

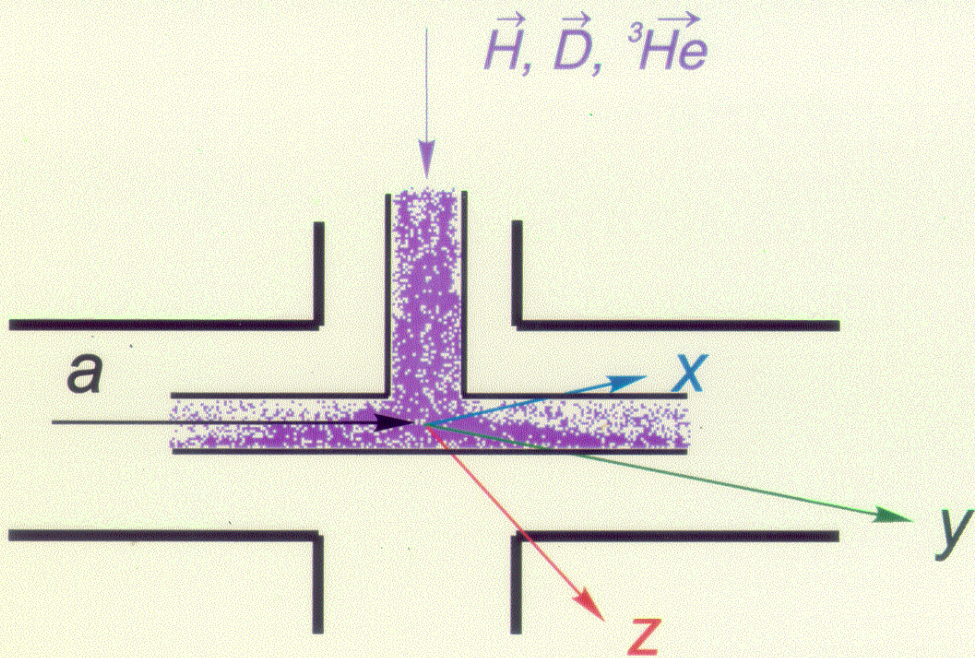
# Polarized Internal Target at ANKE

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Working

VEPP-3



PINTEX

Dynamical processes in nuclei

Spin structure of nucleon

Measurements of polarization observables in pion production

$$\vec{e}\vec{d} \rightarrow ed$$

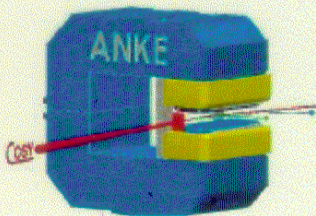
$$\vec{e}\vec{d} \rightarrow e'pn$$

$$\vec{e}\vec{N} \rightarrow e'X$$

$$\vec{p}\vec{p} \rightarrow \pi X$$

$$\vec{p}\vec{d} \rightarrow \pi X$$

Coming soon



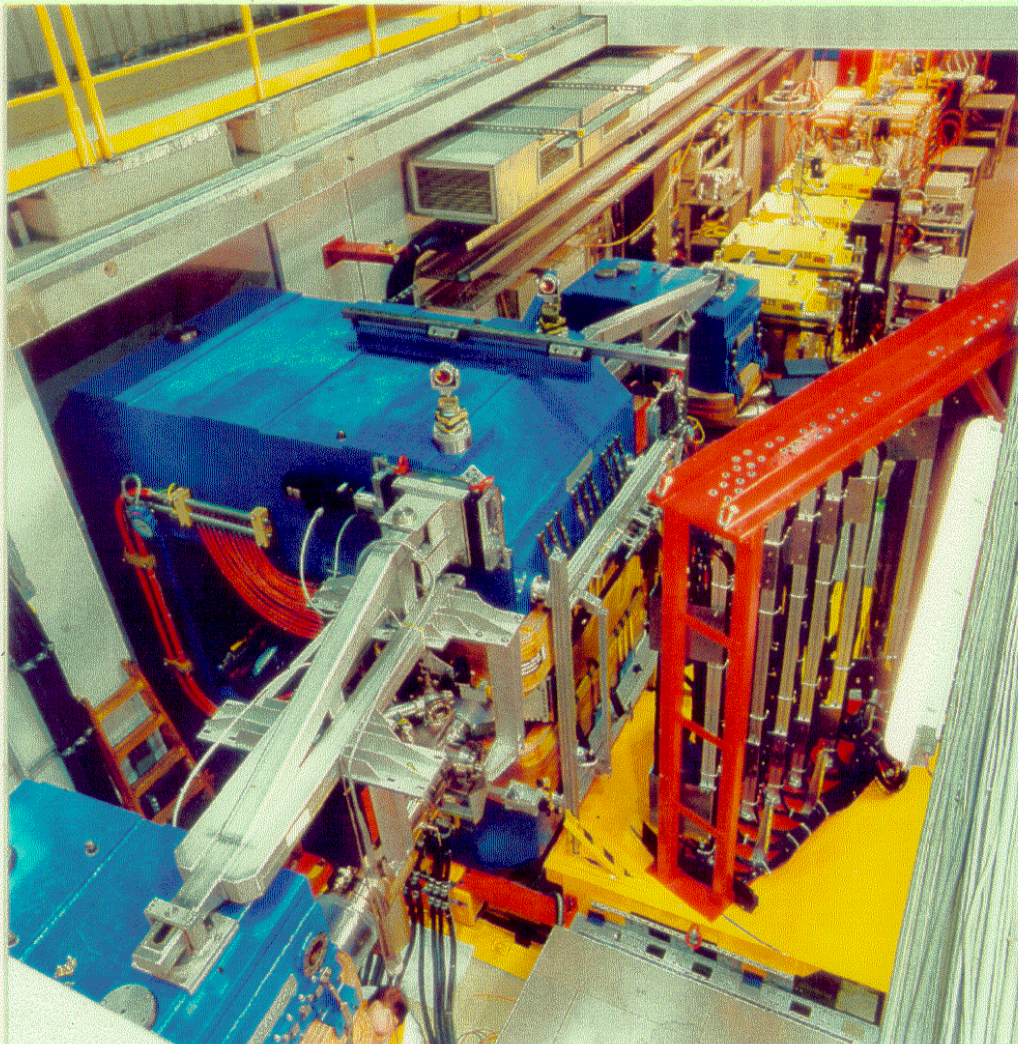
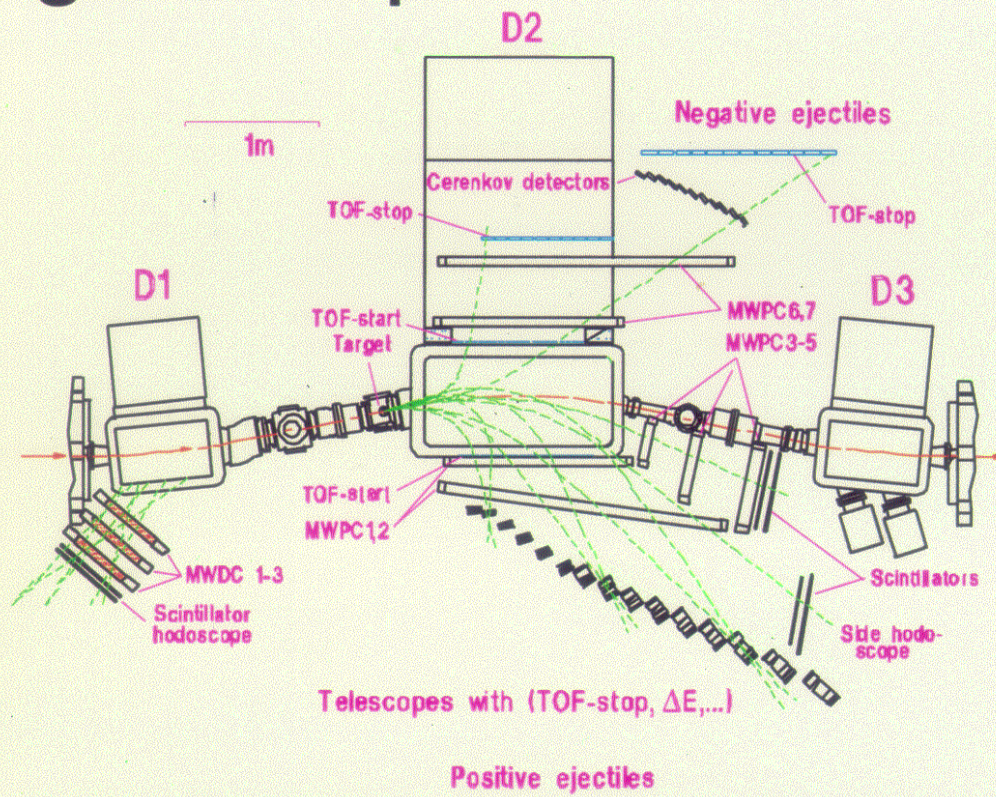
Study of d-breakup with polarized beam and target

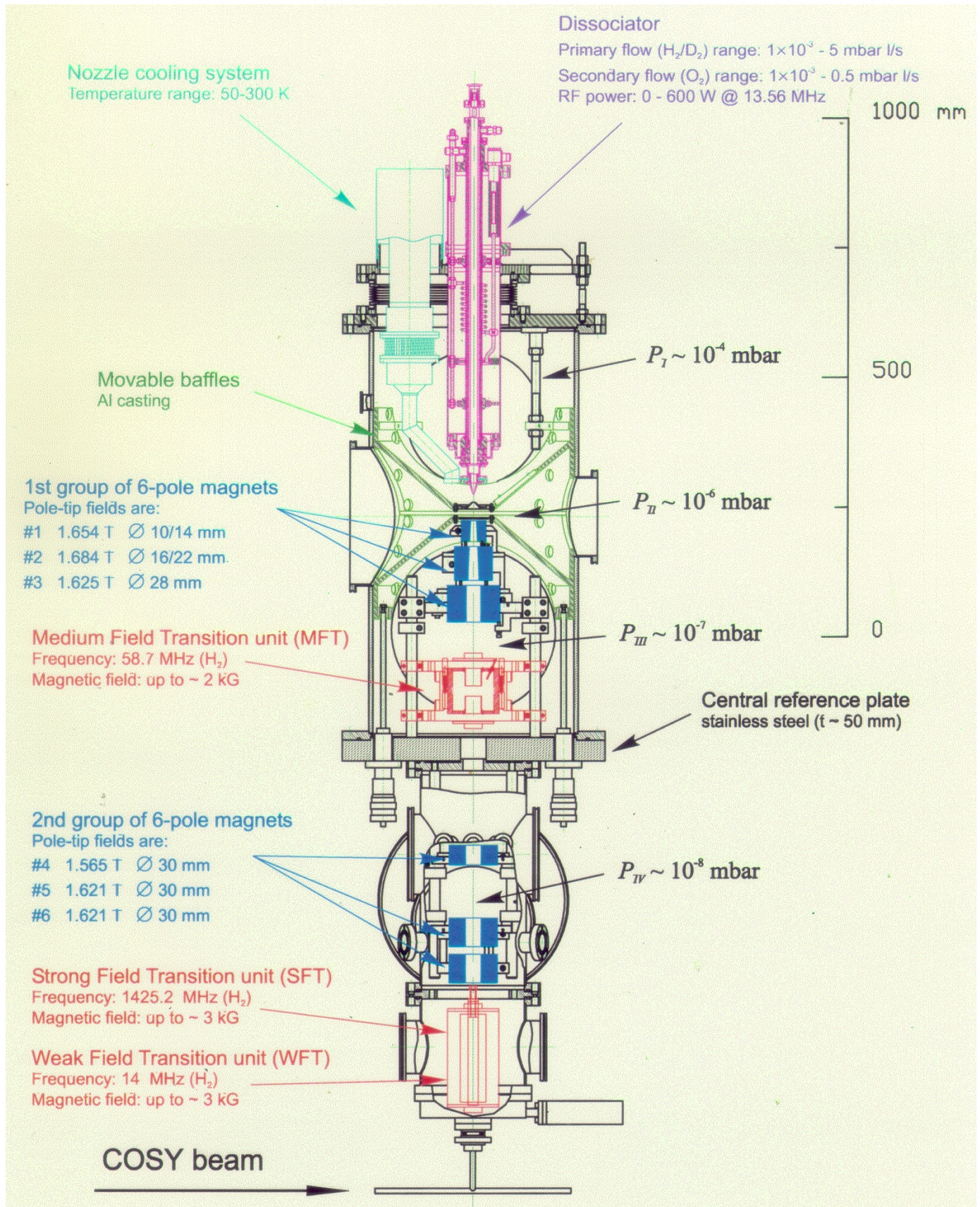
Spin structure of the weakly bound deuteron system and the three-body  ${}^3\text{He}$  system

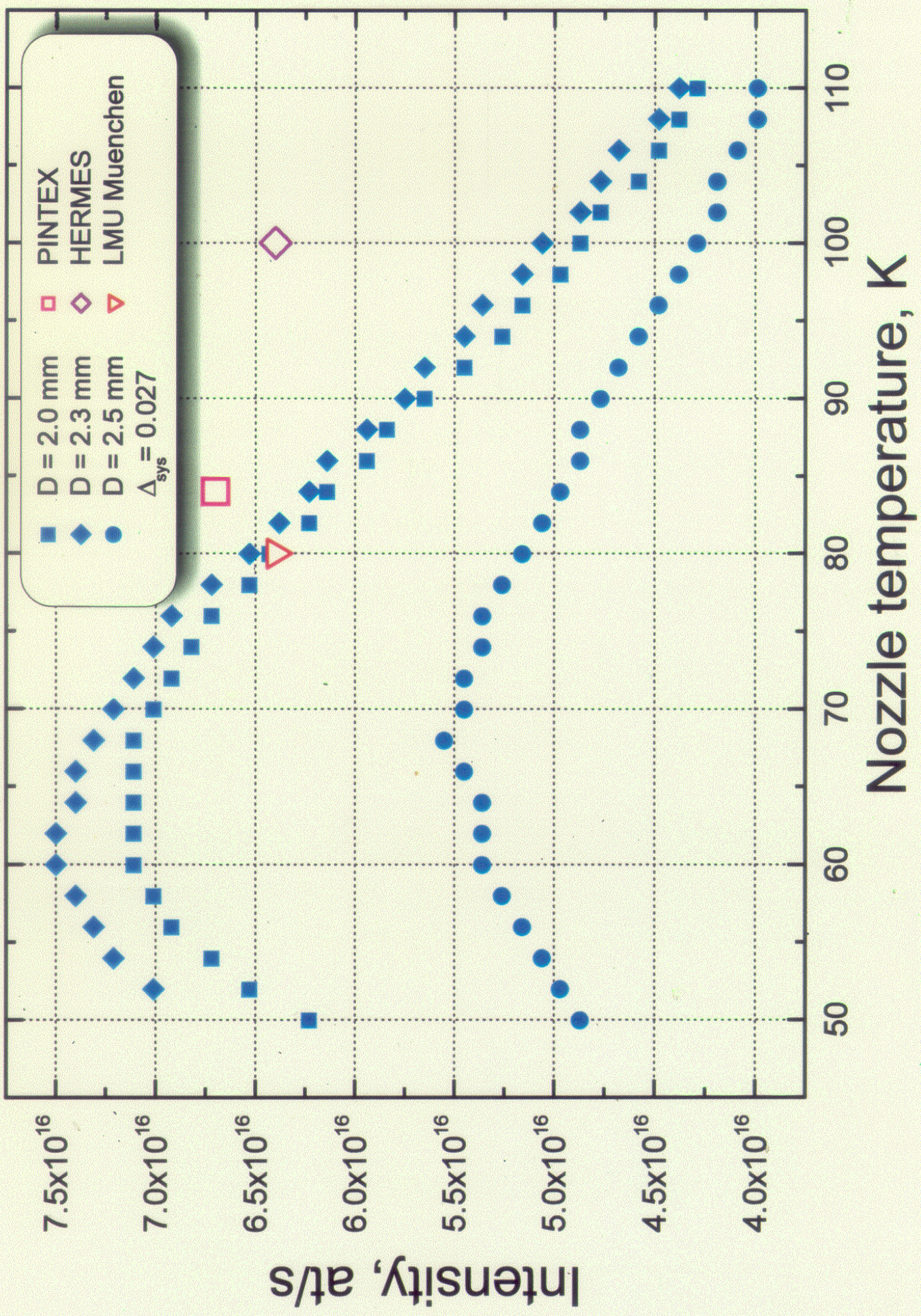
$$\vec{p}\vec{d} \rightarrow (pp)_0 n$$

$$\vec{e}\vec{N} \rightarrow e'X$$

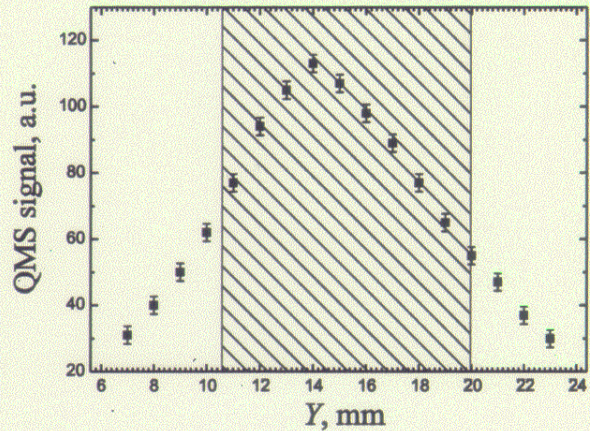
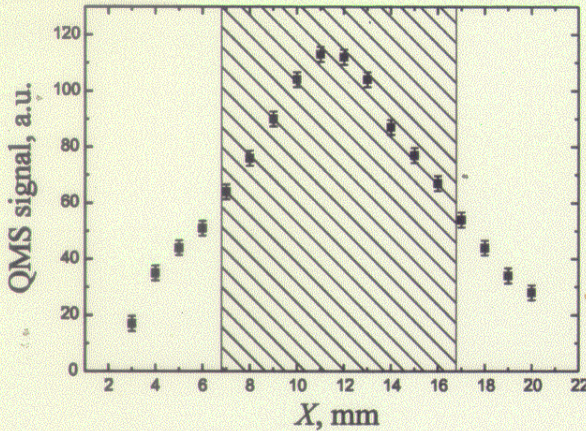
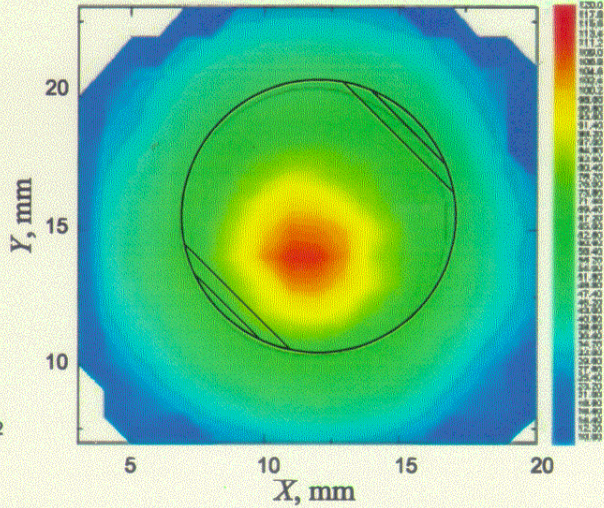
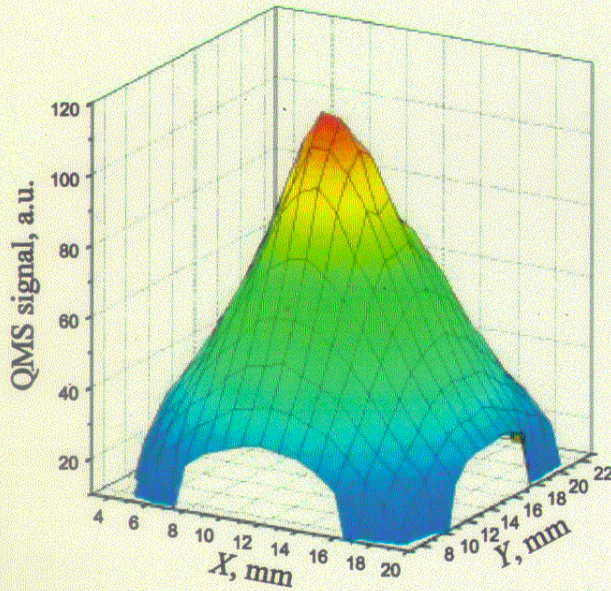
# Magnetic spectrometer ANKE







# Atomic hydrogen beam profile



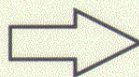
Beam utilization coefficient:

$$\eta = \frac{\int_0^{\sqrt{x^2+y^2 \leq R_{CT}}} \bar{A}(x,y) dx dy}{\int_0^{\infty} \bar{A}(x,y) dx dy}$$

$\bar{A}(x,y)$  - signal of QMS at  $(x,y)$   
 $R_{CT}$  - compression tube radius

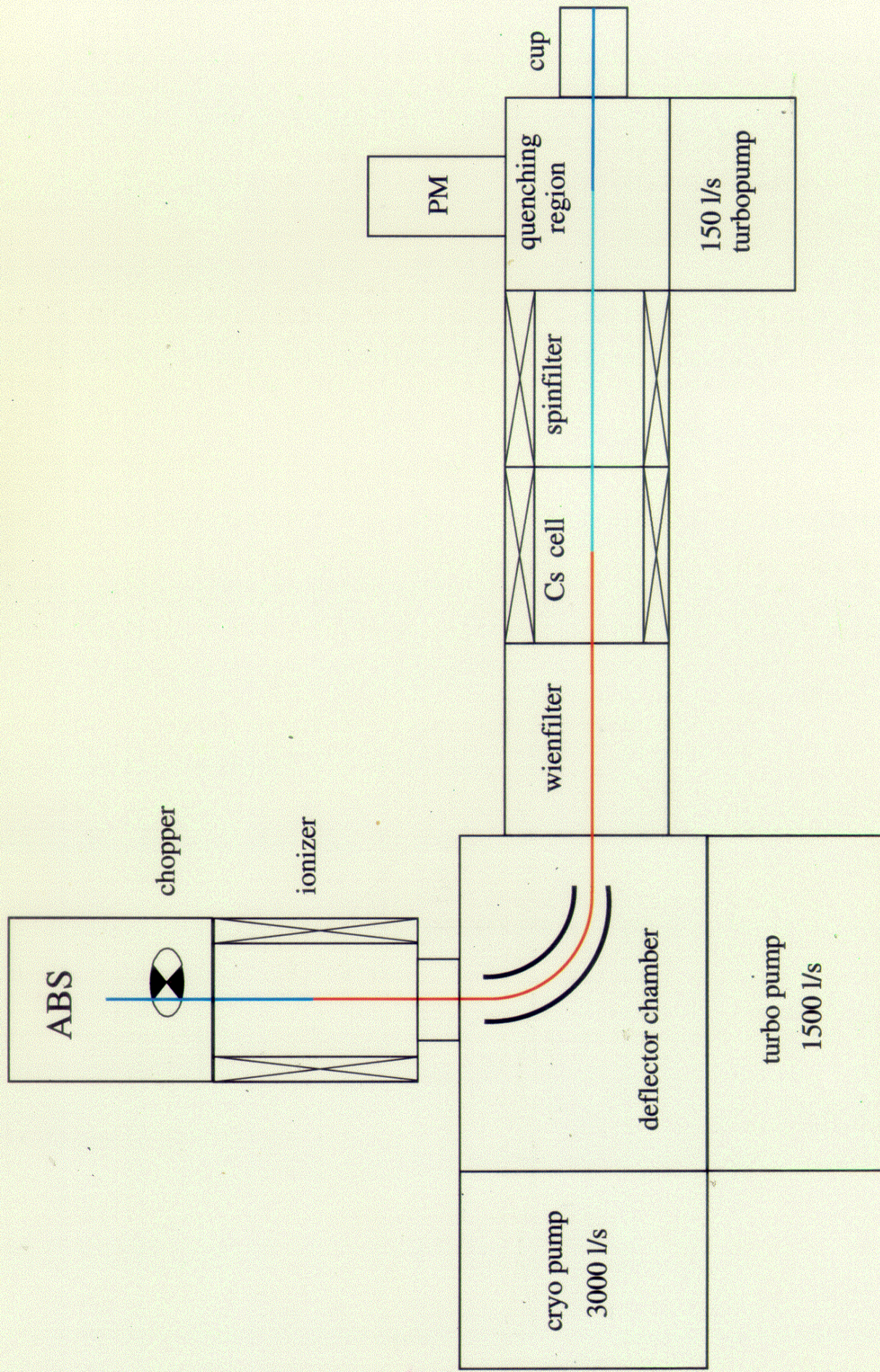
Before nozzle adjustment  $\eta = 0.426$

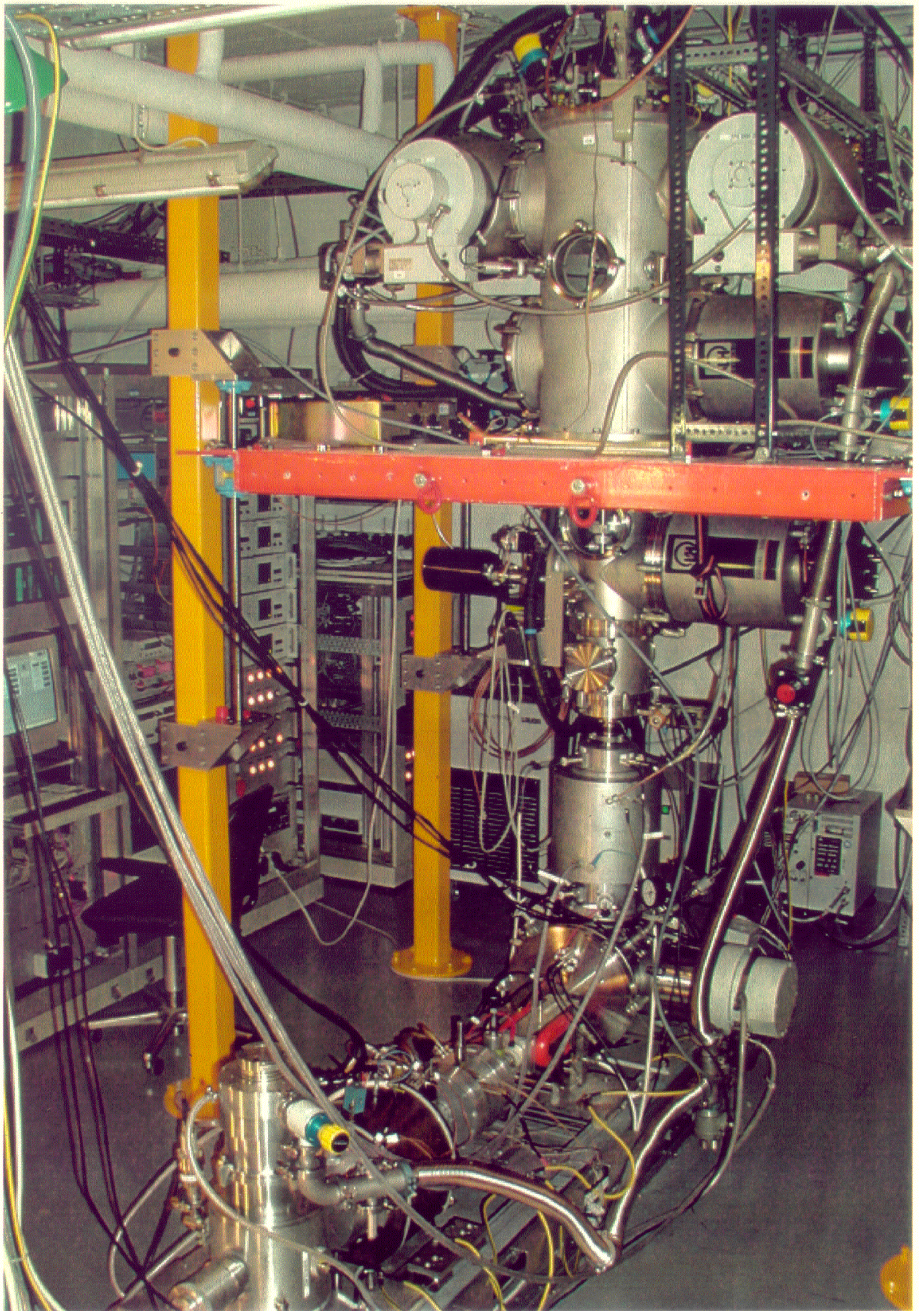
After nozzle adjustment  $\eta = 0.477$



**Intensity GAIN = 5.1%!**

# How to measure the polarization of the ABS beam

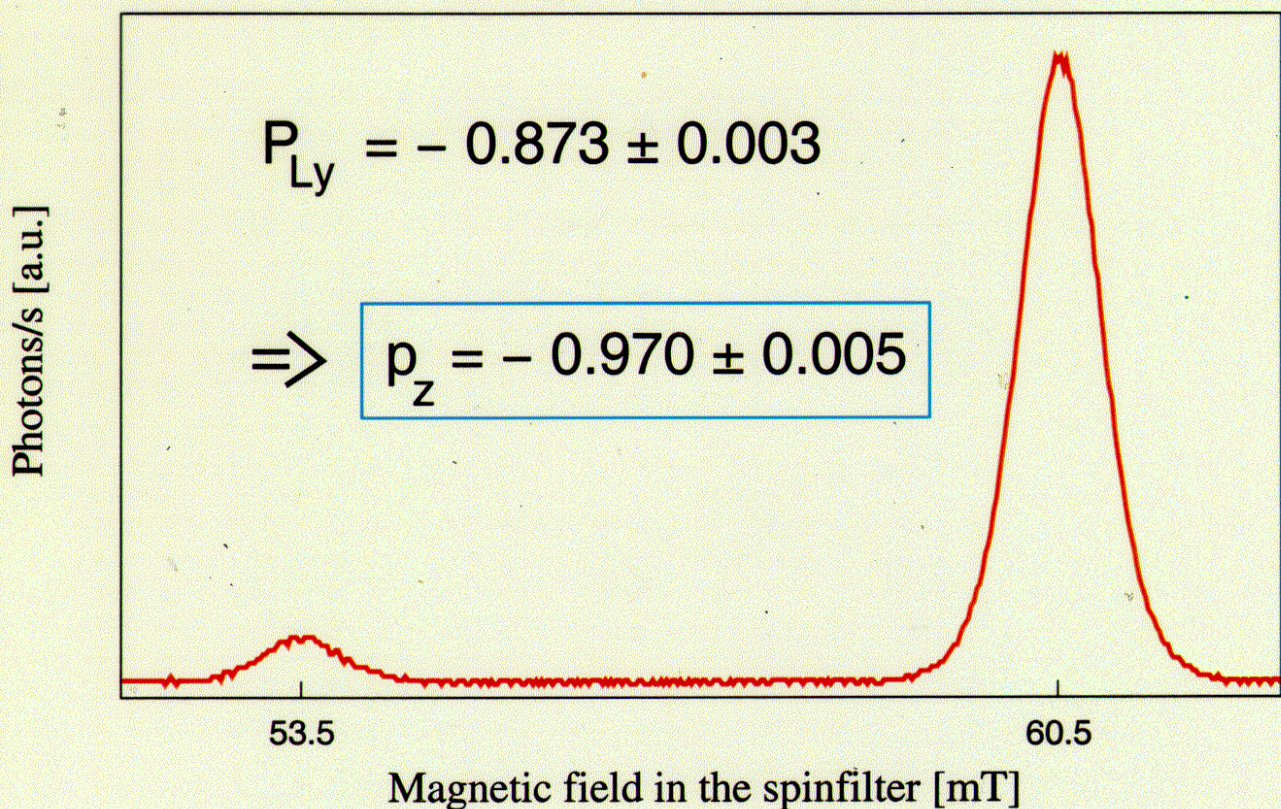
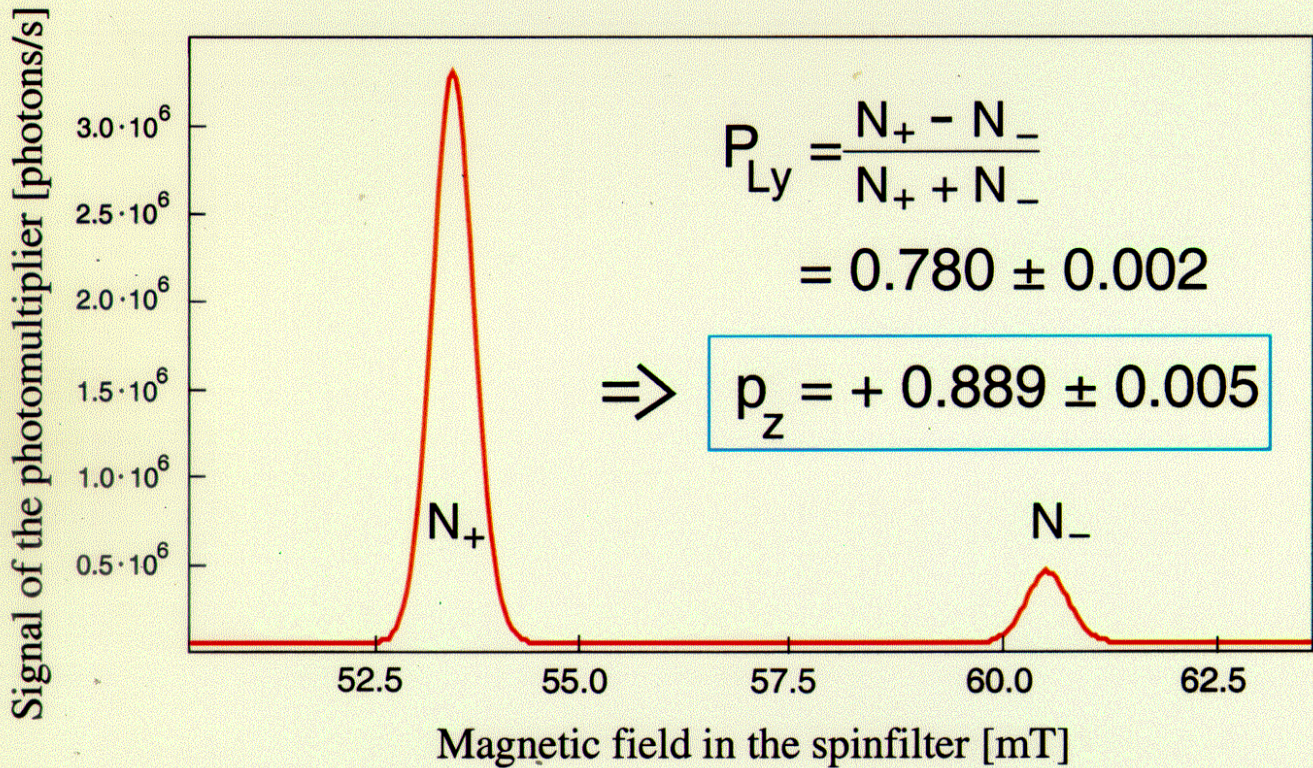




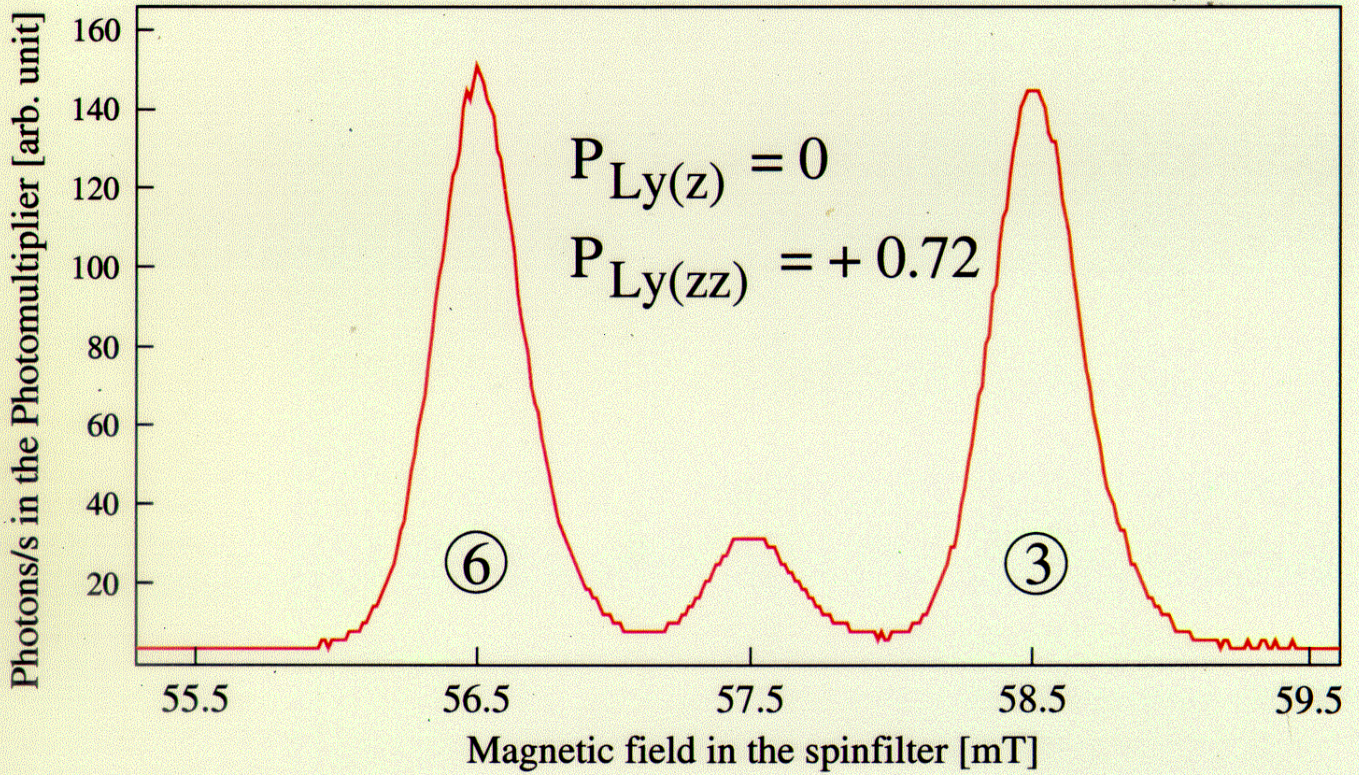


# The Lyman - $\alpha$ Spectrum

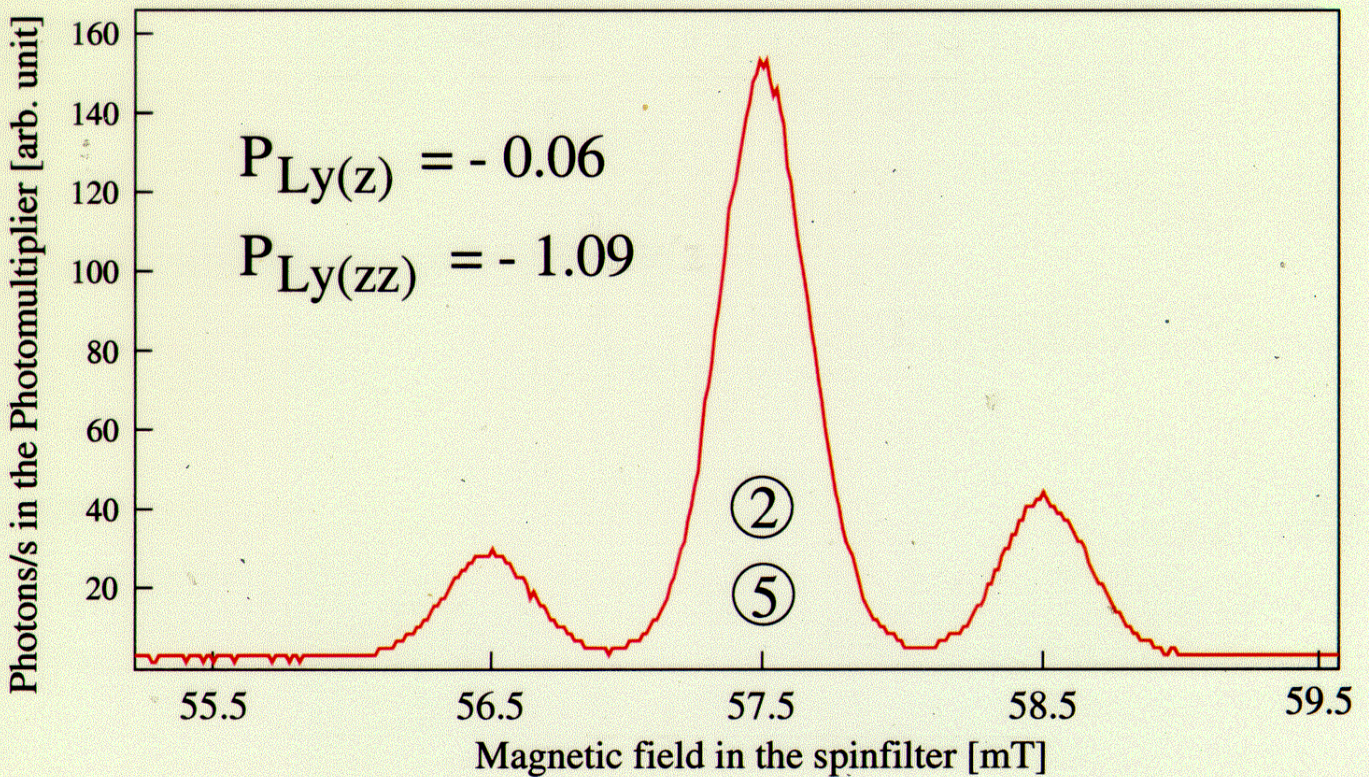
Measurements with a polarized **hydrogen** beam



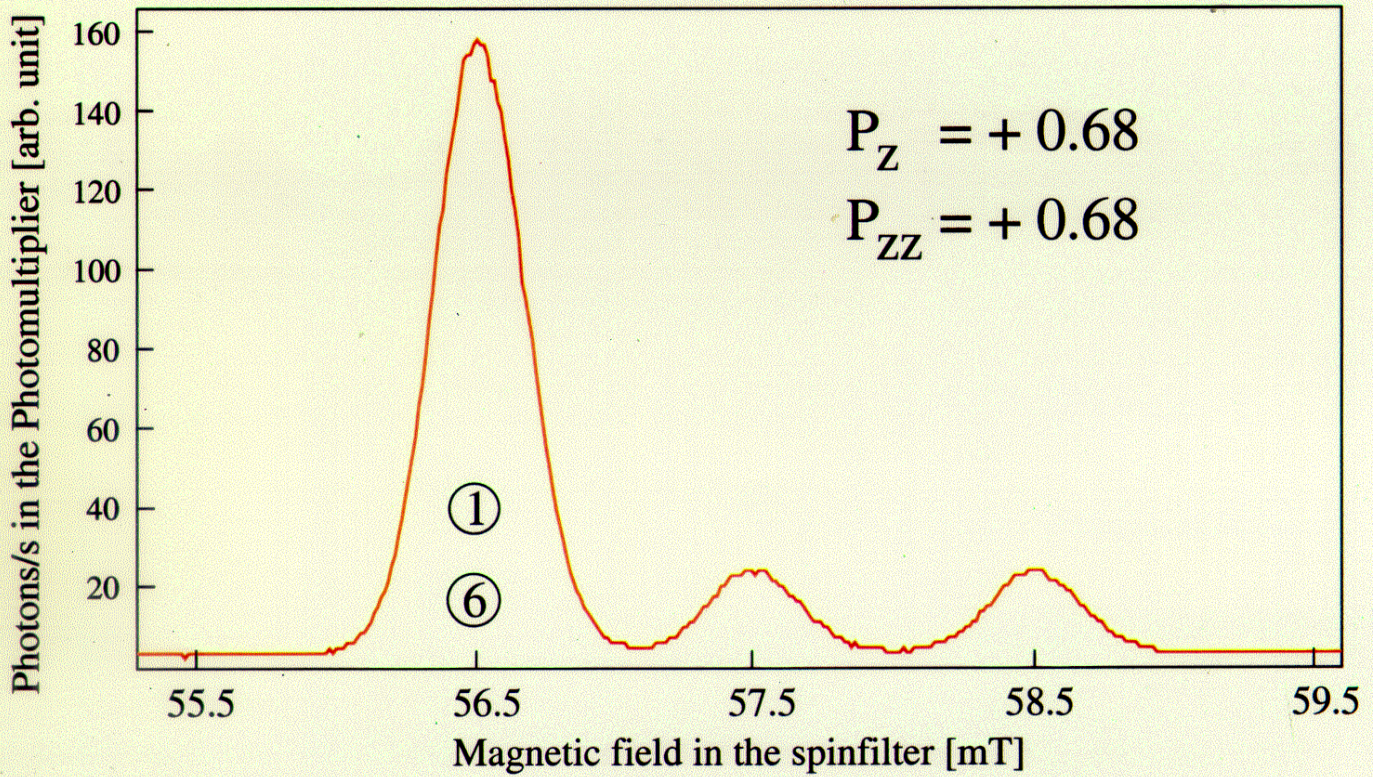
### Deuterium: WFT 1-4 + SFT 2-6



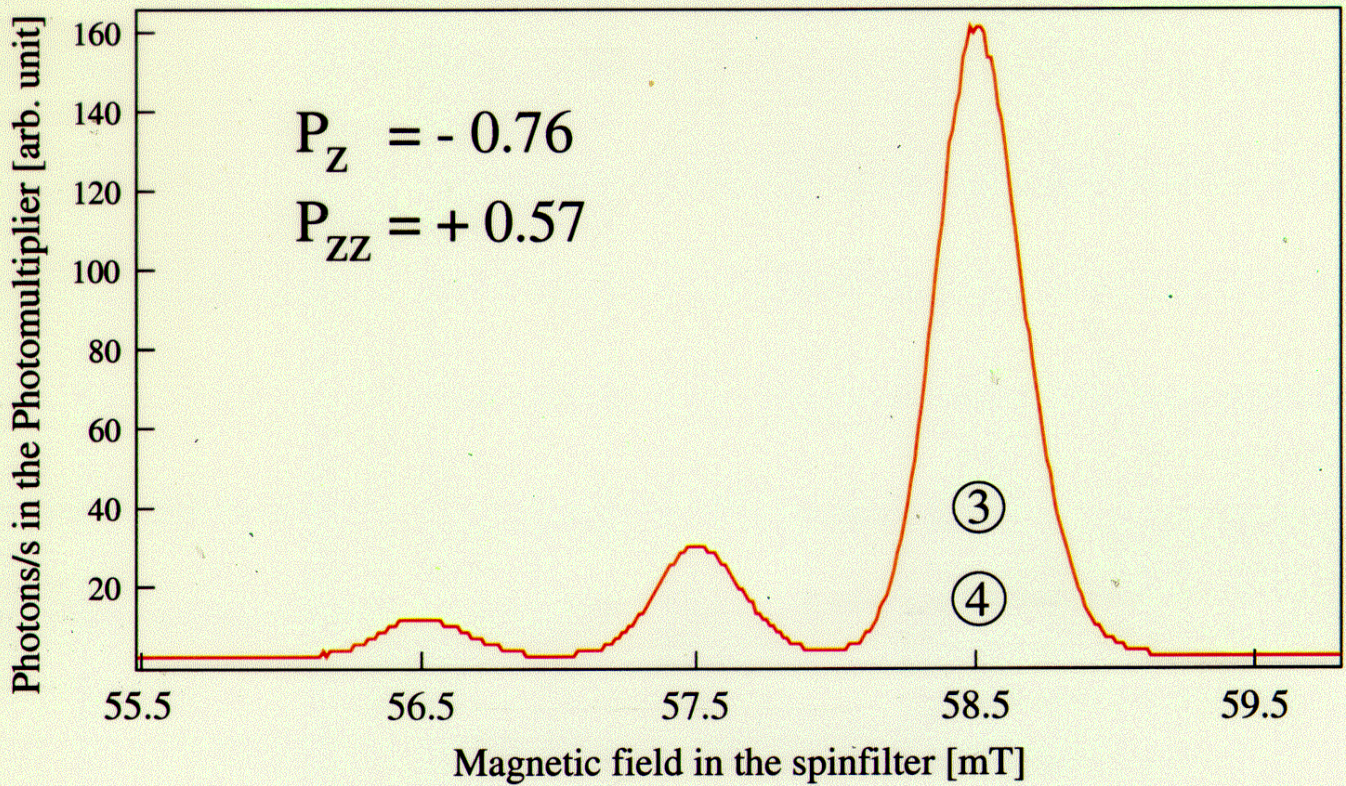
### Deuterium: WFT 1-4 + SFT 3-5

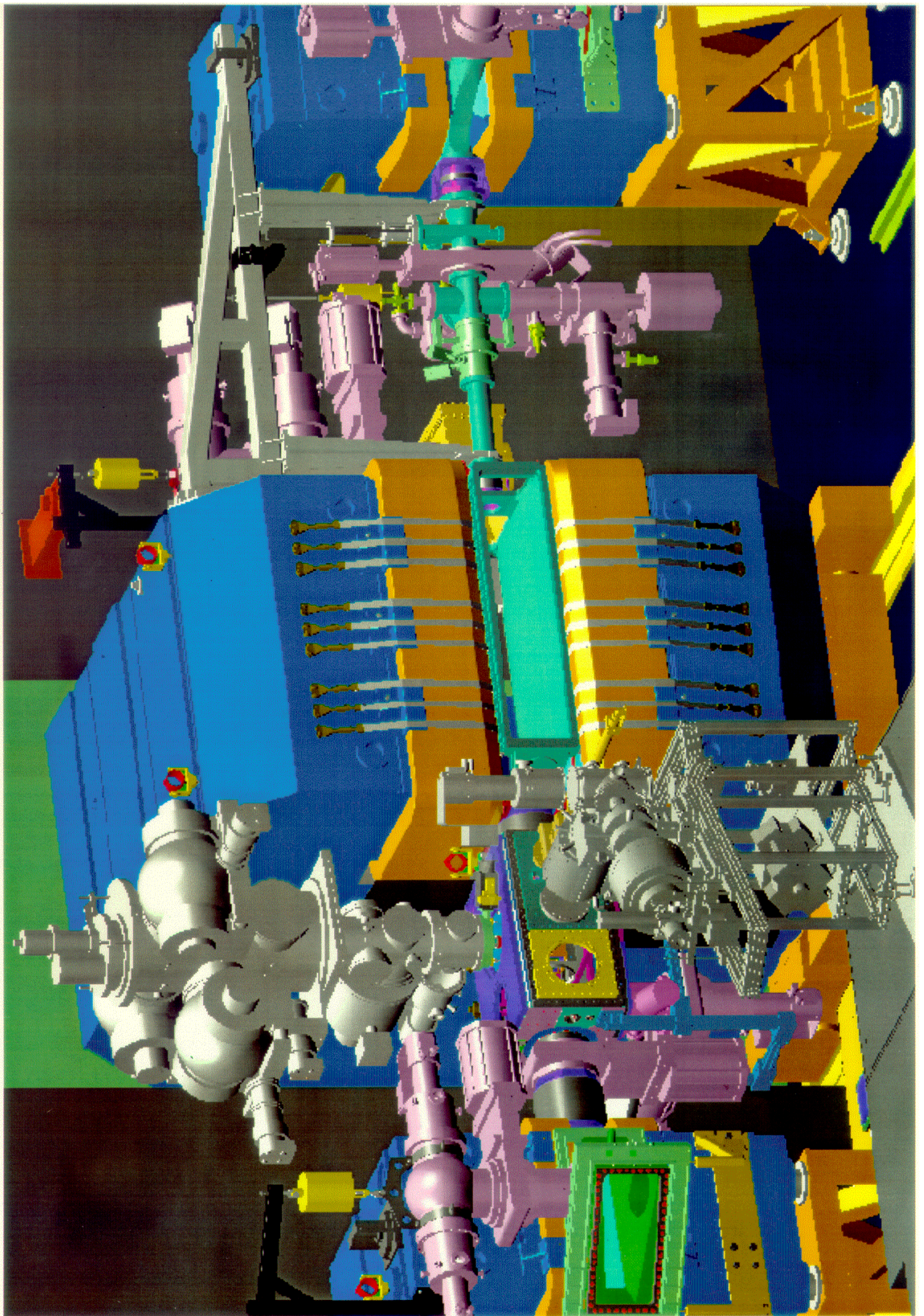


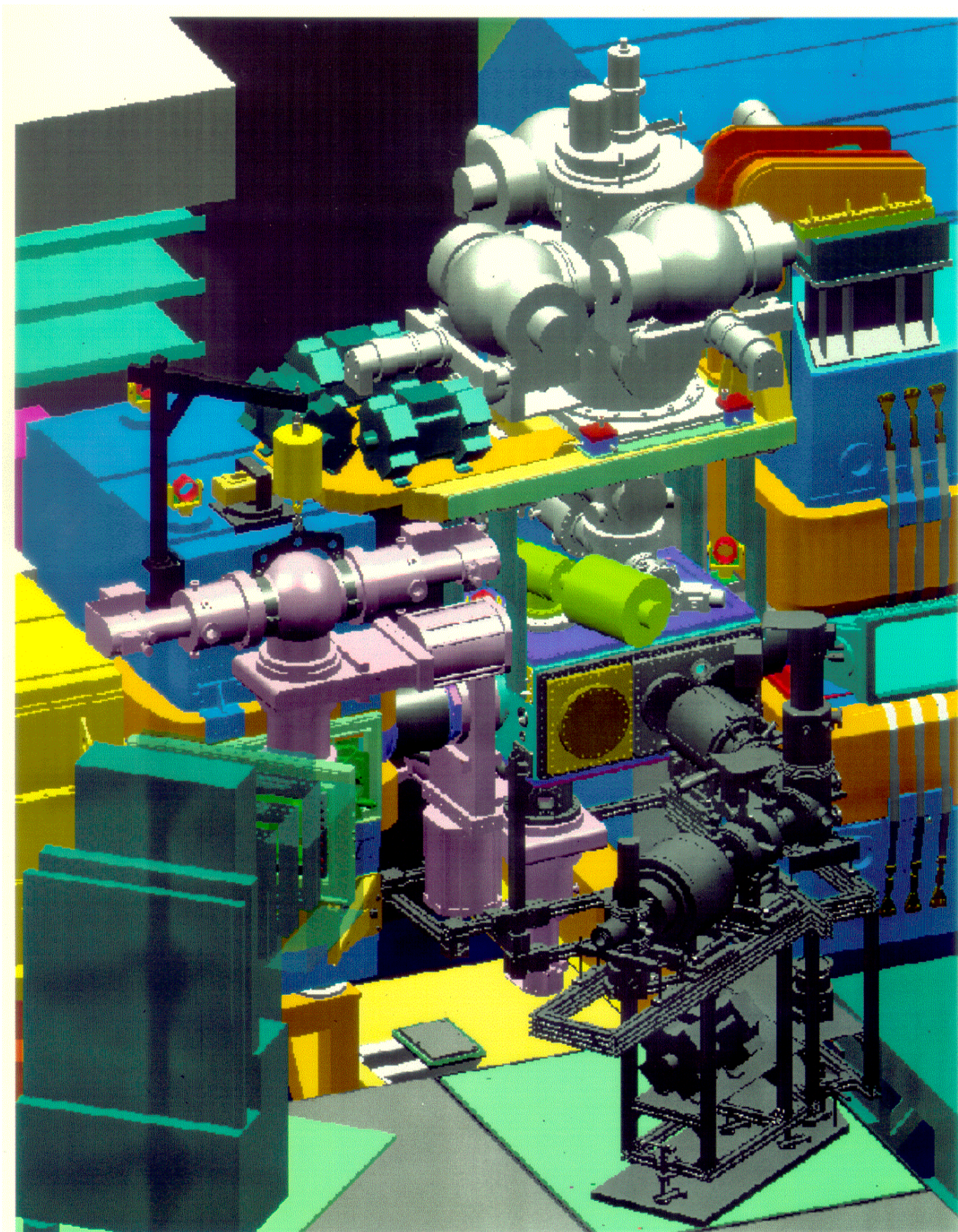
### Deuterium: MFT 3-4 + SFT 2-6

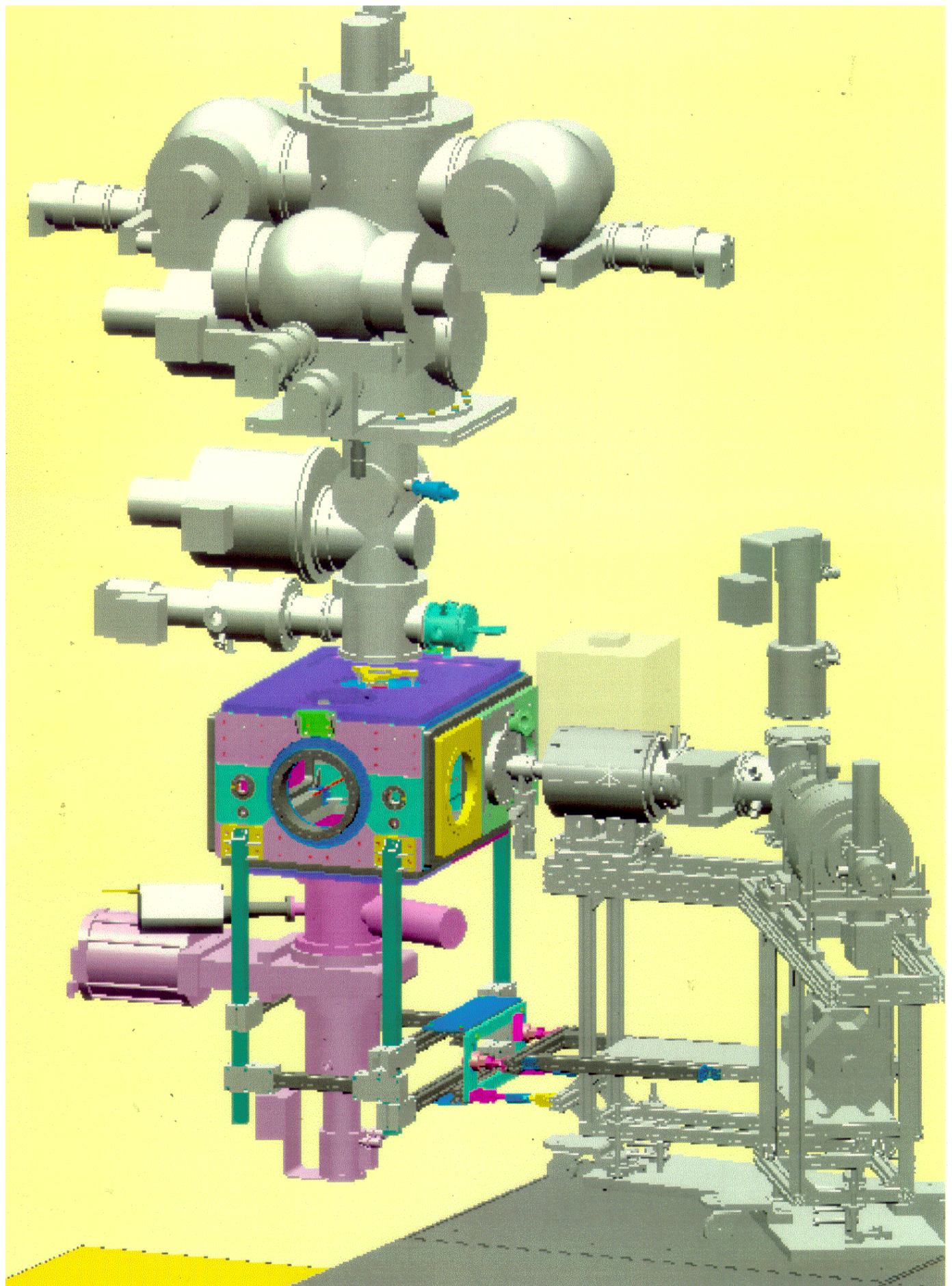


### Deuterium: MFT 3-4 + WFT



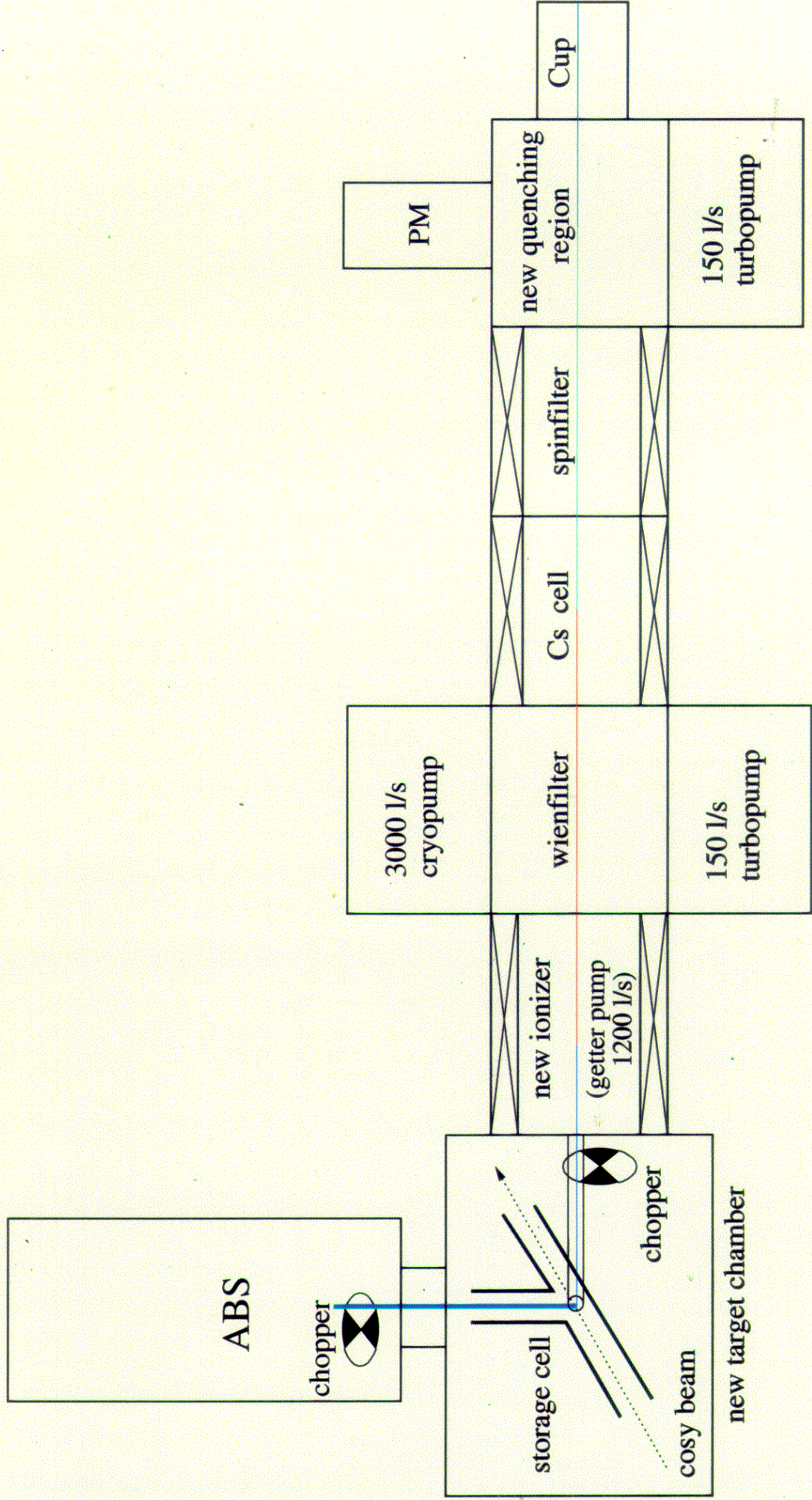








# How to measure the target polarization at ANKE





# Problems:

1.) Intensity: Now only  $10^{-4}$  of all beam atoms reach the ionizer!!!

→ New quenching region increased the efficiency of the polarimeter by factor 20.

2.) Background: –  $H_2$  molecules from recombined atoms are a source for unpolarized protons!!

→ New NEG pump, installed in the ionizer volume, increased the pumping speed for  $H_2$  to 2000 l/s.

– water (and oil) are a source for unpolarized protons!!!

→ The NEG pump helps only a little bit...

Now: Signal to background ratio:  $\sim 1 \longleftrightarrow 100$

3.) Holding field: A very simple Helmholtz configuration produces 0.5 mT.

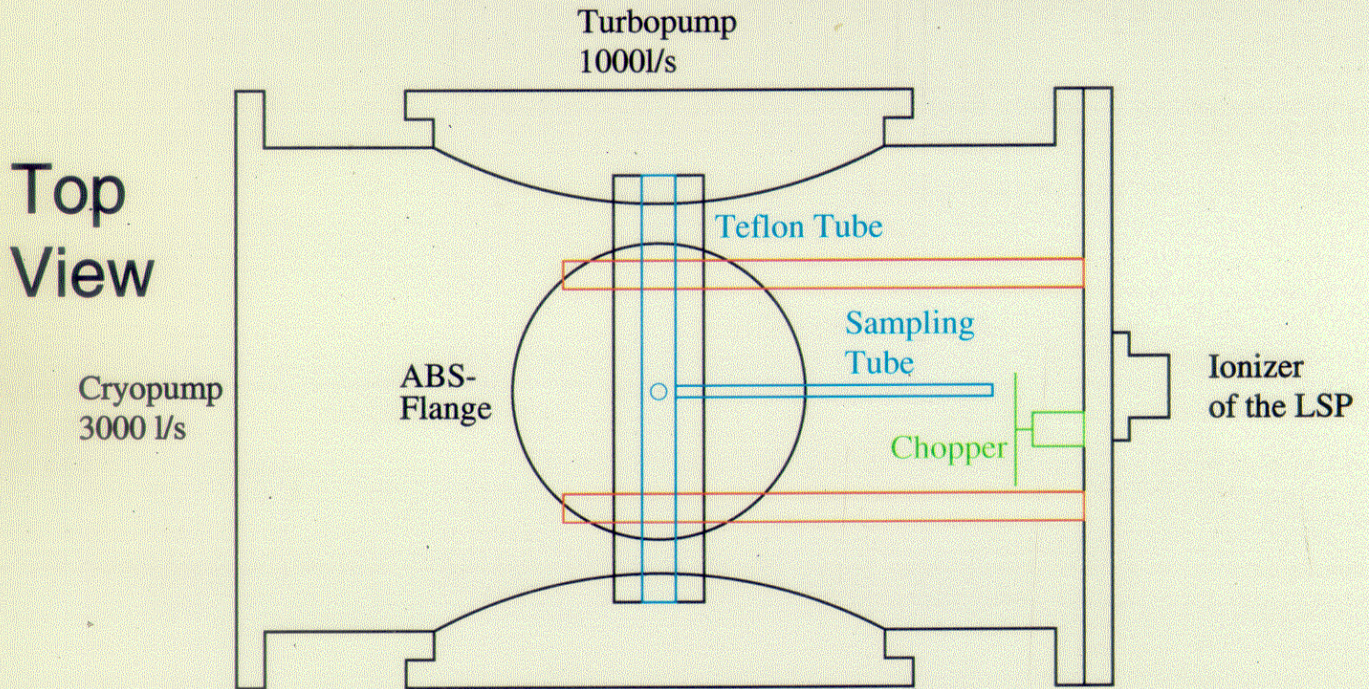
Not enough for deuterium!

4.) Some more details:

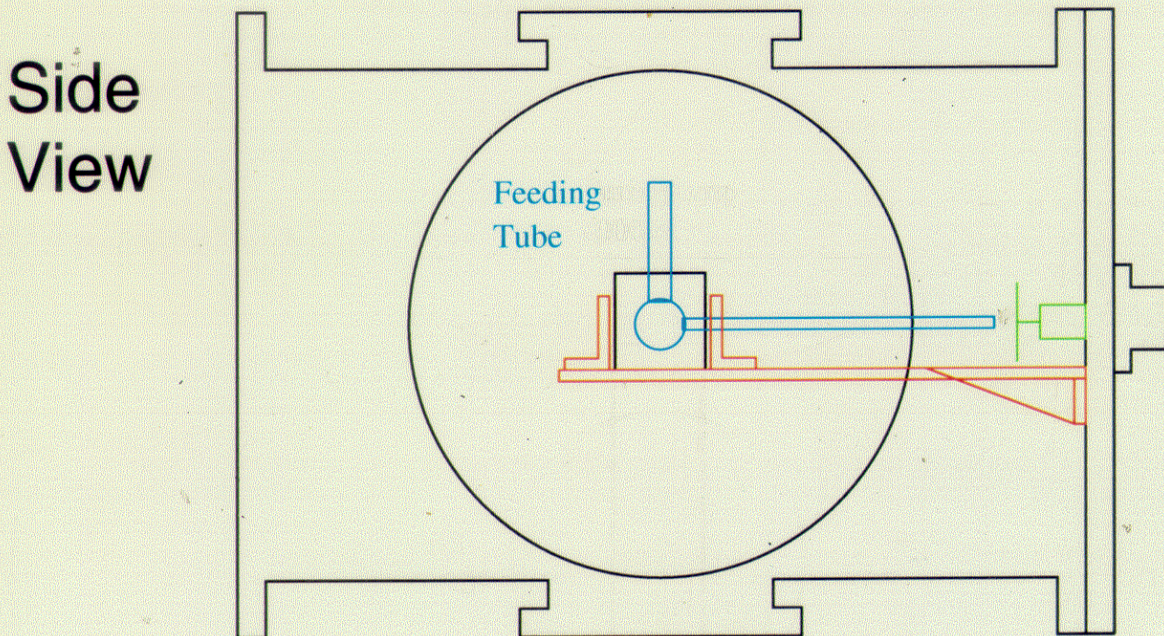
- Highest Efficiency of ionizer is unstable!
- Influence of the different chopper not clear!
- Atoms in the deflector chamber mostly will not recombine !
- Other sources for light signals become important!

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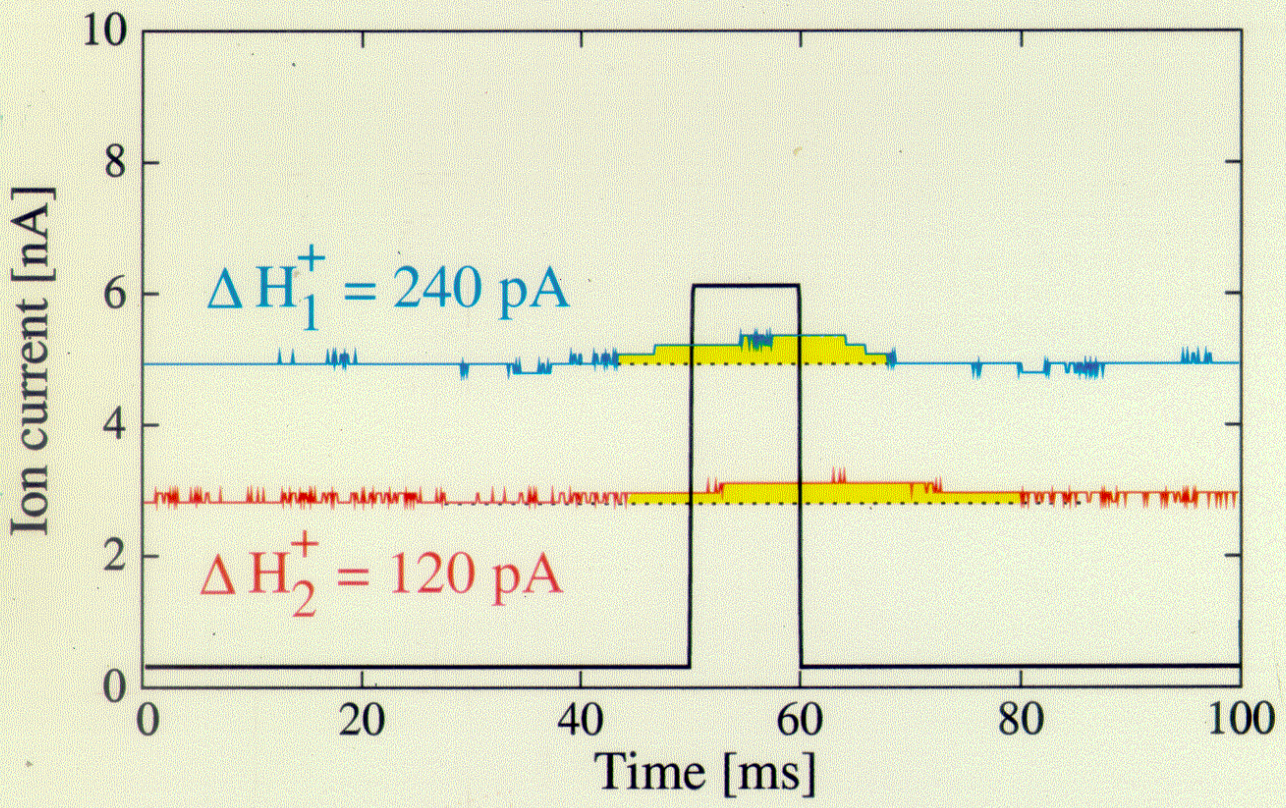
# First Cell Tests



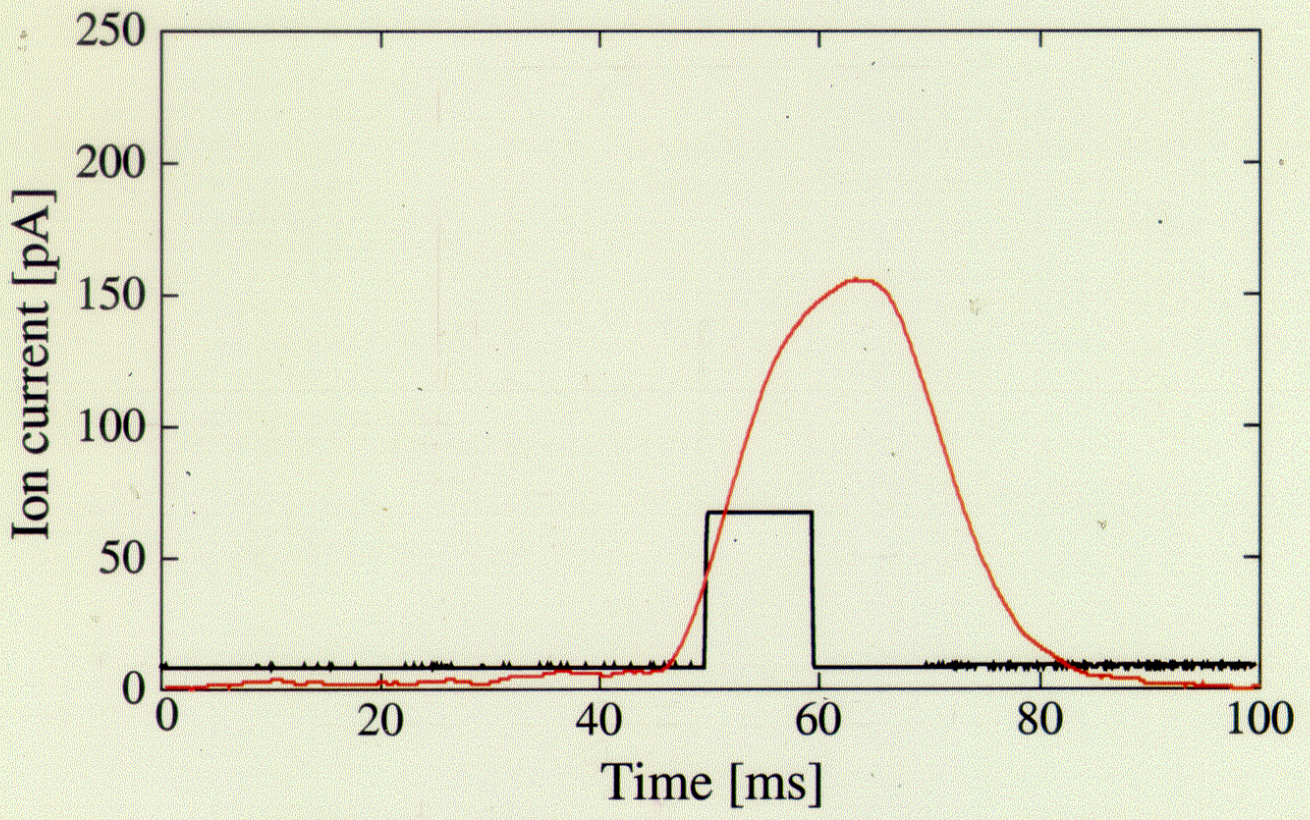
**Deflector Chamber**



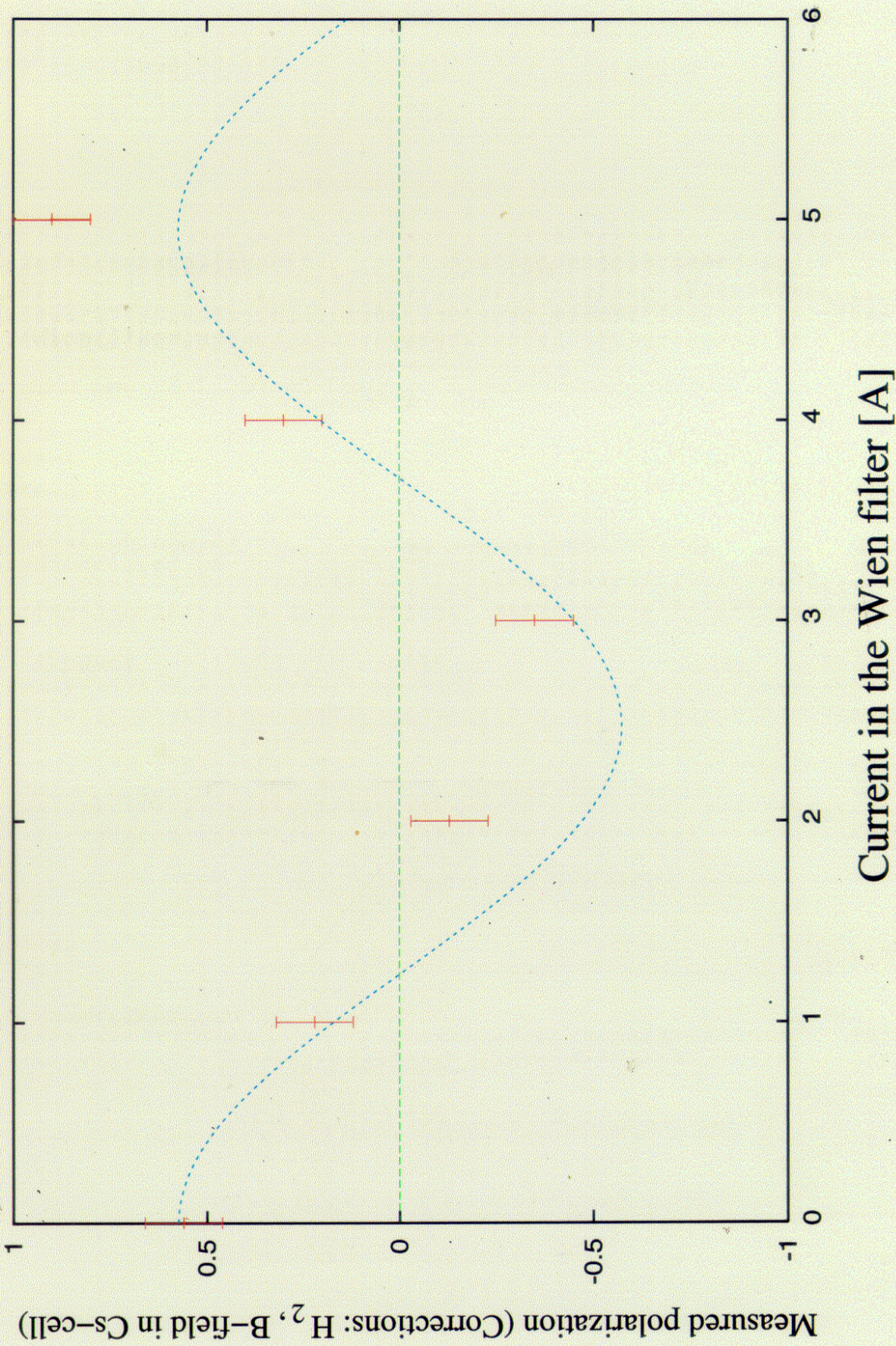
# Ion current, measured with oszilloscope



# Ion current, measured with amplifier and scope



# Wien-filter function of the polarization



# Time scale:

09./10. 2004: Transportation of ABS, LSP and all hardware to COSY (LKW-Schleuse). ISTC project will start. (see talk L6)

End of 2004 /

Beginning of 2005: Tests of different cells in the new target chamber at ANKE. (see talk T20)

Spring 2005: Installation of PIT at ANKE. Commissioning and first test measurements.

