Using the values of PB and P, the following value of the antineutrino–spin asymmetry was obtained:

$$B = 0.9894 \pm 0.0083 \quad (3)$$

This result has an accuracy which is 4.2 times better than the previous measurement [7].

Using the obtained result, it is possible to give the restriction on the mass of the right boson W_R from the neutron β–decay. The value of the antineutrino–spin asymmetry is predicted in the frames of $V-A$ theory to be equal $B_{V-A} = 0.988 \pm 0.001$. According to the left-right model (at zero mixing angle) the value $B = (1-2\delta^2)B_{V-A}$, where δ is the squared ratio of left and right boson masses.

Since no difference between predicted and measured values is found within experimental errors of $\pm 0.83\%$, the restriction for right boson mass is $M_{W_R} > 282$ GeV/c^2 (90% CL). More complete analysis of restrictions from this experiment and previous ones is presented in the plane squared mass ratio (δ) *vs* mixing angle (ζ) – see Fig. 3. The figure includes experimental results for the neutron lifetime, neutron electron spin asymmetry, lifetime for $0^+ \rightarrow 0^+$ transitions, and lifetime and asymmetry in ^{19}Ne, which together suggest a mass about 230 GeV/c^2 for W_R. The results of our experiment fail to confirm the existence of this island directly from the neutron beta decay.

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PRECISE DETERMINATION OF NEUTRON BEAM POLARIZATION BY TWO ANALYZER METHOD

A. P. Serebrov, A. V. Alduschenkov, M. S. Lasakov, I. A. Kuznetsov, I. V. Stepanenko, N. G. Kolyvanova, M. S. Dewey[1)]

[1)] *National Institute of Standards and Technology, Gaitherburg, Maryland, USA*

The method of measurement of the neutron beam polarization by two analyzers was discussed in Ref.[1]. The main peculiarity of the method is the reversing of the neutron trajectories through the analyzing device. This method is extended by taking into account systematic errors and spin flipping in analyzers.

An accuracy of 0.2% in measuring the beam polarization in Ref.[1] was limited by a strong spectral dependence of the polarization and by a large angular divergence of the neutron beam.

To study a possibility of obtaining higher accuracy of the polarization, we constructed two devices with horizontal disposition of analyzers. The analyzing devices were constructed

in two versions: signes of curvature of curved supermirrors are opposite for setups N1 and N2. The two versions can exclude the possible influence of the spin-orbital interaction for neutrons in supermirrors [2]. This interaction can manifest itself as a distinction between two measured polarization values P_1 and P_1'.

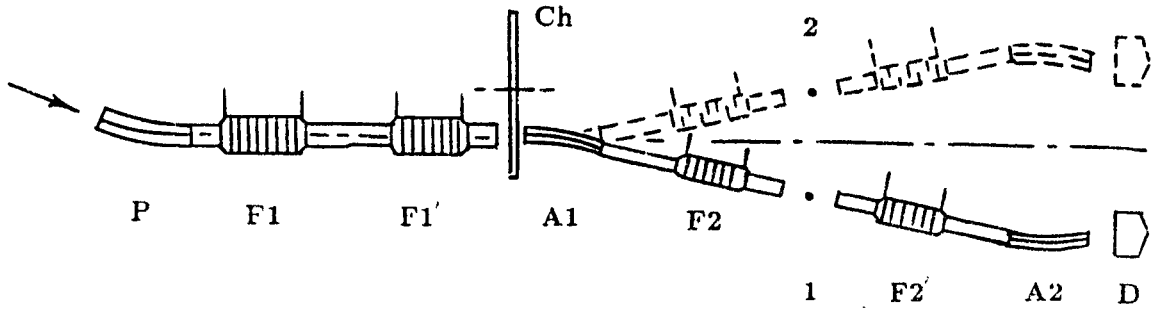

Fig.1. Scheme of the experimental setup. P - polarizer, F1, F1', F2 and F2' - flippers, A1 and A2 - analyzers, Ch - chopper of neutron beam, D - detector. Two analyzing systems N1 and N2 are shown on the bottom and on the top, respectively

The analyzing system consists of two analyzers (A1 and A2) - see Fig.1. A1 and A2 are connected by a neutron guide, containing a spin flipper (F2). An additional flipper (F2') is available for determining the flipper efficiency of F2.

The measured value of the polarization is connected with the true P as follows

$$P_1^2 = P^2 \frac{A_1}{\widetilde{A}_1} = \frac{N_{-+} \cdot \widetilde{N}_{-+}}{N_{++} \cdot \widetilde{N}_{+-}}; \tag{1}$$

$$P_1'^2 = P^2 \frac{\widetilde{A}_2}{A_1} = \frac{N_{-+} \cdot \widetilde{N}_{-+}}{\widetilde{N}_{++} \cdot N_{+-}} \tag{2}$$

where A_1, A_2, $\widetilde{A}_1$, $\widetilde{A}_2$ are analyzing powers for two positions of the analyzing system.

The set of combinations of neutron counting rates for straight (N_{ik}) and inverse ($\widetilde{N}_{ik}$) geometries needed to determine the neutron beam polarization is given in [1].

The parameter "b",

$$b = \frac{1}{8}\left(1 - \frac{N_{--}\widetilde{N}_{--}}{N_{-+}\widetilde{N}_{-+}}\right), \tag{3}$$

is essential for determination of the accuracy of the beam polarization. It is connected with the spin flipping probability in the analyzers. The most reliable value of the polarization is given by the quantity P_A that is the geometrical mean of P_1 anf P_1'

$$P_A^4 = P^4 \frac{A_1}{\widetilde{A}_1} \cdot \frac{\widetilde{A}_2}{A_2} = \frac{N_{-+}^2}{N_{++}N_{+-}} \cdot \frac{\widetilde{N}_{-+}^2}{\widetilde{N}_{++} \cdot \widetilde{N}_{+-}} \tag{4}$$

In this work we used the Shaerpf's polarizer with supermirror coating of 3×5 cm^2 cross section. The polarizer was put in a permanent magnet which provides a field of 900 G. The neutron quide and two flippers F1 and F1′ were placed inside the polarizing section.,

Equality of the parameter "b" to zero indicates to symmetrization of neutron spin passing through the analyzing device. Meanwhile an accuracy of 10^{-3} for "b" can be obtained essentially quicker than for the polarization values.

Presented in Table are experimental data obtained by means of the analyzing devices N1 and N2 with the slope angle corresponding to the minimum "b".

	N1	N2
b	0.0003(2)	0.0001(2)
P_1	0.9827(8)	0.9845(10)
P_1'	0.9819(8)	0.9820(10)
P_2	0.9826(8)	0.9833(10)
P_3	0.9811(8)	0.9829(10)
P_A	0.9823(6)	0.9833(7)
P_B	0.9818(6)	0.9831(7)
A_1	0.9718(6)	0.9718(7)
A_2	0.9711(6)	0.9737(7)

The spectral dependence of the beam polarization measured by means of the analyzing device N1 is shown in Fig.2.

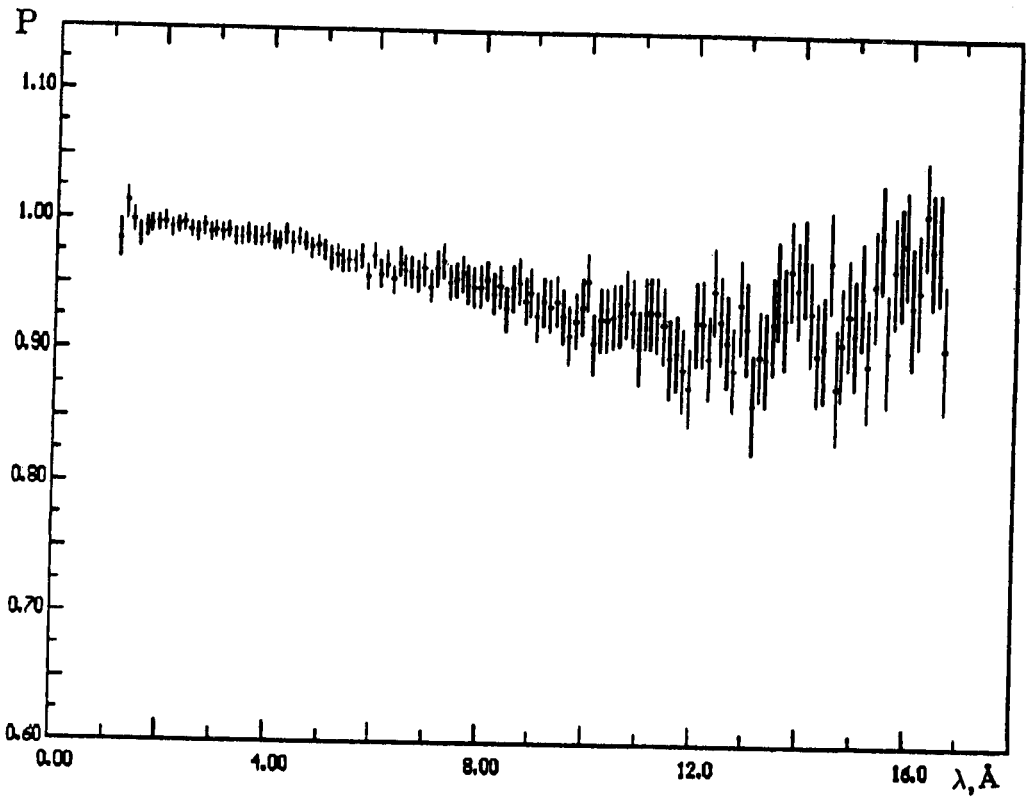

Fig.2. The neutron beam polarization plotted against the neutron wave length

To summarize, the precise determination of the neutron beam polarization is carried out in this work using two setups with different curvature signes of the supermirrors. The values of the polarization obtained for both device geometries are equal with an accuracy of 10^{-3}. This fact confirms formally the reliability of the result.

Another criterion is the coincidence of the polarization values P_1, P_1', P_2 and P_3 within the errors under the condition that parameter "b" is small.

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MEASUREMENT OF POLARIZATION OBSERVABLES IN $\vec{d}+p \to \vec{p}+p+n$ REACTIONS AT $T_d = 2.0$ GeV

S. L. Belostotski, H. C. Bhang[1)], M. Boivin[2)], B. Bonin[3)], A. Boudard[3)], M. Garçon[3)], O. G. Grebenyuk, J. Erő[4)], Z. Fodor[4)], L. G. Kudin, P. Koncz[4)], R. Lombard[3)], B. Mayer[3)], V. N. Nikulin, C. F. Perdrisat[5)], V. Punjabi[5)], Z. Seres[4)], Y. Terrien[3)], E. Tomasi–Gustafsson[2)], J. Yonnet[2)], M. Youn[1)]

1) *Department of Physics, Seoul National University, Seoul , Korea*
2) *Laboitoire National Saturne, Saclay, Gif-sur-Yvette, France*
3) *Service de Physique Nuclaire, Centre d'Etude de Saclay, Saclay, Gif-sur-Yvette, France*
4) *Central Research Institute for Physics, Budapest, Hungary*
5) *College of Williamson and Marry, Williamsbourg, Virginia, USA*

We have studied the deuteron breakup in the $p(d,2p)n$ reaction at T_d=2.0 GeV. In this experiment, the vector analyzing power A_y, the tensor analysing power A_{yy}, and the polarization of the forward scattered proton are measured in a kinematical domain close to the *pp* quasifree scattering. These observables are presented as a function of the neutron momentum ranging from 0.04 to 0.45 GeV/c in the rest frame of the deuteron. Marked deviations from the first order Impulse Approximation using conventional deuteron wave functions are observed. Corrections due to the multiple scattering, the final state interaction and the Δ excitation are computed. With them, a reasonable agreement with the data is obtained.

The polarized deuteron beam of the accelerator SATURNE was incident on a 4 cm thick liquid hydrogen target. Fast protons from the reaction (p_1) were selected at the scattering angle $\Theta_1 = 18° \pm 0.5°$ by the magnetic spectrometer SPES-4 in coincidence with the recoil protons (p_2) detected at the angle $\Theta_2 = 57°$($\pm 4.25°$ in the scattering plane and $\pm 8°$ in the vertical plane) with a mosaic of E and ΔE scintillation counters. Two multiwire proportional chambers at 1.5 and 3 m from the target provided determining the recoil track position. Six central momentum settings for the proton detected in SPES-4 (p_{10} = 1.6, 1.7, 1.8, 1.9, 2.0, 2.05 GeV/c) were used. The polarimeter POMME located behind the final focal plane of SPES-4 was used to measure the polarization of the fast protons. At the chosen Θ_1 and