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I. OTS

ON THE POLARIZATION EFFECTS IN HIGH-ENERGY LARGE-ANGLE *p-d* SCATTERING

I. OTS. POLARISATSIOONIEFEKTIDEST KÕRGE ENERGIAGA PROOTONITE HAJUMISEL DEUTRONITELT TAGASISUUNAS

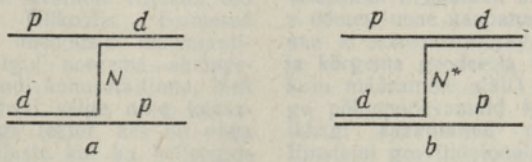
И. ОТС. О ПОЛЯРИЗОВАННЫХ ЭФФЕКТАХ ПРИ РАССЕЯНИИ НАЗАД ВЫСОКОЭНЕРГЕТИЧЕСКИХ ПРОТОНОВ ДЕЙТРОНАМИ

A sharp increase in the cross-sections at a large-angle *p-d* scattering has been observed in the energy range 0.5—1.5 Gev [1–3]. The theoretical analysis shows that it is very likely that the pick-up process may account for the high-energy *p-d* back-scattering. A. K. Kerman and L. S. Kisslinger [4] have studied the large-angle *p-d* cross-section for 1 Gev protons as a baryon-transfer reaction. They find that the S-state component of the deuteron wave function makes a negligibly small contribution at 1 Gev, while the contribution from the D-state component increases. Using a 6—7 per cent D-state, about 50 per cent of the back-scattering cross-section can be accounted for. The remaining 50 per cent of the cross-section is explained by the authors as the result of resonance transfer. They point out from the general principles of the field-theory model that a deuteron contains components with baryon resonances (the first excited nucleon state N* (1688) with 5/2 spin) of about 1 per cent. This very small D* component can have a large or even dominant effect at some energies and angles.

J. S. Sharma et al. [5] take into account besides the N* (1688) $\equiv F_{15}$ resonance the contributions of other N* exchanges in which the contributions of the P'_{11} (1470), P''_{11} (1780) and D'_{13} (1520) exchanges are found to be extremely important.

To check up the hypothesis of resonance exchange models, the experimental investigations of the polarization effects in the energy region under study and large angles would be of great importance. That is due to the fact that the pole diagram model with the nucleon transfer and those with the resonance exchange have different polarization effects.

Let us discuss the Kerman-Kisslinger model in which the main contribution to the differential cross-section for *pd* scattering in the Gev range is made by diagrams *a* and *b* (see Figure).



It is well known that the pole diagram with the spin 1/2 particle transfer (nucleon on diagram *a*) with unpolarized initial particles gives

no polarization to final particles, and the angular distribution of the final particles does not depend on the polarization of one of the initial particles (see, e. g. [6]). The spin of resonance N* (1688) being 5/2, the final particles from diagram *b* with non-zero orbital momenta at both vertices (only the D*-wave was taken into account by Kerman and Kisslinger) and with non-zero formfactors for both total spin states ($j_{N^*p} = 2, 3$) can be polarized. The angular distribution depends then on the polarization of one of the initial particles as well [6]. Similar polarization effects would arise also from the interference of diagrams *a* and *b*.

In this case there is no restriction that the formfactors for both total spin states have to be different from zero.

As to the model of Sharma et al. [5] it is necessary to point out that final particles can be polarized even from the interference of diagrams with the spin 1/2 resonance P'_{11} and P''_{11} exchange.

Thus, the observed polarization of scattered protons and the angular asymmetry, which depends on the polarization of one of the initial particles, would be the factors for suggesting the theory of resonance transfer.

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