

Target Polarimetry

* NMR

⇒ low $\vec{B}$ -field, $f_0 = 91 \text{ kHz}$
 $\vec{B} \rightarrow 0^\circ (180^\circ) \sim 10^\circ$

⊕

⇒ need good H_2O calibration
 $P_p \sim 7 \cdot 10^{-9} !! \rightarrow \text{low e-noise}$
 $\rightarrow \text{vibrations}$

* EPR

⇒ effect of $\vec{B}_{^3\text{He}}$ on hyperfine levels of R atoms

⊕

⇒ need stable $\vec{B}$ -field

$$\frac{\Delta B}{\Delta t} < 10^{-4} \text{ G/min} \checkmark$$

* $^3\text{He}(\vec{e}, e')$ elastic asymmetry ⇒ $\propto P_e P_e$

⊖ ?

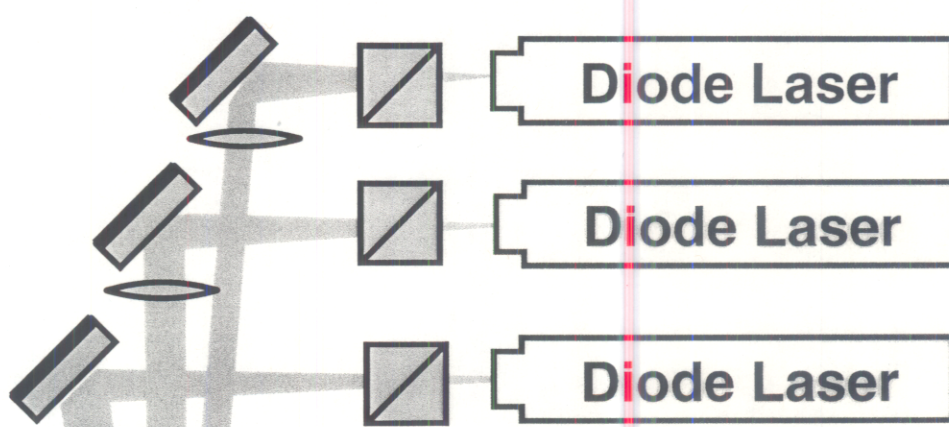
⇒ need HRS @ small θ_e

In general: $\vec{B}$ -field gradients small

($\lesssim 20 \text{ mG/cm}$), but not

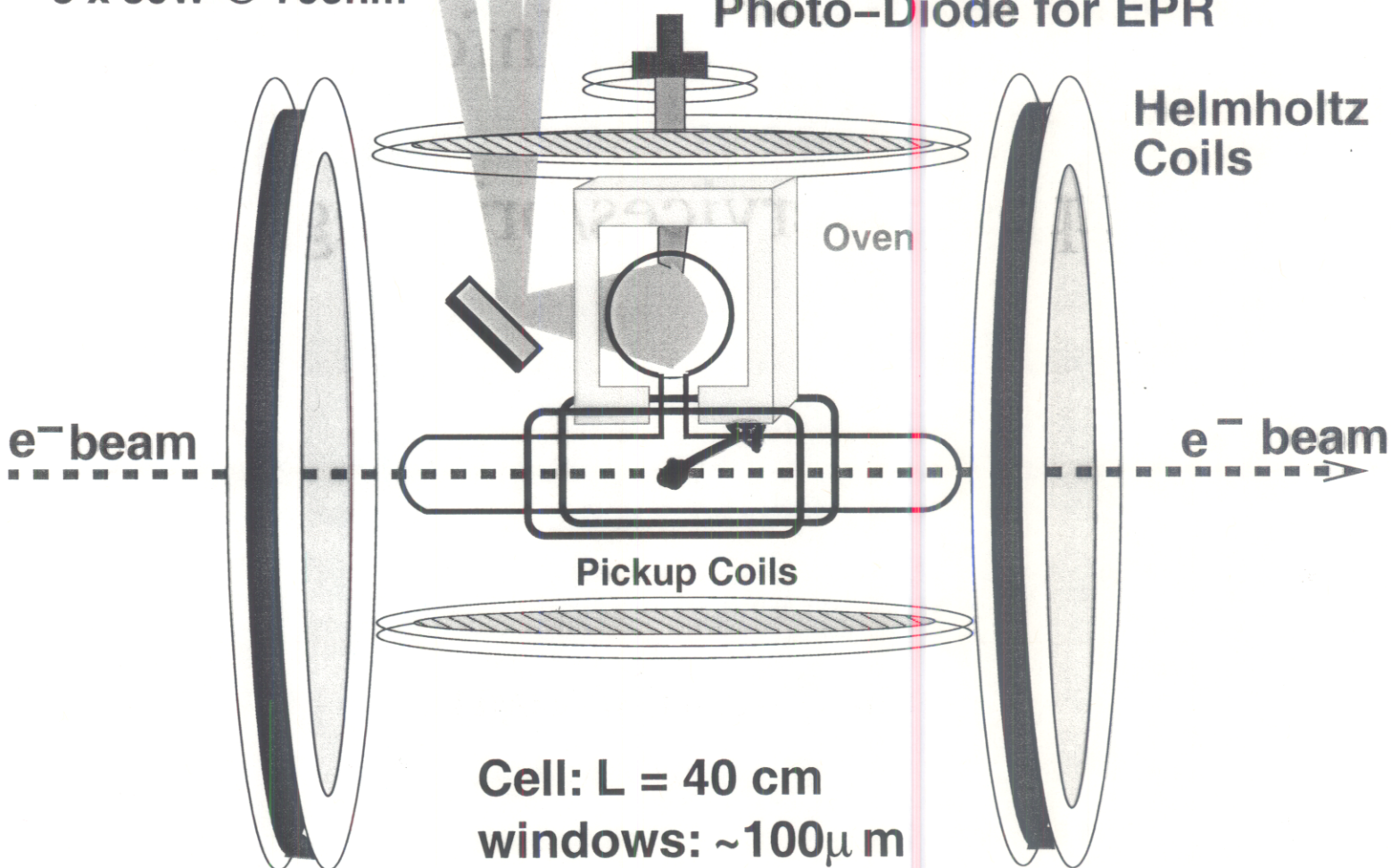
too small (EPR → masing)

$P = 45\%$
@ $I = 12\mu A$



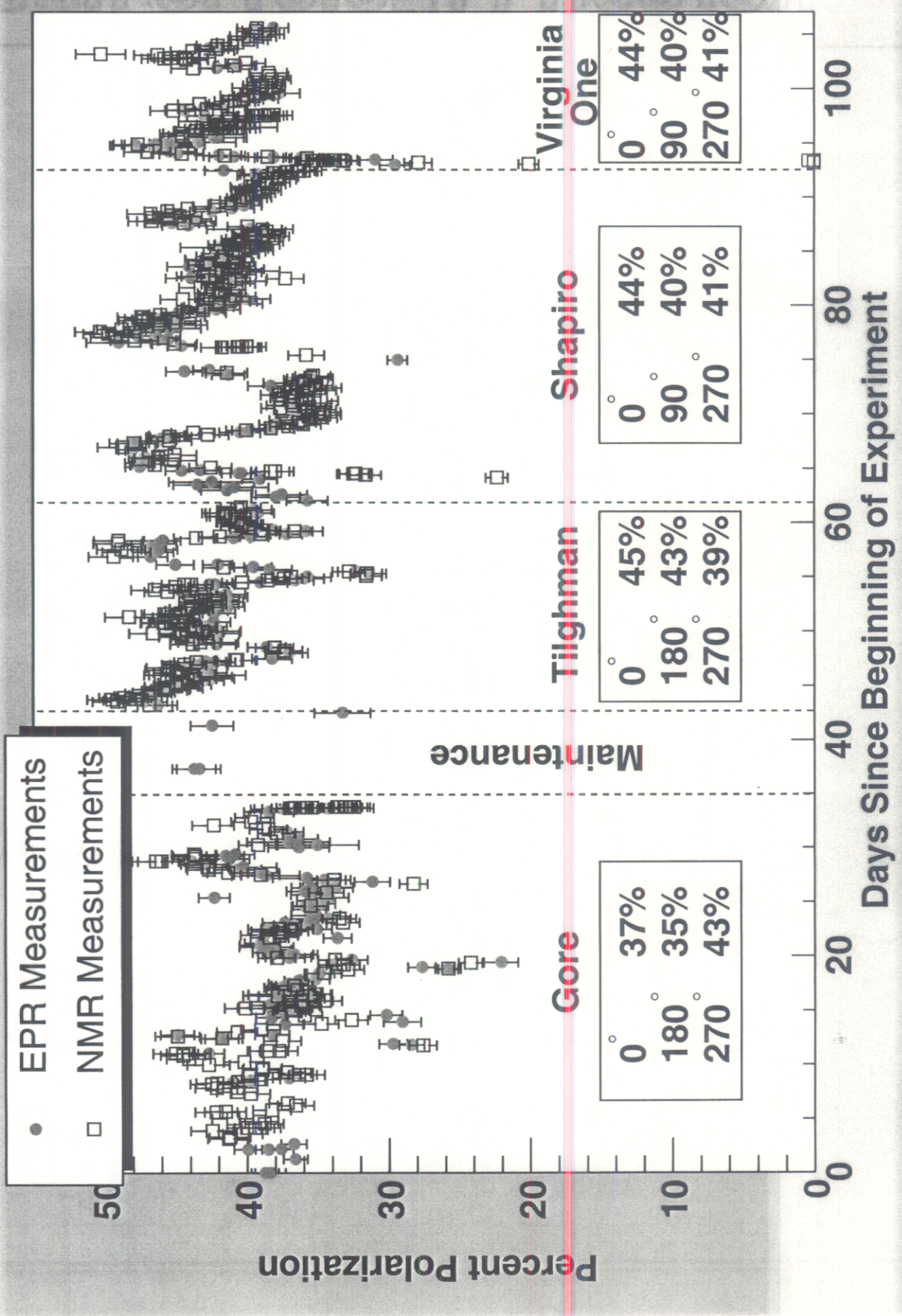
3 x 30W @ 795nm

Photo-Diode for EPR



K. Kramer
X. Zheng
W.K.

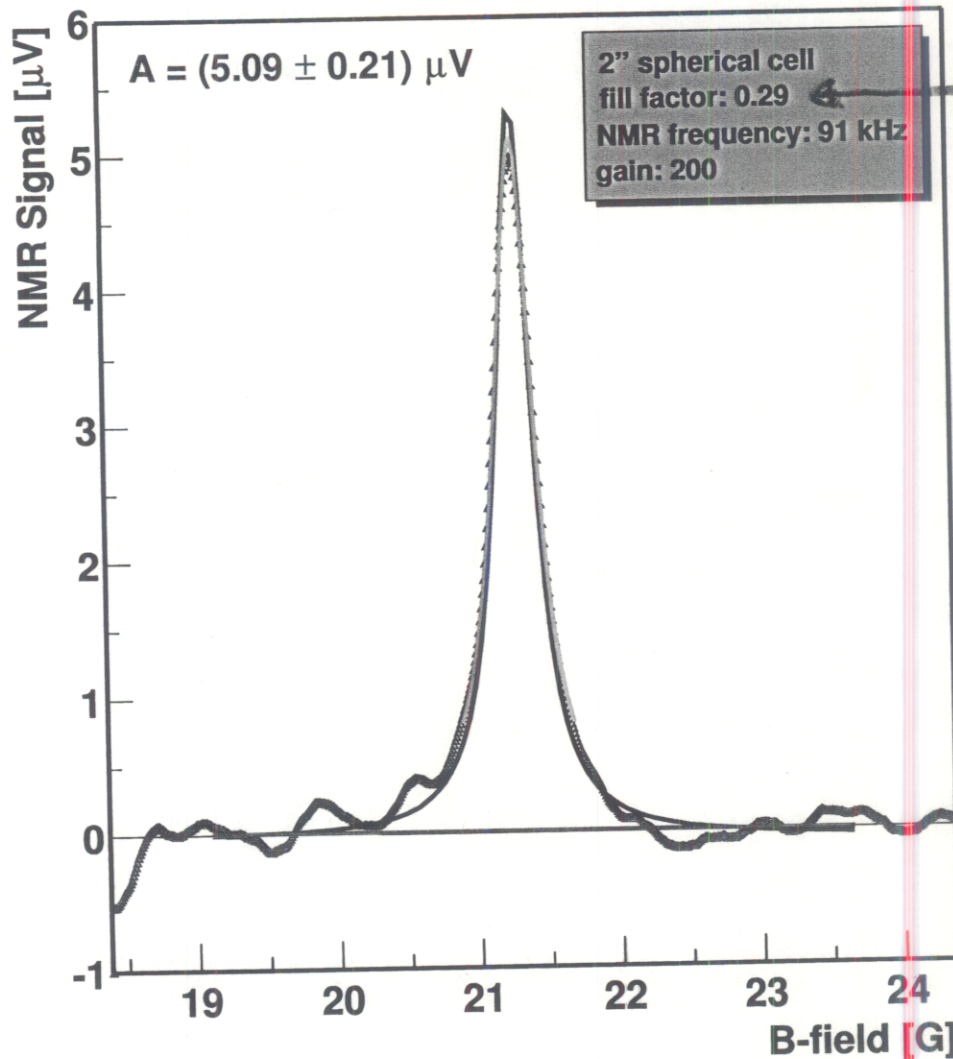
Target Polarizations for E99-117 and E97-103



Double Coil System (UK)

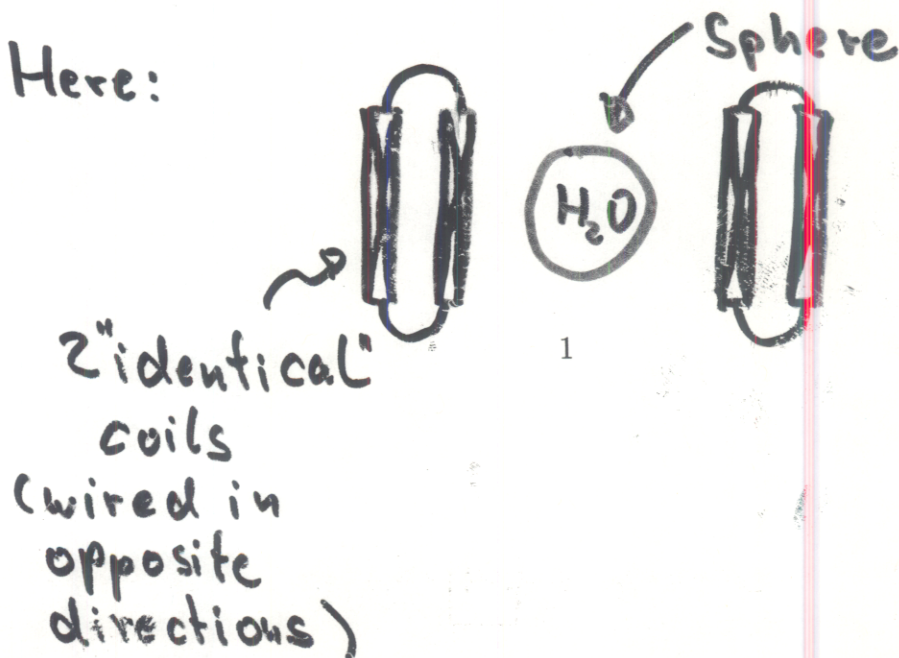
Water NMR

August 6, 2002



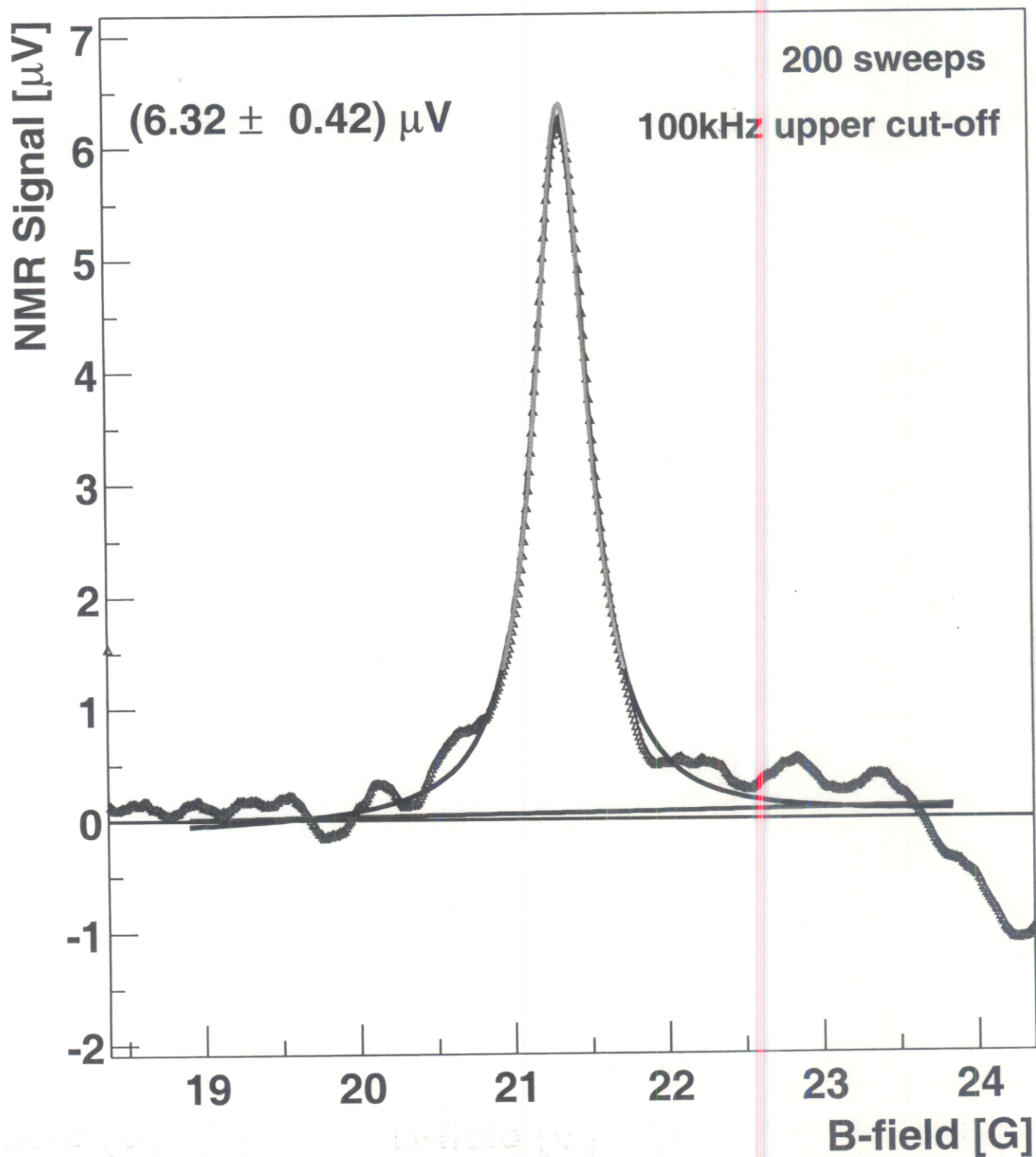
- 1000 Sweeps (fast)
- with back-ground minimization

Here:



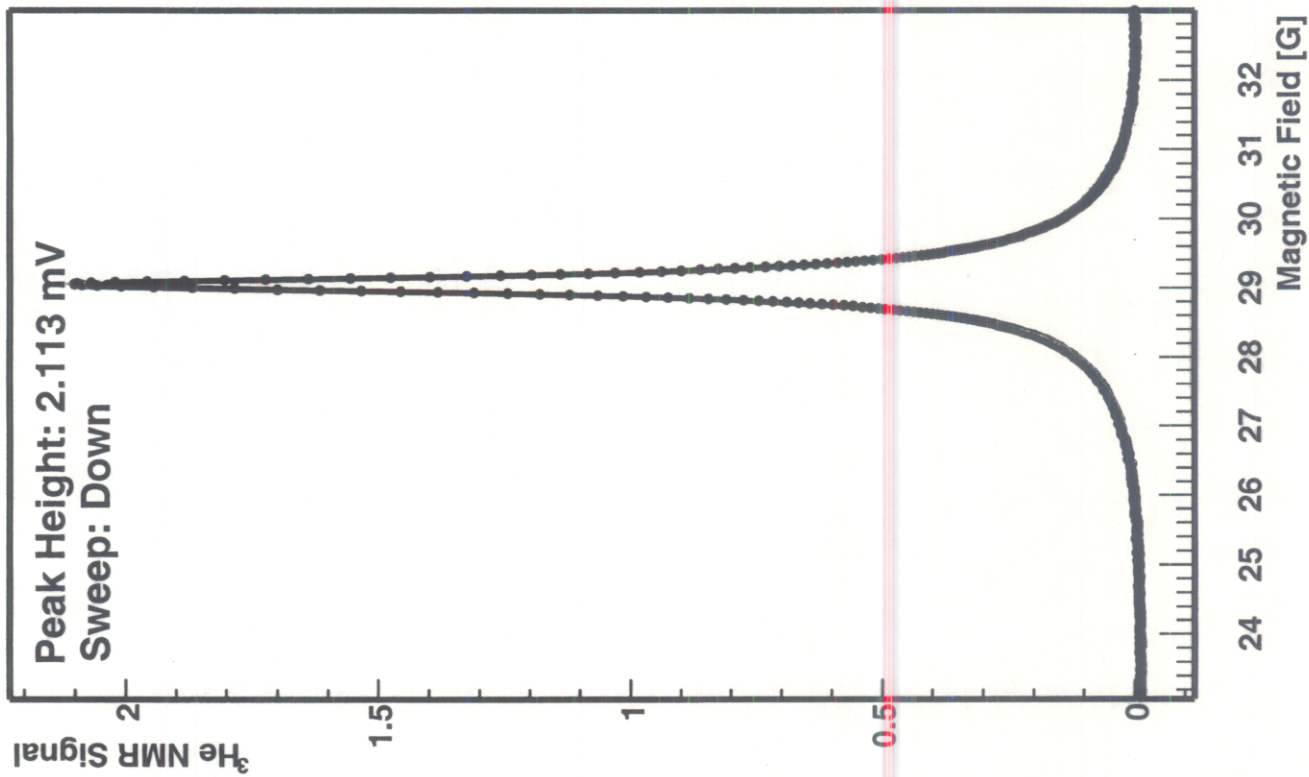
Double Coil System

Water NMR

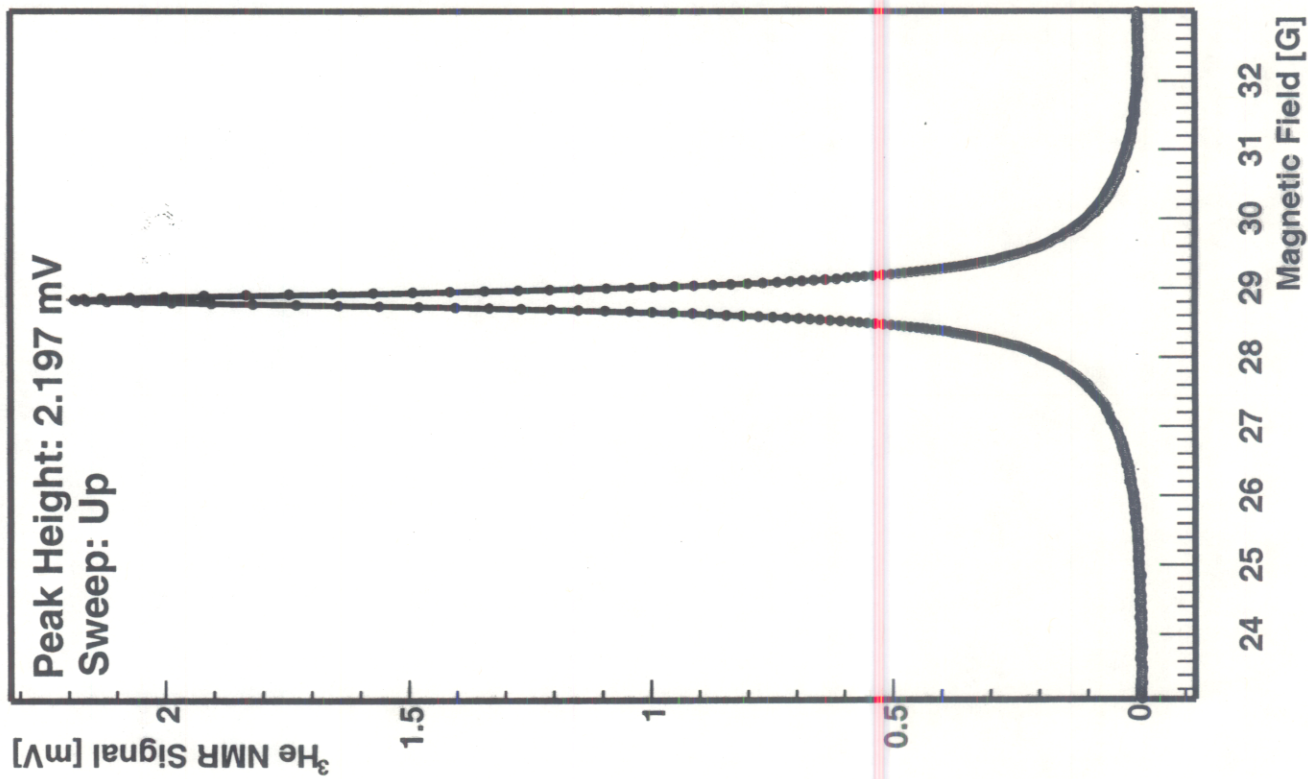


Double Coil System

Sep 29, 2000



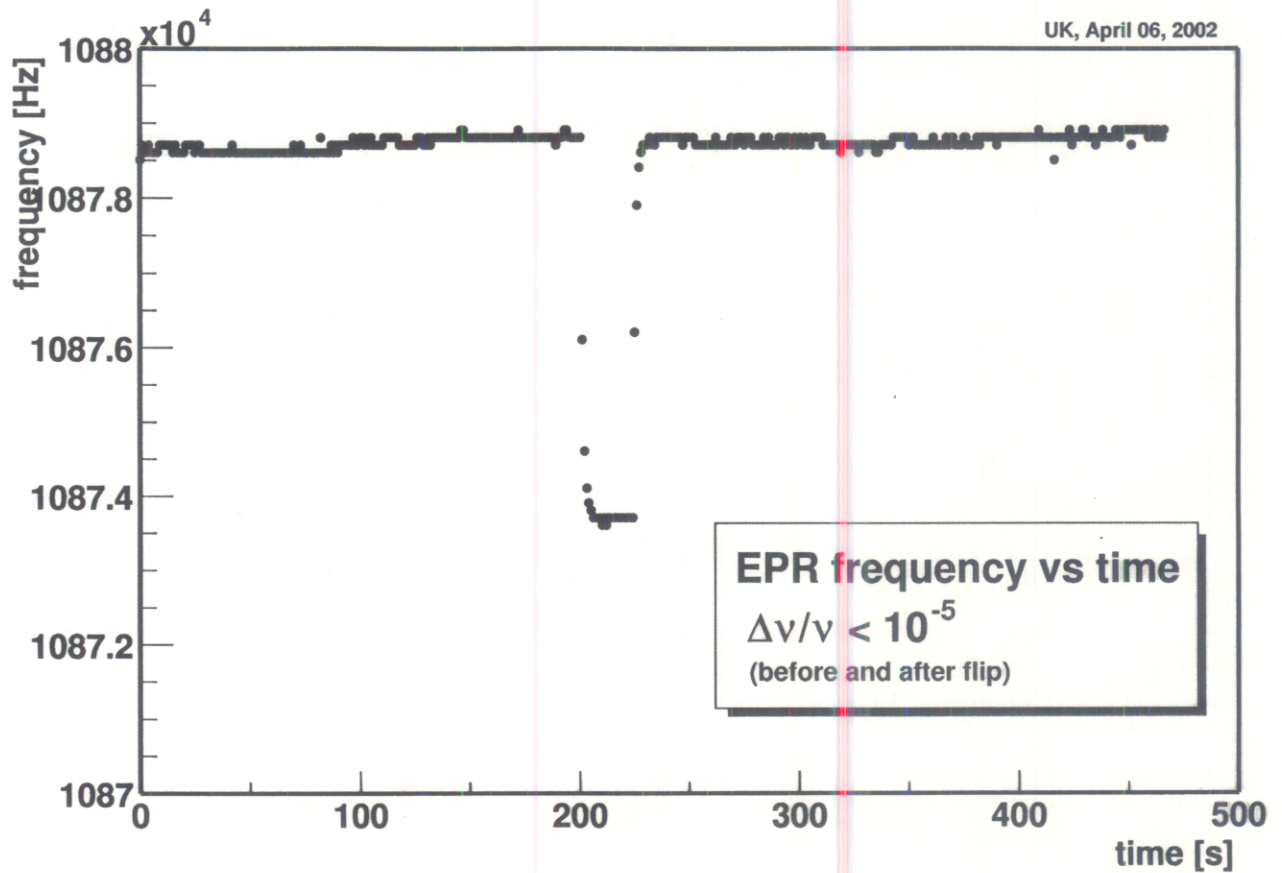
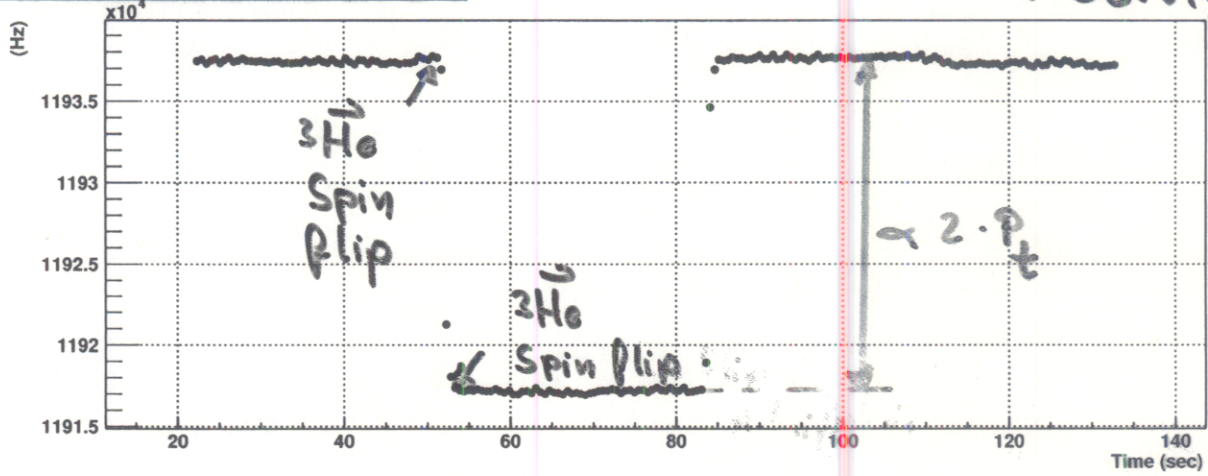
Polarized ^3He NMR Signal

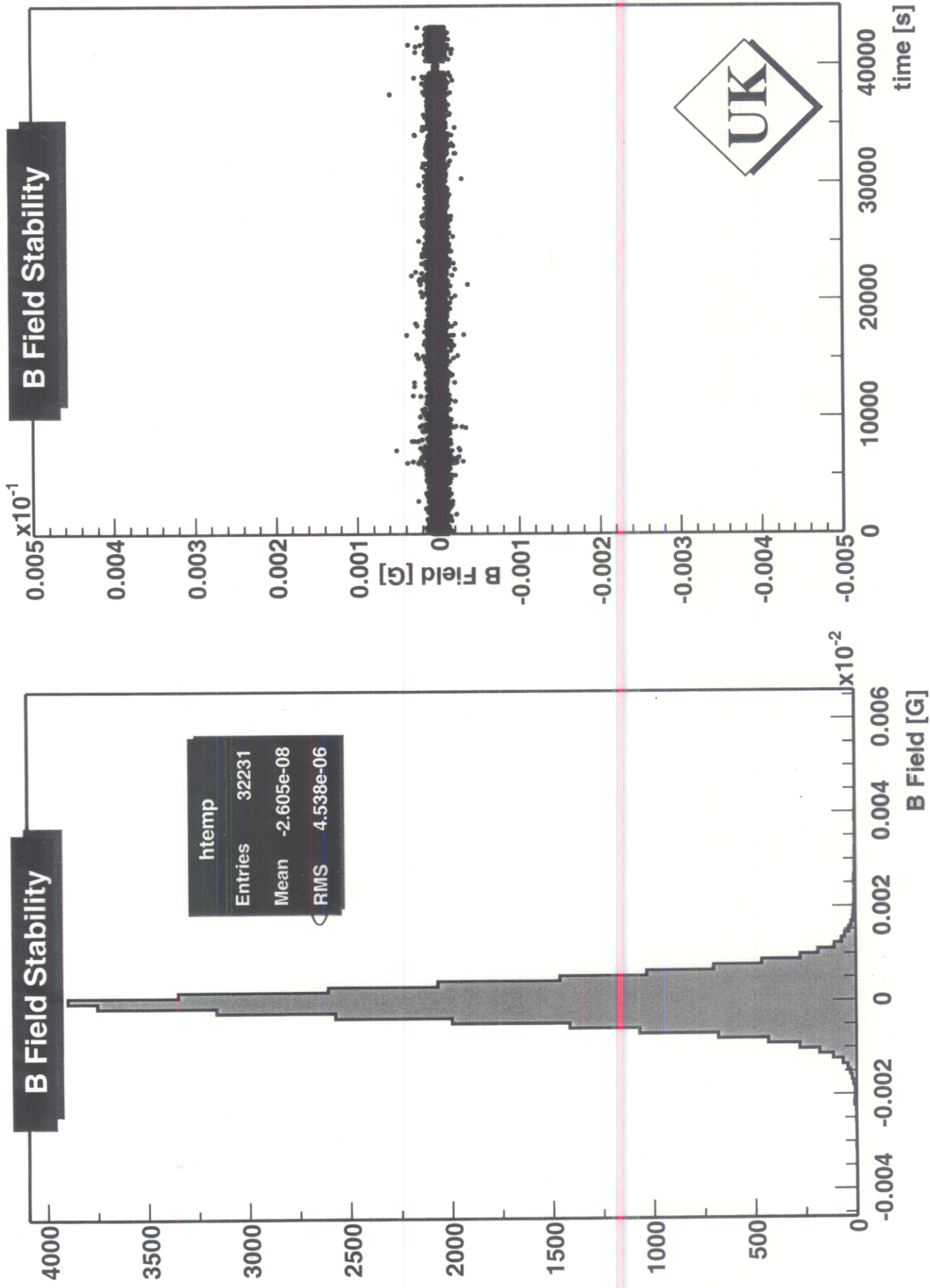


EPR - Electron Paramagnetic Resonance

EPR Spectrum AFP10_10_11_00am.dat

P. Solvignon

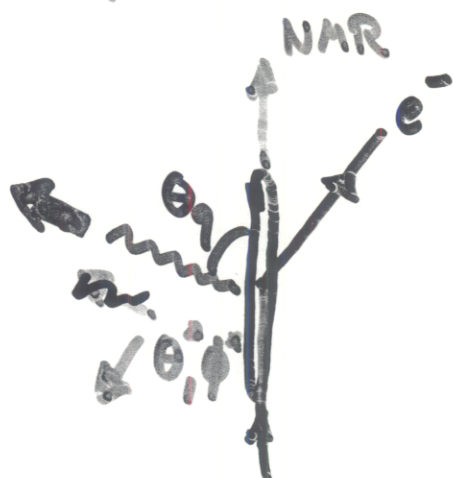




Summary

* Start testing w/ new "Helmholtz Coils" asap !!

* **NMR** Field rotation ^{not possible} ~~necessary~~



$$\theta_1 = 35.2^\circ$$
$$28.3^\circ$$
$$25.4^\circ$$

- residual B-field?
constant?
→ magnet cycling?
- temperature effect of coils → need time to stabilize!!
- feedback loop for B-field stabilization?

* **EPR** • new pumping cell geometry?
→ α_0 ??

• reflective end windows?

* Field gradients w/ field clamps (Big Bit)

Magnetic Field Direction

$$\frac{\Delta G_E^h}{G_E^h \text{ Galster}} [\%] \sim (\text{Error due to } \delta^*, \phi^*) \cdot 10$$

$$\text{e.g. } \Delta \theta^* = \Delta \phi^* = 0.3^\circ \Rightarrow \frac{\Delta G_E^h}{G_E^h \text{ Galster}} \sim 3\%$$

$$\Rightarrow \underline{\Delta \delta^*, \Delta \phi^* < 0.5^\circ}$$

Project for this Summer

- Equipment:
- Fluxgate (triaxial)
in house: 1 G (UK, JLab)
10 G (JLab)
 - Hall probes (single axis, triaxial)
in house: UK
 $\Rightarrow$ need amplifier, readout
 - design & construction
summer/fall 2003