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INTERACTION OF RELATIVISTIC DEUTERONS WITH NUCLEONS

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INTRODUCTION

The investigation of processes of the relativistic deuteron fragmentation on nuclei in particular on nucleons, can give nontrivial information about the deuteron structure. As is known, in a general relativistic case it is impossible to introduce the notion of a deuteron wave function. But it is better to consider these processes in the infinite momentum frame (IMF) using light cone variables[1-6]. In that frame time-ordered graphs of the old perturbation theory (OPTh) may be used instead of relativistic invariant Feynman graphs, many graphs of OPTh are negligible[7]. There are only graphs corresponding to the dissociation of a deuteron into two nucleons, so the notion of the wave function of dynamics of the light cone may be introduced[1-6].

The analysis of processes of relativistic deuteron fragmentation on nuclei using variables of the light cone is performed, for example, in refs. [8,9] where it was shown that the invariant inclusive proton spectrum is proportional to some deuteron structure function which means that there is a probability to find a constituent like a nucleon in the deuteron with the fractional momentum x. It is defined in terms of the Bethe-Salpeter bound state wave functions (w.f.)[9]. But there is still no exact simple solution of the Bethe-Salpeter equation, there are only model dependent solutions. Therefore refs.[2-6] propose a rather interesting approach to this problem: the relativistic wave function of deuteron (w.f.d.) is defined in terms of nonrelativistic w.f. depending on relativistic invariant variable κ^2. The above proton spectrum can be calculated using, for example, a realistic w.f. of Paris[10] or of the type in ref.[11]. One cannot calculate the spectator mechanism alone, it is necessary to take into account the graphs with rescattering of π-mesons [12] or with absorption of a virtual meson by a deuteron nucleon[13], these give the contribution comparable with one simple spectator graph, or larger, in the middle region of the momentum spectrum. All above contributions decrease and become negligible at the end of the proton momentum spectrum, and the spectator mechanism with the realistic w.f. does not describe[13] experimental

data. In refs.[14-17] it is shown that besides nucleon degrees of freedom it is necessary to take into account quark degrees of freedom in the deuteron. For example, in ref.[17] the total deuteron structure function is represented as a sum of two parts. The first part is proportional to a square of the nonrelativistic w.f. depending on κ^2, and the second one can be connected with an admixture of the six-quark state (6q), its form and parameters being determined from the Regge-asymptotic at $x \to 1$, from the description of experimental data on cumulative hadrons and from the reaction $ed \to e'X$.

The processes like $dA \to pX$ when protons are emitted at a large angle ($\theta^* \approx \pi/2$) in N-N c.m.s. are analysed in refs.[8,9,18,19] on the basis of the hard collisions model[20]; there the deuteron structure function $G(x, p_t)$ was also introduced, it depended both on x and on the transverse momentum p_t of a nucleon inside the deuteron. The form of the deuteron function $G(x, p_t)$ was chosen on the basis of general field-theoretical ideas[1], parameters were chosen on the basis of the best agreement between theory and experiment; their values depended on the energy of initial deuterons[18,19], i.e. the structure function $G(x, p_t)$ is not universal, scaling one, independent of the initial deuteron energy. Therefore a question arises, if this function gives direct information about the deuteron structure.

The present paper deals with the analysis of the reactions like $dA \to pX$, when protons are emitted at large angles in the N-N c.m.s., in the framework of the hard collisions model[20], also taking into account secondary interactions and a possible admixture of the "6q"-state in the deuteron. Kinematic regions of those considerable contributions into proton spectrum are identified.

I. HARD COLLISIONS AND SECONDARY INTERACTIONS IN THE PROCESS $dN \to pX$

In the framework of the hard collisions model in IMF the expression for the contribution of the invariant inclusive proton spectrum of the reaction $dp \to pX$, corresponding to the graph in Fig.1, is written in the following form[8]:

$$\rho^{(1)}_{dp} = \int G_{N/d}(x, k_t)\, r\rho_{Np}(x, k_t)\, dx\, d^2k_t , \qquad (1)$$

where $G_{N/d}(x, k_t)$ is the deuteron structure function depening on the light cone variable x and its transverse momentum k_t;

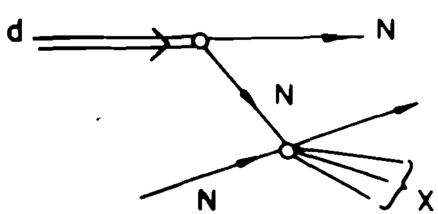

Fig.1. The graph of the simple N-N *collision of the reaction* $dN \to pX$.

$\rho_{Np}(x, k_t)$ is the inclusive invariant proton spectrum of the reaction $Np \to pX$; $r = \dfrac{I_{NN}}{x I_{dN}}$, where I_{NN}, I_{dN} are the invariant fluxes of two colliding nucleons, and of a deuteron and a nucleon, respectively.

The structure function $G_{N/d}(x, k_t)$ can be related to the w.f. [8,9]

$$\Psi(x, k_t) = \frac{\Phi(k^2)}{k^2 - m^2},$$

where Φ is the solution of the Bethe-Solpeter bound state equation, k is the 4-momentum of a nucleon inside the deuteron, m is its mass

$$G_{N/d}(x, k_t) = \frac{|\Psi(x, k_t)|^2}{4x(1-x)} \qquad (2)$$

with the normalization:

$$\int G_{N/d}(x, k_t)\, dx\, d^2 k_t = 1.$$

According to refs. [2-6] we shall define $\Psi(x, k_t)$ in terms of the nonrelativistic w.f.d. $\phi_{n.r.}$ depending on the relativistic invariant variable κ^2:

$$\Psi(x, k_t) = \left(\frac{m^2 + k_t^2}{x(1-x)}\right)^{1/4} \phi_{n.r.}(\kappa^2), \quad \kappa^2 = \frac{m^2 + k_t^2}{4x(1-x)} - m^2.$$

Knowing the relation between the structure function $G_{N/d}(x, k_t)$ and $\phi_{n.r.}$ and using (1), we can calculate the contribution of hard collisions $\rho^{(1)}_{dp}$ to the inclusive proton spectrum of the reaction under discussion.

Now we shall consider other possible sybprocesses shown in Fig.2 and occurring in the deuteron-nucleon interaction: rescattering of nucleons (Fig.2a), rescattering of π-mesons

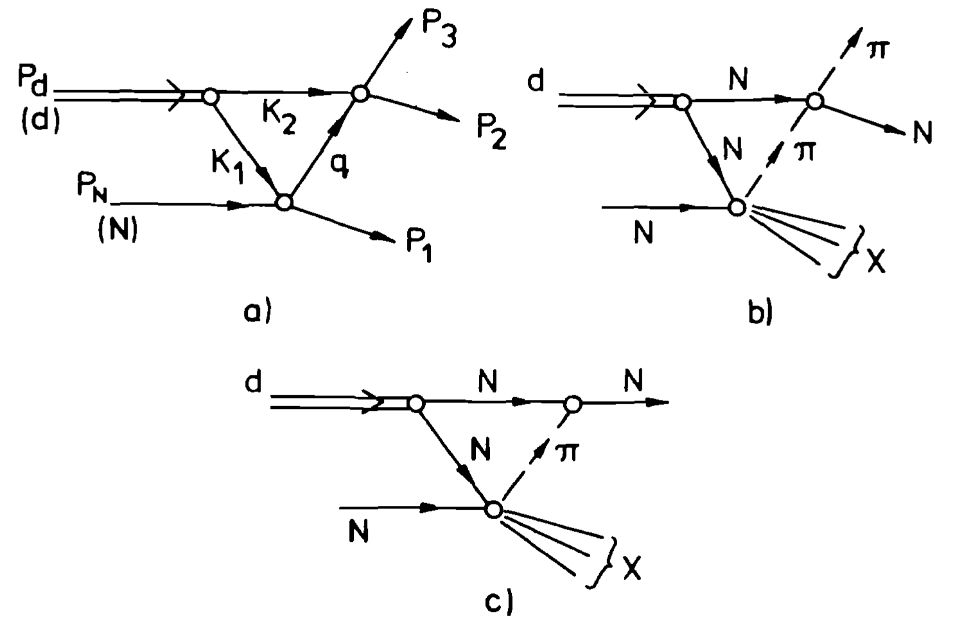

Fig.2. Graphs corresponding to the rescattering of nucleons (a), the π-meson (b) and to the absorption of the virtual π-meson by the deuteron nucleon (c).

(Fig.2b) and absorption of a virtual meson on one of the deuteron nucleons (Fig.2c). Notice that the contribution of the graphs like those in Figs. 2b, 2c with a vector meson in the intermediate state is negligible because of the small value of the cross section for its production [13]. Therefore we do not consider them.

We shall write the expression for the contribution to the inclusive proton spectrum due to rescattering of nucleons (Fig.2a) in the following form:

$$\rho^{(2)}_{dp} = \frac{p_1 |F|^2 \sin\theta\, d\theta}{32(2\pi)^4 m p E_0}, \qquad (3)$$

where F is the amplitude of the process $dp \to px$ corresponding to the graph of Fig.2a; p_d, p_1 are the moments of the initial deuteron and the final proton; θ is the angle of emission; E_d is the initial deuteron energy.

To calculate rescattering effects, we shall confine ourselves to consideration of elastic N-N collisions. This appro-

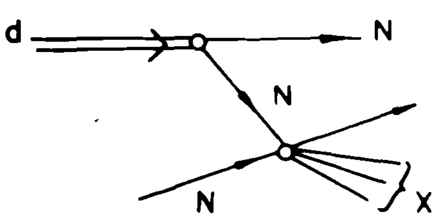

Fig.1. The graph of the simple N-N *collision of the reaction* $\vec{d}N \to pX$.

$\rho_{Np}(x, k_t)$ is the inclusive invariant proton spectrum of the reaction $Np \to pX$; $r = \dfrac{I_{NN}}{xI_{dN}}$, where I_{NN}, I_{dN} are the invariant fluxes of two colliding nucleons, and of a deuteron and a nucleon, respectively.

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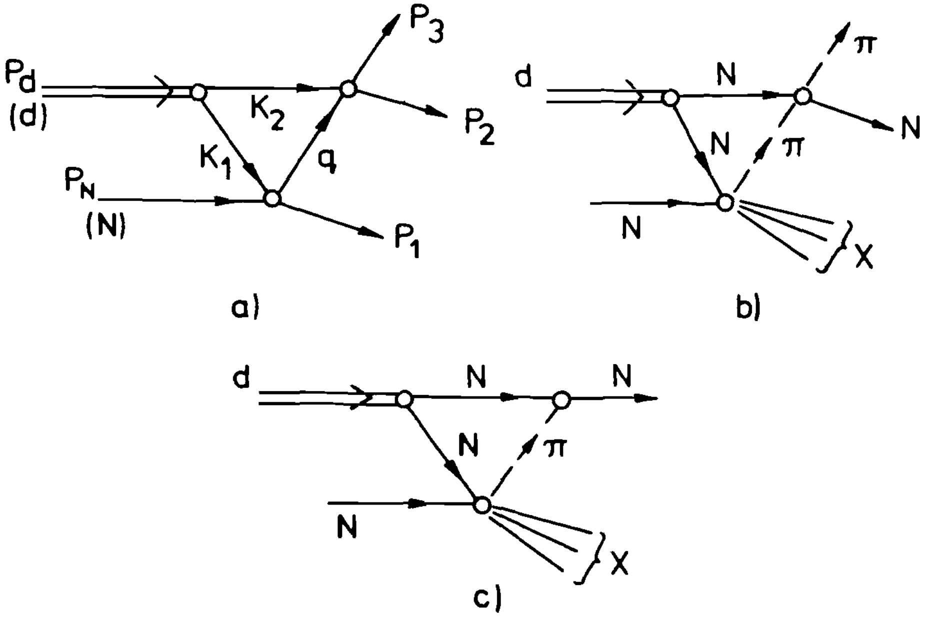

Fig.2. Graphs corresponding to the rescattering of nucleons (a), the π*-meson (b) and to the absorption of the virtual* π*-meson by the deuteron nucleon (c).*

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where F is the amplitude of the process $\dot{d}p \to px$ corresponding to the graph of Fig.2a; p_d, p_1 are the moments of the initial deuteron and the final proton; θ is the angle of emission; E_d is the initial deuteron energy.

To calculate rescattering effects, we shall confine ourselves to consideration of elastic N-N collisions. This approximation is justified at not very large energies of the initial deuteron. Detailed calculations of the amplitude are represented in the Appendix.

Subprocesses with absorption of the virtual meson on the deuteron nucleon and with rescattering of the π-meson (Fig.2c and Fig.2b respectively) are analysed in detail in Refs.[12,13] Therefore we shall write here only the resulting expression for their contributions $\rho^{(3)}_{dp}$ (Fig.2c) and $\rho^{(4)}_{dp}$ (Fig.2b)

$$\rho^{(3)}_{dp} = \rho_{Np\to\pi X}\phi(p_1, k_0)|I|^2, \tag{4}$$

where $\rho_{Np\to\pi x}$ is the inclusive invariant π-meson spectrum of the reaction $Np \to \pi X$

$$\phi(p_1, k_0) = \frac{g^2}{8mp_1^3}|F_\pi(q)|^2 \left(p_1 - k_0 - \frac{E' - E(k_0)}{4m}(p_1 + k_0)\right)^2,$$

where F_π is the π-meson form factor, depending on $q^2 = (p_1 - k_0)^2$, k_0 is the mean value of the deuteron nucleon momentum, m is the nucleon mass, $g^2/4\pi = 14.7$;

$$I = \int_0^\infty e^{iax}\,\Phi_0(x)dx, \qquad a = E_1 - E_\pi - m\frac{E_\pi(p_1)}{p_1\Omega_q}$$

$$\rho^{(4)}_{dp} = \frac{\langle r^{-2}\rangle}{4\pi}\cdot\int \rho_{Np\to\pi x}\frac{d\sigma^{el}}{d\Omega_\pi}\frac{qE(p_1)}{p_\pi E_\pi}d\Omega_q \tag{5}$$

where $\langle r^{-2}\rangle$ is the average value of the inverse square of the distance between nucleons in the deutron, p_π and E_π are the three-momentum and the energy of the final π-meson; $d\sigma^{el}_{\pi N}/d\Omega_\pi$ is the differential cross section of the elastic π-N scattering; Ω_q is the solid angle of emission of the intermediate π-meson (see Fig.2b).

Expressions (3) and (4) have been deduced under an assumption that w.f.d. decreases rather than the amplitude of the process $Np \to \pi X$[13].

The full proton spectrum of the reaction: $dp \to pX$ is the coherent sum of contributions of graphs in Figs.1,2. But it is difficult to calculate correctly the interference between these graphs in a general case of an inclusive reaction, it is necessary to know the final reaction states. The interference between the graphs of Figs.1 and 2a can be evaluted in some case if we suppose that the hard process in Fig.1 is basically the elastic N-p scattering and subprocesses in Fig.2a are two elastic N-N collisions. This evalution seems to be possible at not very large energies of initial deuterons when inelasticities in N-N collisions are not large. Thus, we shall represent the full proton spectrum in the form of the sum of the following contributions:

$$\rho_{dp} = \rho^{(1,2)}_{dp} + \rho^{(3)}_{dp} + \rho^{(4)}_{dp}, \tag{6}$$

where $\rho^{(1,2)}_{dp} = \rho^{(1)}_{dp} + \rho^{(2)}_{dp} + \rho^{inter.\,1,2}_{dp}$ is the coherent sum of the contributions of the graphs in Figs.1, 2a, $\rho^{(inter.\,1,2)}_{dp}$ is the contribution of the interference between the graphs in Fig.1 and 2a, see Appendix.

Contributions of graphs in Figs.2b, 2c were calculated quite correctly in Refs.[12,18] using formulae represented above for the process $dp \to pX$ at 9 (GeV/c) when protons are emitted at the angle $\theta^* = 90°$ in the N-N c.m.s. There the function of the type[10] is used as w.f.d.

Calculation results of the full proton spectrum of the reaction $dp \to pX$ at $p_d \approx 9$ (GeV/c), $\theta^* \simeq \pi/2$ using (6) and realistic w.f.d. of the type[11] and the experimental data [18] are represented in Fig.3; there are also contributions of the simple graphs in Figs.1, 2. Note that there was some uncertainty due to off-shell effects when we were calculating the contribution of Fig.2c graphs.This uncertainty made us introduce a form factor F_π in expression (4),as in Ref.[13], in the following form:

$$F_\pi = (1 + t/a_1\mu^2)^{-1},$$

where $t = q^2$ is the square of the π-meson four-momentum in the intermediate state, μ is the π-meson mass, a_1 is some parameter. The value of a_1 is chosen from the best theoretical description of the π-N elastic scattering experimental data, from elastic or inelastic N-N interactions with one or two π-mesons produced. These theoretical calculations were performed within the one pion exchange model (OPE)[21]. Calculation results of the contribution $\rho^{(3)}_{dp}$ of the graphs in Fig.2c to the proton spectrum are very sensitive to the parameter value a_1 in F_π, this is clearly seen in Fig.3.

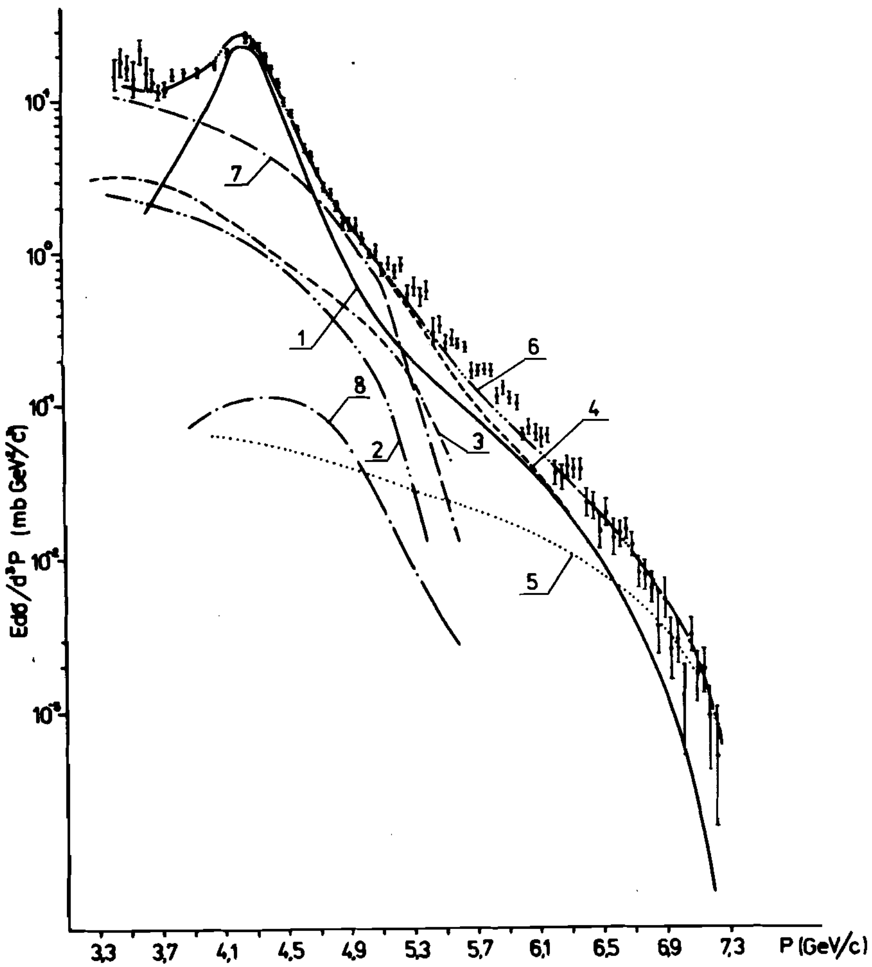

Fig.3. The dependence of the inclusive invariant spectrum $E d\sigma / d^3 p$ *of the reaction* $dp \to pX$ *on the final proton momentum* p. *Curves: 1 is the contribution of the graph of Fig.1; 2 is the contribution of the graphs of Fig.2c; 3 is the contribution of the graphs of Fig.2b,* $a_1 = 10$; *4 is the contribution of the sum of the Fig.1-2 graphs with* $\Phi_{n.r.}(\kappa^2)$ *of type* [11]; *5 is the contribution of the Fig.1 graph with the structure function* $\tilde{G}_d(x)$ *of the type (8) due to only the "6q"-component contribution in the deuteron; 6 is the full contribution of all Figs.1-2 graphs with the structure function* $G(x, p_t)$ *of the form (7), i.e. the "6q"-component is taken into account; 7 is the contribution of the Fig.2c graph with* $a_1 = 33$; *8 is the contribution of the graphs as in Fig.2a.* ⟟ *- experimental data at* $P_d = 9$ *(GeV/c)* [18].

II. DEUTERON STRUCTURE AT SMALL NUCLEON DISTANCES

As is shown in Fig.3, E the discrepancy between the full proton spectrum calculated using (6) and the experimental data is considerable at the end of the spectrum, that is at $p > 5.7$ (GeV/c) or $x > 0.63$. Large momenta of final protons correspond to large relative nucleon momenta inside the deuteron or small distance between nucleons inside the deuteron. In our calculations, as mentioned above, the nonrelativistic w.f.d. of the type [11] is used, but it depends on the relativistic invariant variable κ^2. All forms of nonrelativistic w.f.d., as is known, are valid at medium or large nucleon distances. Therefore, it is not correct to use the above-mentioned w.f.d. at small nucleon distances, inside the deuteron, i.e. to consider a deuteron consisting of two nucleons. According to investigations of the deuteron structure, an indivisible six-quark state can be formed at small nucleon distances [14-17] or few-nucleon correlations can cause large momenta nucleons inside the deuteron [4].

To take into account this deuteron state which differs from the state described by w.f.d. of the type [16], we shall use the results of Ref. [17] where the deuteron structure function is represented in the following form:

$$G(x, p_t) = (1 - \omega) G_{N/d}(x, p_t) + \omega \tilde{G}_d(x, p_t), \tag{7}$$

where $G_{N/d}(x, k_t)$ is the function defined by expression (2); $\tilde{G}_d(x, p_t)$ is a function caused, for example, by the contribution of the "6q"-component in the deuteron; ω is the probability of this "6q"-state.

The form of $\tilde{G}_d(x, p_t)$ neglecting its p_t-dependence is defined in Ref. [17]

$$\tilde{G}_d(x) = C x^a (1 - x)^b. \tag{8}$$

The value of b is defined from the Regge-behaviour of the quark distribution in a six-quark cluster $\tilde{q}(x)$ which is connected with the structure function $\tilde{G}_d(x)$ in the following way [17]

$$\tilde{q}(x) = \tilde{G}_d \otimes q_N \equiv \int_x^1 \tilde{G}_d(x/x_1)\, q_N(x_1) \frac{dx_1}{x_1},$$

where $q_N(x)$ is the quark distribution in a free nucleon.

According to the quark-gluon string model, the function $\tilde{q}(x)$ should obey the Regge asymptotics at $x \to 0$ and $x \to 1$, then it should have the following form:

$$\tilde{q}(x) = C x^{-\alpha_R(0)} (1 - x)^{2(1-\bar{\alpha}_B)+b_N}, \tag{9}$$

where $b_N = \alpha_R(0) - 2\bar{\alpha}_N(0)$; $\alpha_R(0) = 1/2$ is the Regge trajectory at $t = 0$, $\bar{\alpha}_N(0) = -0.5 \div -0.75$ is the p_t-average nucleon trajectory; $\bar{\alpha}_B(0)$ is the intersection of the average nucleon and baryon trajectories.

Values of a and C in (8) were determined from normalizations of the function $\tilde{G}_d(x)$ and its first momentum [17]:

$$\int_0^1 \tilde{G}_d(x)dx = 1; \quad \int_0^1 x\tilde{G}_d(x)d = 1 - \Delta_2 . \tag{10}$$

The second condition in (10) is necessary for the description of the experimental data EMC [23] which allows determination of Δ_2 [17,23]. The physical sense of the second condition in (10) is that the quarks in the 6q-cluster do not have its whole momentum, part of the cluster's momentum (Δ_2) is either in a collective sea [23] or in the so-called collective π-mesons [24].

The values of ω in (7) and $\bar{\alpha}_B$ in (9) are determined in Ref. [17] from the best theoretical description of the experimental data on the spectra of cumulative protons and π-mesons produced in processes like fragmentation of deuterons on a proton target and $ed \to e'X$ reaction, they were found to be $\omega \approx 3.6\%$; $\bar{\alpha}_B \approx -0.05$.

Therefore the form (7) of the full deuteron structure function $G(x, p_t)$ with the parameters found in Ref. [17] is known. Substituting this function $G(x, p_t)$ for $G_{N/d}(x, p_t)$ in (1) we can calculate the proton spectrum corresponding to the graph in Fig.1, nucleon and non-nucleon degrees of freedom in the deuteron taken into account.

III. DISCUSSION AND CONCLUSION

Calculation results of the part of the proton spectrum corresponding to the graph of the hard scattering in Fig.1 using the structure function (2) are represented in Fig.3, curve 1. Here parameters of the function $\tilde{G}_d(x)$ did not change, they were taken from Ref. [17]. Calculation results of the full spectrum with all graphs in Figs.1-2 and the structure function (7) taken into account are represented in Fig.3, curve 6. Generally this curve agrees with the experimental data [18,19]. The use of the same structure function $G(x, p_t)$ in the form (7) allowed a satisfactory description of the experimental data on deutron fragmentation at $p_d \approx 9$ (GeV/c) [6] and $p_d \approx 18$ (GeV/c) [25] in Ref. [13]. There the contribution of the structure function $\tilde{G}_d(x)$ in the form (8) to the spectrum was rather considerable at $x > 0.6$ [13]. Note, as was mentioned above, that the contribution of the graph in Fig.2c is very sensitive to the choice of the off-shell π-meson form factor, see curves 2, 7 in Fig.3. The most realistic curve is curve 2 in Fig.3 because a lot of experimental data is described with $a_1 = 10$ in the form factor [19].

From Fig.3 (see curve 8) it is seen that the contribution of the nucleon rescattering with allowance for the graphs of Figs.1 and 2a is negligible. The graphs in Figs.2b, 2c give quite considerable contributions at $p \leq 5.1$ (Gev/c).

Thus the analysis of the process $dp \to pX$ when the proton is scattered at a large angle ($\theta^* \approx \pi/2$) in N-N c.m.s.allows the following conclusions. The hard scattering model, see the graph in Fig.1, with the structure function $G_{N/d}(x, p_t)$ connected with the square of the nonrelativistic w.f.d. using expression (2) describes only a part of the momentum spectrum near $x = 1/2$. It is not correct to define the deutron structure function as the square of the nonrelativistic w.f.d. depending on the relativistic invariant value κ^2. This incorrectness is important especially at the end of the momentum spectrum of protons, $p > 5.7$ (GeV/c) or $x > 1.7$. Besides, it is necessary to take into account the graphs in Fig.2 and especially those in Figs.2b, 2c, they give considerable contributions at the centre part of the spectrum, $p \leq 5.5$ (GeV/c) or $x < 0.6$ and they are negligible at $p > 5.5$ (Gev/c), or $x > 0.6$. At the end of the momentum spectrum of protons it is necessary to take into account a non-nucleon deuteron structure as is made, for example, in Ref. [17]. The same conclusin was made in Ref. [13] where processes of deuteron stripping both on the proton and nuclear targets were analysed. Therefore these conclusions are general.

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APPENDIX

We shall calculate graphs like those in Fig.2a on the basis of OPTh in the nucleon target rest system. In this system as well as in IMF only the graphs in Fig.2a of all time ordered graphs are not negligible, the others give a negligibly small contribution about 1/p (Ref. [7]), where P is the initial deuteron momentum. The four-momenta k_1, k_2, k_N will have the following components:

$$k_1\left(xP + \frac{m^2 + k_t^2}{2xP},\ k_t,\ xP\right),\quad k_2\left((1-x)P + \frac{m^2 + k_t^2}{2(1-x)P},\ -k_t,\ (1-x)P\right),$$

$P_N(m, 0_t, 0)$; M_d is the deuteron mass, m is the nucleon mass.

The amplitude F in (3) is normalized in the following way: $F = (2\pi)^{3/2} F_d$ where the amplitude F_d corresponding to the graph in Fig.2a is represented in the following form:

$$F_d = -\frac{1}{(2\pi)^3}\int \frac{d^3k}{4\sqrt{E(k_1)E(k_2)E(q)}} f_1 f_2 \Phi\, G.$$

Using light cone variables we shall write this expression in the form:

$$F_d = -\frac{P}{4(2\pi)^3}\int_0^1 \frac{f_1(s_1, t_1) f_2(s_2, t_2)}{\sqrt{E(k_1)E(k_2)E(q)}}\, dx \int \Phi(x, k_t)\, G(x, k_t)\, d^2k_t. \qquad \text{(A1)}$$

where the following notation is introduced: $f_1(s_1, t_1)$, $f_2(s_2, t_2)$ are the amplitudes of an elastic N-N collision; s_1, s_2 are the squares of the total energies in the centre-of-mass system (c.m.s.) of two colliding nucleons; t_1, t_2 are the transfers in either collisions (see Fig.2a);

$$G(x, k_t) = E(k_1) + E(q) - E_2 - E_3 \equiv E(k_1) + E(q) - (E_0 + m - E_1) =$$
$$= \frac{(p - p_{1z})(m^2 + k_\perp^2)}{2xP[P(1-x) - p_{1z}]} + \frac{p_{1\perp}^2 + 2p_{1\perp}\cdot k_{1\perp}}{2[P(1-x) - p_{1z}]},$$

$G(x, k_t)$ is the noncovariant Green function written via variables x and k_t. W.f.d. $\Phi(x, k_t)$ normalised as in Ref. [6] is connected with the nonrelativistic w.f.d. in the following way [6]:

$$\Phi(x, k_t) = \frac{(m^2 + k_t^2)^{1/4}}{2(x(1-x))^{3/2}}\, \phi_{n.r.}(\kappa^2)$$

or

$$\Phi(x, k_t) = \frac{\Psi(x, k_t)}{2x(1-x)}.$$

The function of the type [11] was used as $\phi_{n.r.}(\kappa^2)$, then $\Phi(x, k_t)$ will have the following form

$$\Phi(x, k_t) = \frac{(m^2 + k_t^2)^{1/4}}{2(x(1-x))^{3/4}} \sum_{i=1}^{s} A_i \exp\left\{-a_i\left[\frac{m^2 + k_t^2}{4x(1-x)} - m^2\right]\right\}. \qquad \text{(A2)}$$

Substituting (A2) into (A1) and supposing that the amplitudes f_1, f_2 decrease much weaker with the increasing k_t^2 then the function Φ of the form (A2), we integrate expression (A1), but the integration with respect to dx was performed numerically. The amplitudes f_1, f_2 are represented in the form:

$$f(s, t) = \frac{i + a}{4\pi}\, \sigma_{tot}^{NN}(s)\, e^{bt + ct^2}$$

the slopes b, c were taken from Ref [18], $a = \mathrm{Re}f(0)/\mathrm{Jm}f(0)$ was taken from the experimental data [26].

For the calculation of interference between the graphs in Figs.1 and 2a, e.g. $\rho_{dp}^{(inter.\ 1,2)}$ in (6), it was supposed that the process represented in Fig.1 is the elastic hard N-N collision. Then the amplitude of this process can be represented in the form:

$$F_d^{(1)} = \Phi(x, k_t)\, f(s, t). \qquad \text{(A3)}$$

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Долидзе М.Г., Лыкасов Г.И. E2-88-133
Взаимодействие релятивистских
дейтронов с нуклонами

Анализируются процессы взаимодействия быстрых дейтронов с нуклонами $dN \to pX$, когда протон рассеивается на большой угол в с.ц.м. $N-N$. При этом используется волновая функция релятивистского дейтрона в динамике светового фронта. Показывается, что необходимо учитывать, как и в процессах типа фрагментации дейтрона, диаграммы с перерассеянием и поглощением π-мезона нуклоном дейтрона, а также ненуклонную, кварковую, степень свободы в дейтроне. Приводится сравнение теоретических расчетов с экспериментальными данными.

Работа выполнена в Лаборатории ядерных проблем ОИЯИ.

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Dolidze M.G., Lykasov G.I. E2-88-133
Interaction of Relativistic
Deuterons with Nucleons

The processes of the interaction of fast deuterons with nucleons $dN \to pX$, when the proton is scattered at a large angle in $N-N$ c.m.s. are analysed. There the wave function of a relativistic deuteron in dynamics of the light cone is used. It is shown that, as in the processes of the deuteron fragmentation type, it is necessary to take into account, the graphs of rescattering and absorption of the π-meson by a deuteron nucleon, as well as a non-nucleon, quark, degree of freedom in the deuteron. The comparison of the theoretical calculations with the experimental data is performed.

The investigation has been performed at the Laboratory of Nuclear Problems, JINR.

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