MEASUREMENT OF POLARIZATION PARAMETERS FOR REACTION $\vec{d}p \to \vec{p}pn$ IN COMPLETE KINEMATICS

(experiment N 145 at Saturne, France)

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Intermediate energy polarized deuteron experiments aim at investigating deuteron structure at relatively small distances ($r<1$ fm, $k>0.2$ GeV/c, where k is the internal nucleon momentum in the deuteron). According to calculations with realistic NN potentials (Paris, Bonn, Reid, etc.) $u(k)$ S-state) passes zero at k being about 0.4 GeV/c whereas $w(k)$ (D-state) dominates at $k = 0.2 - - 0.6$ GeV/c. This basic prediction being the consequence of the nuclear core hypothesis should be verified experimentally. In nonpolarized deuteron break-up experiments using both electron and hadron probes, only the $u^2(k) + w^2(k)$ combination, which stands for the nucleon momentum distribution in the deuteron, can be measured. When the deuteron is polarized, the measurements of polarization parameters provide the missing information on the $u(k)/w(k)$ ratio. Thus the behaviour of $u(k)$ and $w(k)$ can be completely reconstructed in the k region under investigation.

Experiment N 145 'Measurement of polarization parameters for the $\vec{d}p \to p_1p_2n$ reaction in complete kinematics' proposed by the LNPI group is in progress now at the Saturne accelerator of C.E.N. de Saclay (France). The polarized deuteron beam of Saturne with an energy of 2 GeV is focused onto a liquid hydrogen target (fig.). The SPES-4 facility together with the POMME polarimeter are used as a high energy arm for the forward-going protons p_1 scattered at the angle $\Theta_1 = 18 \pm 5°$ in coincidence with the low energy arm RS (Recoil Spectrometer) which detects the recoil protons p_2 scattered at the angle $\Theta_2 = 57 \pm 4.25°$. The RS equipment (LNPI contribution to the experiment) consists of E and ΔE scintillation counters and two proportional chambers $MWPC_1$ and $MWPC_2$. The momentum k_1 and scattering angle Θ_1 of the p_1 protons are measured with the SPES-4 spectrometer. The polarization P_z of these protons is measured by the POMME polarimeter.

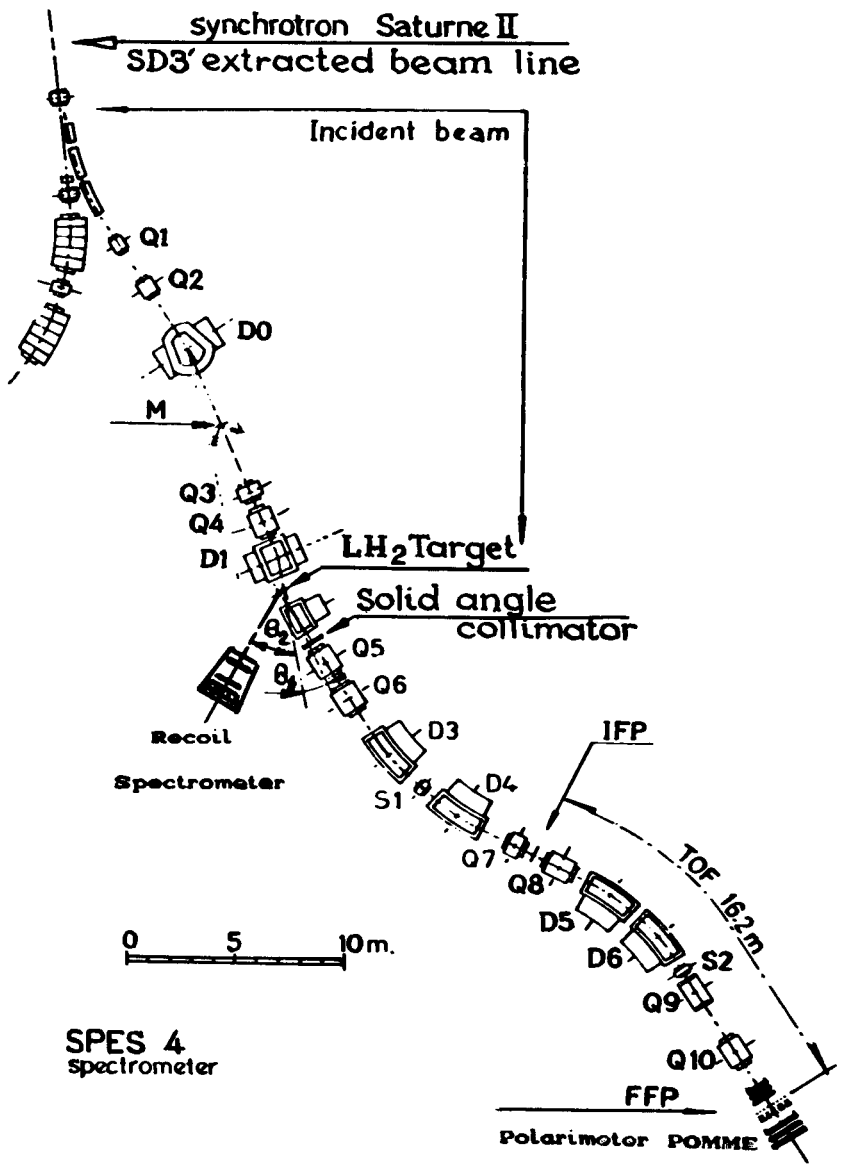

Fig. Set-up of experiment N 145 at Saturne. $Q_1 - q_{10}$ are quadrupoles, $S_1 - S_2$ — are sextupoles, $D_0 - D_6$ deflecting dipole magnets, $Q_3Q_4D_1$ are moveable units for changing scattering angle, IFP and FFP are intermediate and final focal planes of SPES-4 spectrometer, respectivelv

The time-of-flight information of the ΔE counters triggered by the FFP counters of SPES-4 and amplitude analysis of the E, ΔE counters of RS are used to select real ppn events and suppress the random background of the inclusive protons and pions. Charged particle track information from MWPCs helps to reconstruct the Θ_2 angle and eliminate particle trajectories not coming from the target. The deuteron beam intensity has been limited to $3 \cdot 10^9$ per burst by the admissible inclusive counting rate of the front chamber $MWPC_1$ located at a distance of 1.4 m from the target.

During the first run of the experiment (April'89) tensor A_{zz} and vector A_z analyzing powers and, also polarization P_z have been measured in the range from 0.04 to 0.42 GeV/c. To cover this K range, the experimental data on A_{zz} and A_z have been collected on five sets of the SPES-4 central momentum: $k_1 = 1.6, 1.7, 1.8, 1.9, 2$ GeV/c. It follows from the preliminary treatment of the data that random background contribution does not exceed 50%. After the subtraction of the background all the events are supposed to be grouped in k bins with $\Delta k = 10$ MeV/c. An average statistical error for a bin is expected to be 2 — 3% for A_{zz} and 3 — 5% for A_z. For P_z we have obtained preliminary data. The next run is planned for May 1990.