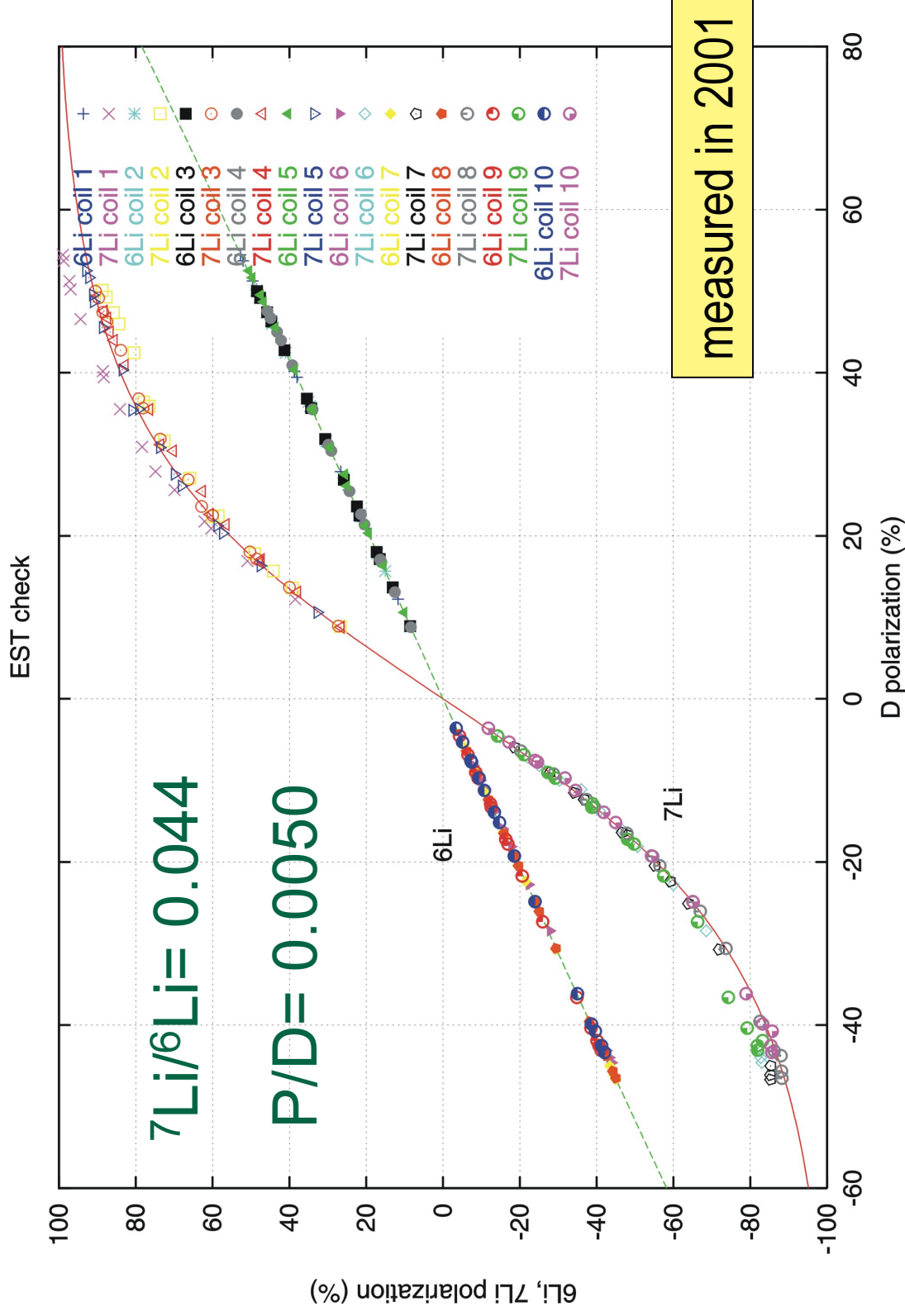
- TE calibration
 - TE measurement of each coil in upstream was done *separately* to avoid influence from other coils.
 - To correct this retuning effect,
 - high polarization measurement in frozen mode were done under the same condition as TE calibration
 - compare with runtime polarization data and calibrate them.

Source of problems

- Thermometer cables and NMR cables made a big loop around the upstream cell.



${}^6\text{Li}$, ${}^7\text{Li}$, Proton polarization can be calculated from EST theory



Summary

- Highest polarization

coil	2001 positive	2001 negative	2002 positive	2002 negative
1	57.80		57.00	-54.07
2	52.10		52.57	-51.43
3	53.00		57.41	-52.57
4	51.30		54.98	-52.82
5	56.70			
6		-46.20	56.76	-43.39
7		-48.30	57.41	-48.79
8		-49.60	59.98	-50.51
9		-45.50	55.13	-47.04
10		-45.90	55.18	-47.61
average	54.18	-47.40	56.41	-50.08

error of the measurement is ~ 1% in 2001, and < 2.5 % in 2002