



Novel Technique to Measure Polarizability of the Nucleon*

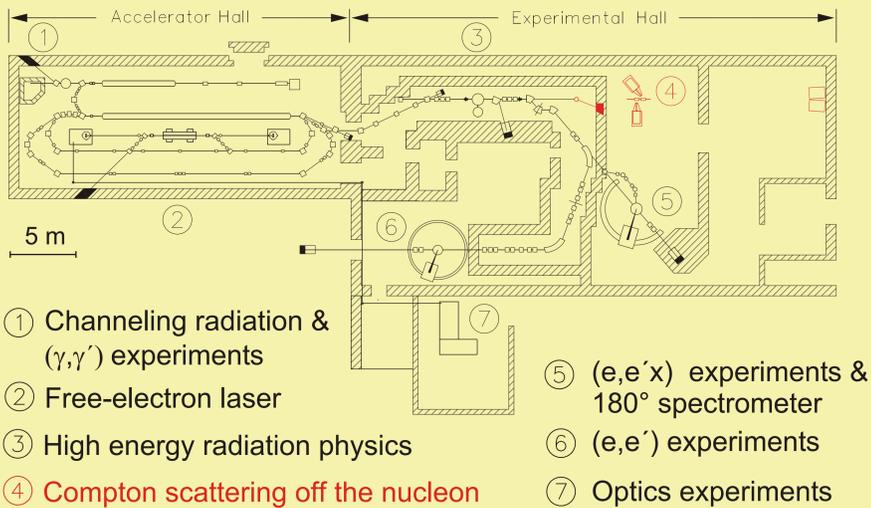
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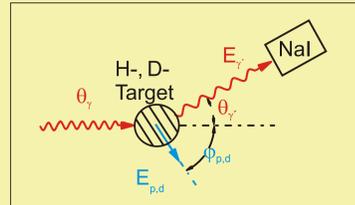
DPG - 2006
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S-DALINAC



New Experimental Technique



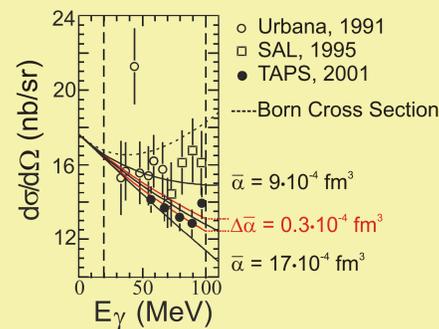
$E_\gamma = 20 - 100$ MeV
 $E_{\gamma'} = 15 - 100$ MeV
 $E_p = 0.4 - 8$ MeV

Advantages

- high luminosity
- low background

Expected Accuracy

$\Delta\bar{\alpha}_p, \Delta\bar{\beta}_p \approx 0.3 \cdot 10^{-4} \text{ fm}^3$
 $\Delta\bar{\alpha}_n, \Delta\bar{\beta}_n \approx 1.0 \cdot 10^{-4} \text{ fm}^3$



Simulations

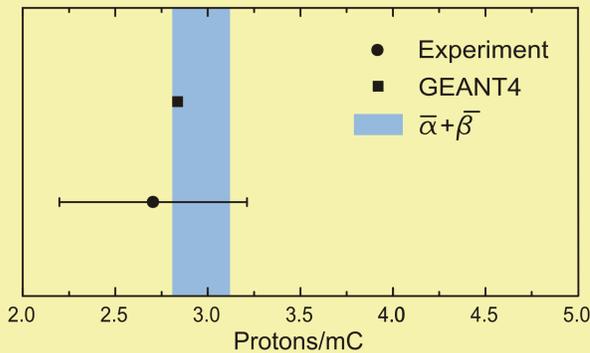
Proton signal:

- Response function of NaI(Tl)
- Ionisation chamber

GEANT4 (whole setup):

- Bremsstrahlung production
- Collimation
- Compton scattering

First Experimental Results

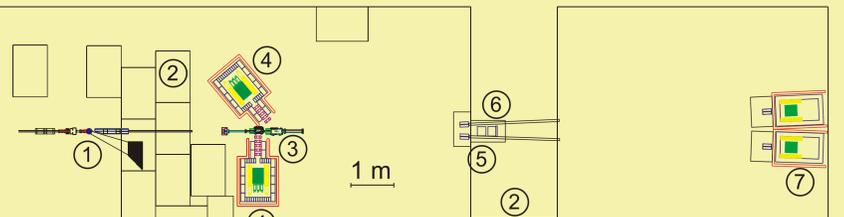


$E_e = 69.5$ MeV
 $I_e = 1 \mu\text{A}$

Beam time: 37 hours
Identified protons: 305

Error:
statistical and systematic

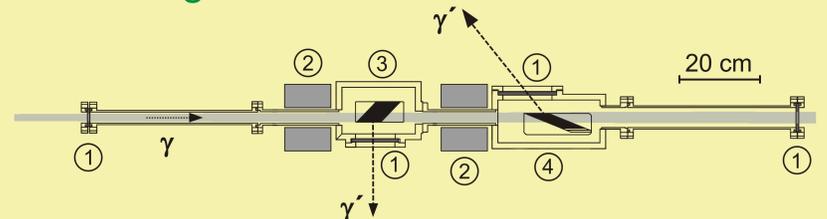
Final Experimental Setup



- 1 - Converter target
- 2 - Concrete shielding
- 3 - H/D high-pressure ionisation chambers

- 4 - 10"x14" NaI(Tl)
- 5 - Beam position monitor
- 6 - Quantameter
- 7 - 10"x10" NaI(Tl)

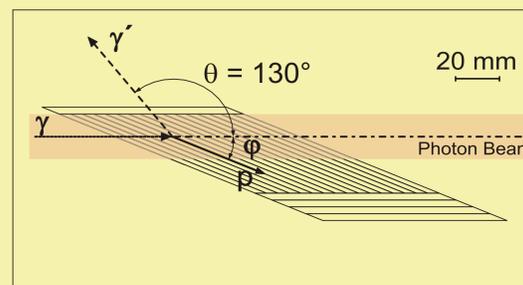
H/D High - Pressure Ionisation Chambers



- 1 - Be window
- 2 - Permanent magnet

- 3 - Chamber 90°
- 4 - Chamber 130°

Multi - Strip Anode



90°: 16 Strips,
each 2.5 x 65 mm²

130°: 9 Strips,
each 2 x 100 mm²