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CORRELATIONS OF TWO PROTONS IN RELATIVISTIC dp-COLLISIONS

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1. Introduction

The nuclear reactions with participation of such a simple nuclear system as a deuteron gain an increasing physicists' interest. There are a lot of papers dealing with deuteron interactions at high energies in which different theoretical approaches (see reviews [1,2]) to the discription of the structure of a relativistic hadronic composite system are considered. In many papers particular attention is paid to the reaction with a relativistic deuteron $dp \to ppn$ [3,4,5,6] where the observable proton is beyond kinematic boundaries for frozen nucleons in the deuteron . It is shown that at small angles of proton emission the main contribution to this process is made by deuteron stripping, and as the proton registration angle increases, the contribution of subprocesses with target protons increases. For the description of secondary proton momentum spectra from reaction $dp \to pX$ at large transverse momenta in some papers[7] the hard collision model [8] was used. This model being one of the relativistic impulse approximation variant [1,2] describes rather well the experimental data [6]. An important element of this model is the nucleon momentum distribution $G(x, \vec{k_\perp})$ inside the deuteron, which defines the probability of finding in relativistic deuteron the nucleon with transverse momentum $\vec{k_\perp}$ and the fraction x of the deuteron longitudinal momentum . In order to use this reaction for extracting the nucleon momentum distribution in the deuteron one needs correct calculations of secondary interactions (SI) like rescattering, final state interaction [9] etc. Unfortunately, due to an ambiguity of the SI calculations [9,10,11,12] one can use three main variants of the deuteron structure functions (Fig.1): i)the phenomenological structure fuunction by Blankenbecler and Schmidt [8]; ii)the structure function obtained from the deuteron nonrelativistic wave function(e.g. for the Paris potential [13]); iii)the structure function similar to the previous one but with a high momentum tail due to the exotic flucton (6q) component [14]. In case i) BS-function is in a good agreement with data [5] and possibly the SI-contribution is negligible. The variant ii) shows that one can describe the data only by the significant SI-effect [9,10,11]. In iii) SI may give an appreciable contribution only in the region of $0.6 \leq x \leq 0.8$ and at $x \geq 0.9$ the high momentum tail dominates.

The analogous problem of relation between the impulse approximation contribution [15] and that of SI-effects [16] now also exists in the

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description of the $ed \to e'pn$ reaction .

In this paper we investigate the correlation function

$$R = \frac{\frac{E_1 E_2 d\sigma(dp \to p_1 p_2 n)}{dp_1 dp_2} \cdot \sigma_{inel}^{pd}}{\left(\frac{E_1 d\sigma(dp \to p_1 pn)}{dp_1}\right)\left(\frac{E_2 d\sigma(dp \to p_2 pn)}{dp_2}\right)} , \tag{1}$$

which is the ratio of the double-inclusive differential cross section to the product of two single-inclusive differential cross sections, and σ_{inel}^{pd} is the cross section of inelastic deuteron-proton interaction. On the contrary to the single-inclusive $dp \to p_1 pn$ reaction the process $dp \to p_1 p_2 n$ with registration of two final protons allows us to eliminate the SI-contributions. The results of this paper are also valid for the reaction $dp \to ppX$ at moderate (several Gev) energies due to the fact that the inelastic processes contribution is small.

In section 2 we present the double- and single-inclusive differential cross sections formulae needed to calculate the R-function. In section 3 expressions for different aforesaid deuteron structure functions are given and in section 4 we present results of our calculations of the R-function and some discussion on them.

2. Cross sections in hard collision model

One can calculate the two-inclusive differential cross sections of reaction $dp \to ppX$ using the model of hard collisions. The corresponding graphs of this process are shown in Fig.2 with an intermediate neuteron (Fig.2a) or a proton (Fig.2b).

For the analysis of the diagrams of Fig.2 it is also convenient to parametrize different momenta using variables defined in a general set of frames along the interaction axis (a particle's name and four-momentum are denoted by the same symbol). Four-momenta of the target proton and the incident deuteron are defined as

$$\begin{aligned} A &= \left(P_1 + \frac{A^2}{4P_1}, \vec{O}_T, -P_1 + \frac{A^2}{4P_1}\right) \\ B &= \left(P_2 + \frac{B^2}{4P_2}, \vec{O}_T, P_2 - \frac{B^2}{4P_2}\right) . \end{aligned} \tag{2}$$

A specific frame in this set is selected by relating P_1 and P_2. For example, the laboratory frame is defined by the conditions

$$P_1 = \frac{m_A}{2}$$

$$P_2 = \frac{E_d + |\vec{p}_d|}{2} .$$

For the infinite momentum frame $P_2 \to \infty$, and for the center-of-mass frame such conditions are the following

$$P_1 - \frac{A^2}{4P_1} = P_2 - \frac{B^2}{4P_2}$$

and

$$\sqrt{S} = P_1 + \frac{A^2}{4P_1} + P_2 + \frac{B^2}{4P_2}.$$

Also one can define the other momenta for the particles in Fig.2a and Fig.2b, respectively, as

$$\begin{aligned} C &= \left(xP_2 + \frac{C^2 + \vec{C}_T^2}{4xP_2}, \vec{C}_T, xP_2 - \frac{C^2 + \vec{C}_T^2}{4xP_2}\right) \\ \beta &= \left((1-x)P_2 + \frac{l_\beta{}^2 + \vec{C}_T^2}{4(1-x)P_2}, -\vec{C}_T, (1-x)P_2 - \frac{l_\beta{}^2 + \vec{C}_T^2}{4(1-x)P_2}\right) \end{aligned} \tag{3}$$

and

$$\begin{aligned} \beta &= \left((1-y)P_2 + \frac{\beta^2 + \vec{\beta}_T^2}{4(1-y)P_2}, -\vec{\beta}_T, (1-y)P_2 - \frac{\beta^2 + \vec{\beta}_T^2}{4(1-y)P_2}\right) \\ b &= \left(yP_2 + \frac{l_b^2 + \vec{\beta}_T^2}{4yP_2}, \vec{\beta}_T, yP_2 - \frac{l_b^2 + \vec{\beta}_T^2}{4yP_2}\right). \end{aligned} \tag{4}$$

Note that with these parametrizations

$$\begin{aligned} x &= \frac{C_0 + C_3}{B_0 + B_3} \\ y &= \frac{b_0 + b_3}{B_0 + B_3} , \end{aligned}$$

which are the usual light-cone variables. The squared off-shell masses of the particles β in Fig.2a and b in Fig.2b can be defined from the energy conservation law for corresponding vertices of the deuteron disintegration and are given by

$$\begin{aligned} l_\beta{}^2 &= \frac{x(1-x)B^2 - (1-x)C^2 - \vec{C}_T^2}{x} \\ l_b^2 &= \frac{y(1-y)B^2 - y\beta^2 - \vec{\beta}_T^2}{1-y} . \end{aligned}$$

It is simple to evaluate the diagrams of Fig.2a and Fig.2b , respectively, as

$$\frac{E_C E_D d\sigma}{d\vec{C} d\vec{D}}(AB \to CDX) = \frac{x}{1-x}\frac{I(\beta,A)}{I(B,A)}\overline{G}_{C/B}(x,\vec{C}_T) \frac{E_D d\sigma}{d\vec{D}}(\beta A \to DX), \quad (5)$$

$$\frac{E_C E_D d\sigma}{d\vec{C} d\vec{D}}(AB \to CDX) = \int dy\, d\vec{\beta}_T\, G_{b/B}(y,\vec{\beta}_T)\frac{1}{y}\frac{I(b,A)}{I(B,A)} \frac{E_C E_D d\sigma}{d\vec{C}\, d\vec{D}}(bA \to CDX). \quad (6)$$

The structure functions $\overline{G}_{C/B}(x,\vec{C}_T)$ and $G_{b/B}(y,\vec{\beta}_T)$ are in principle different , but they are chosen so that they differ only by the vertex functions included in their definitions. In fact, these vertex functions have the same structure but differ only in the on-shell or off-shell properties of the external connecting lines. One can set these vertex functions (approximately) equal if it does not matter which external line is off-shell (this is rigorously correct in the nonrelativistic limit) and the structure functions G and $\overline{G}$ can be taken to be the same [8]. In Eqs. (5) and (6) E_C and E_D are the total energies of C and D particles, $I(\beta, A)$ and $I(B,A)$ are invariant streams of coincident particles. In this paper we consider the contribution only of elastic n-p and p-p subprocesses of Fig.2 , i.e. there are only two outgoing particles in the processes $\beta A \to DX$ in Fig.2a and $bA \to CDX$ in Fig.2b. In this case we have

$$\frac{E_D d\sigma}{d\vec{D}}(\beta A \to DX) = \frac{2}{\pi} I(\beta,A)\,\delta(m_X^2 - m_E^2)\frac{d\sigma}{dt'}(\beta A \to DE),$$

$$\frac{E_C E_D d\sigma}{d\vec{C}\, d\vec{D}}(bA \to CD) = \frac{I(b,A)}{\pi}\delta^{(4)}(b+A-C-D) \frac{d\sigma}{dt'}(bA \to CD)\,. \quad (7)$$

The substitution of Eqs. (7) to (5) and (6) leads, respectively, to

$$\frac{E_C E_D d\sigma}{d\vec{C}\, d\vec{D}} = \frac{2}{\pi}\frac{x}{1-x}\frac{I^2(\beta,A)}{I(B,A)}\overline{G}_{C/B}(x,\vec{C}_T)\,\delta(m_X^2 - m_E^2) \frac{d\sigma}{dt'}(\beta A \to DE),$$

$$\frac{E_C E_D d\sigma}{d\vec{C}\, d\vec{D}} = \frac{1}{\pi}\int dy\, d\vec{\beta}_T\, G_{b/B}(y,\vec{\beta}_T)\frac{I^2(b,A)}{yI(B,A)}\delta^{(4)}(b+A-C-D) \frac{d\sigma}{dt'}(bA \to CD). \quad (8)$$

To calculate the correlation function R from Eq. (1), one must know the cross sections of the proton production at different angles in the inclusive $dp \to pX$ reaction. For such processes with large transverse momenta the invariant cross section of the production of proton D in Fig.2a is given [7,8] as

$$\frac{E_D d\sigma}{d\vec{D}}(AB \to DX) = \frac{2m_A}{\pi a B_3}\int_{\beta_T^{min}}^{\beta_T^{max}}\int_0^{\phi^{max}}\frac{(1-\alpha_1)\mid\vec{\beta}\mid^2}{\alpha_1\mid\alpha_1-\alpha_2\mid} G_{\beta/B}(\alpha,\vec{\beta}_T)\frac{d\sigma}{dt'}(\beta A \to DE)\,\beta_T\, d\beta_T\, d\phi\,, \quad (9)$$

where

$$\alpha = \frac{\beta_0+\beta_3}{B_0+B_3},$$
$$a = B^2 + (B_0+B_3)(m_A - D_0 + D_3),$$

and ϕ is the angle between $\vec{\beta}_T$ and $\vec{D}_T$. The quantities α_1 and α_2 are roots of the equation

$$\left[\frac{m_A - D_0 - D_3}{B_0+B_3}+\alpha\right]\left[a - \frac{C^2+\vec{\beta}_T^{\,2}}{1-\alpha}\right] - m_E^2 - (\vec{\beta}_T - \vec{D}_T)^2 = 0\,,$$

which represents the four-momentum conservation law $\beta + A = D + E$ (see Fig.2a) and the integration limits β_T^{min},β_T^{max} and ϕ^{max} are defined from the condition that α_1 and α_2 be real numbers.

For the deuteron stripping processes the invariant cross section of the $AB \to CX$ reaction in Fig.2a is given [7,8,14] by

$$\frac{E_C d\sigma}{d\vec{C}}(AB \to CX) = A(l_\beta^2)\, x\, \overline{G}_{C/B}(x,\vec{C}_T)\,\sigma_{np}^{tot}(s')\, f_{kin}\,, \quad (10)$$

where $\sigma_{np}^{tot}(s')$ is the total cross section of the n-p interaction, s' is the square of the total energy in the center-of-mass frame of interacting particles in the subprocess of Fig.2a , $x = (C_0+C_3)/(B_0+B_3)$ is the light-cone variable and $A(l_\beta^2)$ is the factor modifying $\sigma_{np}^{tot}(s')$ due to the virtuality of the neutron and $f_{kin} = [s'(s'-4m^2)]^{1/2}/[2m(1-x)B_3]$ stands to take account of the phase volume boundary because of a finite momentum of the projectile nucleus. In our calculations the cross sections of the interaction of real and virtual neutrons with protons were set to be the same, hense $A(l_\beta^2) = 1$.

3. Structure functions

To calculate the correlation function R, three types of structure functions pretending now to describe the deuteron relativistic structure were used.

1. The phenomenological structure function [7,8]

$$\overline{G}_{C/B}(x,\vec{C}_T) = \frac{N_0}{2(2\pi)^3}\,\frac{[x(1-x)]^g}{\left[M^2(x)+\vec{C}_T^2\right]^2\left[1+\frac{\vec{C}_T^2}{\delta^2+M^2(x)}\right]^{g-1}}\,, \qquad (11)$$

where

$$M^2(x) = (1-x)C^2 + x\beta^2 - x(1-x)B^2$$

and $g = 3$, $\delta^2 = 0.8\,(Gev/c)^2$, $N_0 = 331.5\,(Gev/c)^2$ [2].

2. The structure function [12] deduced from the nonrelativistic wave function $\Phi_{n.r.}$ for the Paris potential depending on the relativistic invariant variable k^2 [17]

$$G_{N/d}(x,\vec{k}_T) = \left(\frac{m_N^2+\vec{k}_T^2}{x(1-x)}\right)^{\frac{1}{2}} \frac{1}{4x(1-x)}\,|\,\Phi_{n.r.}(k^2)\,|^2\,, \qquad (12)$$

and

$$k^2 = \frac{m_N^2+k_T^2}{4x(1-x)} - m_N^2,$$

where k is the four-momentum of the nucleon inside the deuteron, $\vec{k}_T$ is its transverse momentum.

3. The structure function [14] defined as

$$G(x,\vec{k}_T) = (1-w)\,G_{N/d}(x,\vec{k}_T) + w\,\tilde{G}_d(x,\vec{k}_T)\,, \qquad (13)$$

where $G_{N/d}(x,\vec{k}_T)$ is the function from Eq. (12), $w = 0.036$ is the six-quark component probability in the deuteron and the function $\tilde{G}_d(x,\vec{k}_T)$ giving

the momentum distrubution of a colourless 3q-cluster in the six-quark flucton can be deduced with the help of the quark-gluon-string model in the following form

$$\begin{aligned}\tilde{G}_d(x,\vec{k}_T) &= \frac{b^2}{2\pi}\,\tilde{G}_d(x)\,exp(-bk_T)\,,\\ G_d(x) &= \frac{\Gamma(A_2+B_2+2)}{\Gamma(A_2+1)\Gamma(B_2+1)}\,x^{A_2}(1-x)^{B_2}\,,\\ A_2 &= \frac{(1-\Delta_2)(B_2+2)-2}{2-(1-\Delta_2)}\,.\end{aligned}$$

The value of the parameter b was set to be 2 $(Gev/c)^{-1}$. Other parameters were $\Delta_2 = 0.34$ and $B_2 = 1.1$. The structure functions of Eqs. (11),(12) and (13) have the following normalization

$$\int G(x,\vec{p}_\perp)\,dx\,d\vec{p}_\perp = 1.$$

For the function $\tilde{G}_d(x)$ we have

$$\int_0^1 \tilde{G}_d(x)\,dx = 1$$

and

$$\int_0^1 x\,\tilde{G}_d(x)\,dx = \frac{1-\Delta_2}{2}\,.$$

The latter condition is necessary for the description of the "EMC"-effect and it means, in fact, that the valence quarks in the six-quark cluster do not have its total momentum and part of the cluster momentum is carried by a collective sea of the flucton.

4. Results and discussions

We present three variants of calculations for the correlation function R of Eq. (1) with structure functions of Eqs. (11)-(13) for different angles of observable protons : (0.01°,19°,Fig.3); (7°,19°,Fig.4);(7°,7°,Fig.5).The angles are given in the rest system of target protons and projectile deuteron momentum $9 Gev/c$ according to forthcoming Dubna experiments.

Parametrizations of the differential cross sections of the elastic p-p and n-p interaction and of the total cross sections for n-p interactions used in the calculation of the function R of Eq. (1) are given in Appendix

Table 1. The parametrization of the cross section $\left(\frac{d\sigma}{dt'}\right)^{pp}_{el}$ in the regions of $p^{beam}_{lab} \in [1.75; 12.1] Gev/c$ and $| t' | < t_0$.

p^{beam}_{lab} (Gev/c)	$\mid t' \mid$ (Geb/c)^2	$\left(\frac{d\sigma}{dt'}\right)^{pp}_{el}$ (mb/(Gev/c)^2)
1.75 – 3.0	$\mid t' \mid \le t_1$	$exp(a_1 + b_1 t' + c_1 t'^2)$
	$\mid t' \mid > t_1$	$A_1/(\mid t' \mid - 0.55)^n$
3.0 – 4.0	$\mid t' \mid \le t_1$	$exp(a_2 + b_2 t' + c_2 t'^2)$
	$\mid t' \mid > t_1$	$A_2/(\mid t' \mid - 0.55)^n$
4.0 – 5.0	$\mid t' \mid \le t_2$	$exp(a_2 + b_2 t' + c_2 t'^2)$
	$\mid t' \mid > t_2$	$A_2/(\mid t' \mid - 0.55)^n$
5.0 – 7.0	$\mid t' \mid \le t_2$	$exp(a_2 + b_2 t' + c_2 t'^2)$
	$\mid t' \mid > t_2$	$A_3/(\mid t' \mid - 0.55)^n$
7.0 – 8.0	$\mid t' \mid \le t_2$	$exp(a_2 + b_2 t' + c_2 t'^2)$
	$t_2 < \mid t' \mid \le t_4$	$exp(a_3 + b_3 t' + c_3 t'^2)$
	$\mid t' \mid > t_4$	$exp(a_4 + b_4 t' + c_4 t'^2)$
8.0 – 9.2	$\mid t' \mid \le t_3$	$exp(a_2 + b_2 t' + c_2 t'^2)$
	$t_3 < \mid t' \mid \le t_4$	$exp(a_3 + b_3 t' + c_3 t'^2)$
	$\mid t' \mid > t_4$	$exp(a_4 + b_4 t' + c_4 t'^2)$
9.2 – 12.1	$\mid t' \mid \le t_3$	$exp(a_2 + b_2 t' + c_2 t'^2)$
	$t_3 < \mid t' \mid \le t_5$	$exp(a_3 + b_3 t' + c_3 t'^2)$
	$\mid t' \mid > t_5$	$exp(a_4 + b_4 t' + c_4 t'^2)$

A. The inclusive cross sections of Eq.(8) contain δ- functions which just fix the two-particle elastic kinematics in the subprocesses in Fig.2. We calculated these cross sections for the case when one of the secondary protons is detected at the angle range $[\theta, \theta + \Delta\theta]$, where $\Delta\theta$ is defined by an experimental set-up acceptance (we chose it to be 7.5 $mrad$). Note that we have used for the single-inclusive cross sections in the denominator of the correlation function R of Eq.(1) the BS-structure function of Eq.(11) (variant i)).This function described rather well inclusive cross sections at different angles and played the role of data parametrization.We should like to stress again that one can get good description of the inclusive data using three different deuteron structure functions (i)-iii)) due to

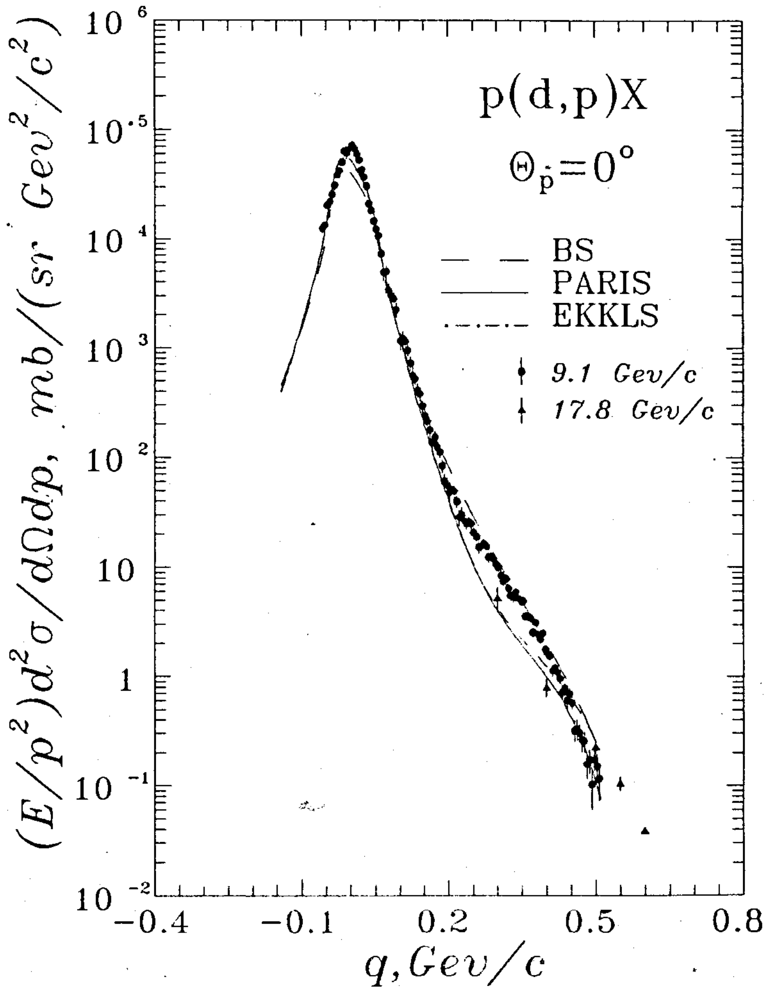

Fig.1. Momentum stectra of protons emitted at 0^o in $dp \to pX$ reaction at incident deuteron momenta 17.8 [3] and 9.1 Gev/c [5] versus the final proton momentum q in the rest frame of the deuteron. BS, PARIS and EKKLS curves represent the results for the deuteron structure functions by [8], [13] and [14], respectively.

ambiguous SI-calculations (rescattering,final state interactions etc.) [9, 10,11,12] . However,in the double inclusive reaction $dp \to ppn$ one can be separated from SI-effects.

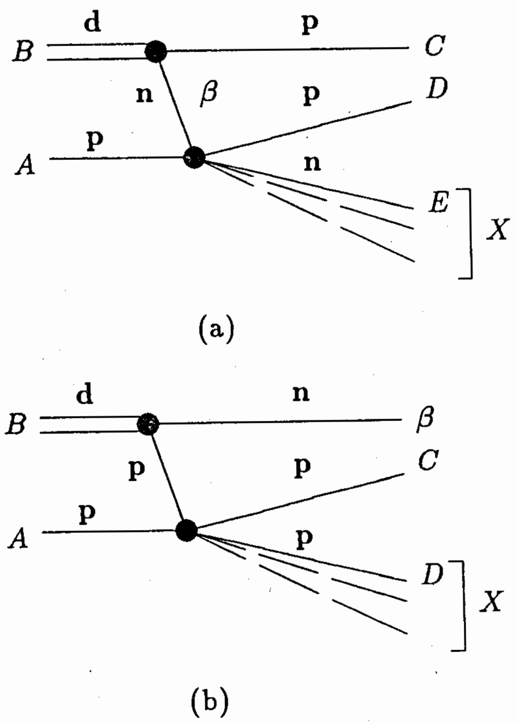

Fig.2. Mechanisms of the reaction $dp \to ppX$.

To define the "real" structure function of the deuteron, it is preferable to detect one of the two final protons at a small angle and the other one at a large angle.In this case (see the diagram in Fig.2a) the stripping proton reveals the undisturbed "real" structure function for the two reasons : 1) the interaction between the neuteron and the target proton occures with a large transfer momentum and hence the final state interaction is suppressed ; 2) due to the elastic kinematics of the subprocess one can fix the momenta and angles so that the momentum and angle distortions from rescattering will be diminished.

Thus the curves in Figs.3,4,5 present the behaviour of the function R for three types of structure functions substituted to the double-inclusive cross section standing in the R's nominator while the denominator remains to be the same for all cases. The light-cone variable $x = (C_0 + C_3)/(B_0 + B_3)$ for one of the secondary protons is plotted on the horisontal axis

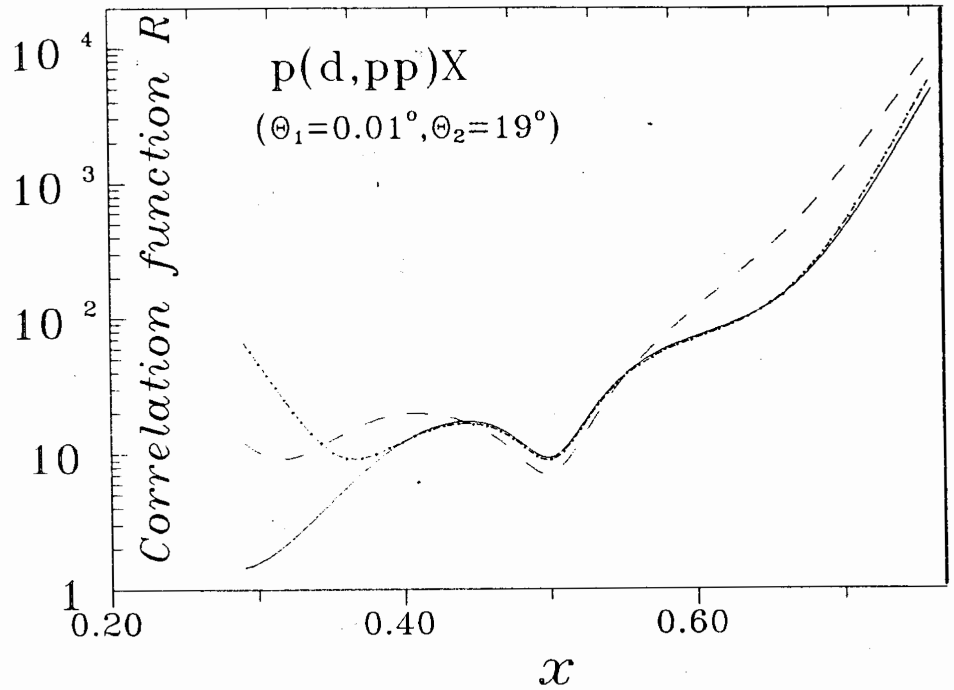

Fig.3. Comparison of the correlation functions R calculated using different structure functions of the deuteron for the reaction $dp \to ppn$ at an incoming deuteron momentum of 9 Gev/c and proton-detecting angles $\theta_1 = 0.01^o$ and $\theta_2 = 19^o$ .The dashed, solid and dashed-dot curves represent the R functions for the structure functions of Eqs.(11), (12) and (13), respectively.

and the momentum of the other protons is defined by the two-particle kinematics in the subprocesses $\beta A \to DE$ and $bA \to CD$ in Fig.2 when values of x, θ_1 and θ_2 are fixed. The region $x \geq 0.6$ (which corresponds to the region $q \geq 0.2 Gev/c$ in Fig.1) is more critical to the choice of the type of the deuteron structure function $G(x, \vec{k}_\perp)$ because here the discrepances become essential.

In summary, we have shown that measurements of two-proton correlations in $dp \to ppn$ reaction may reveal the deuteron structure function among different available model structure functions because the chosen

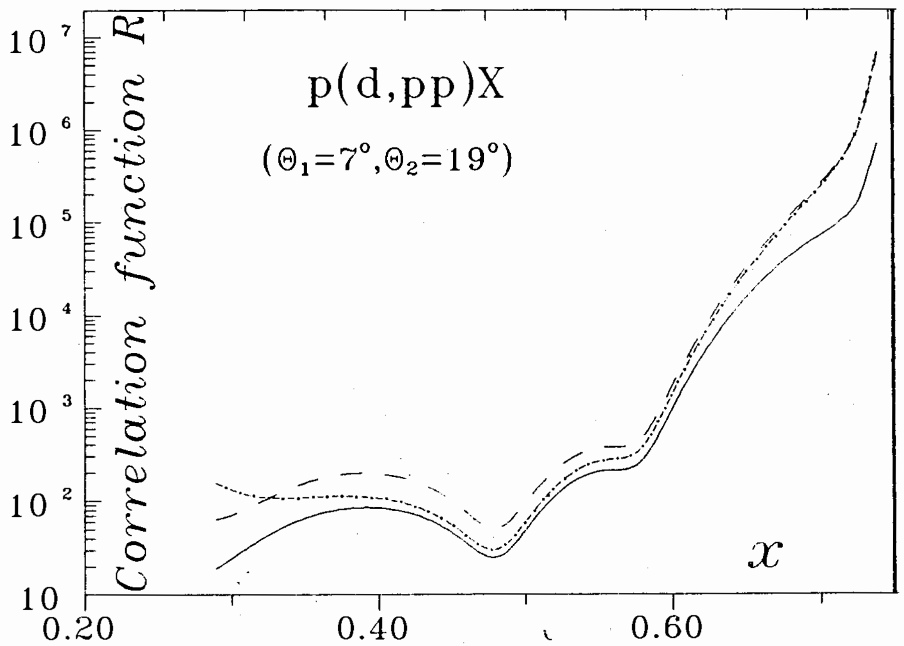

Fig.4. The same as in Fig.3, but for $\theta_1 = 7^o$ and $\theta_2 = 19^o$.

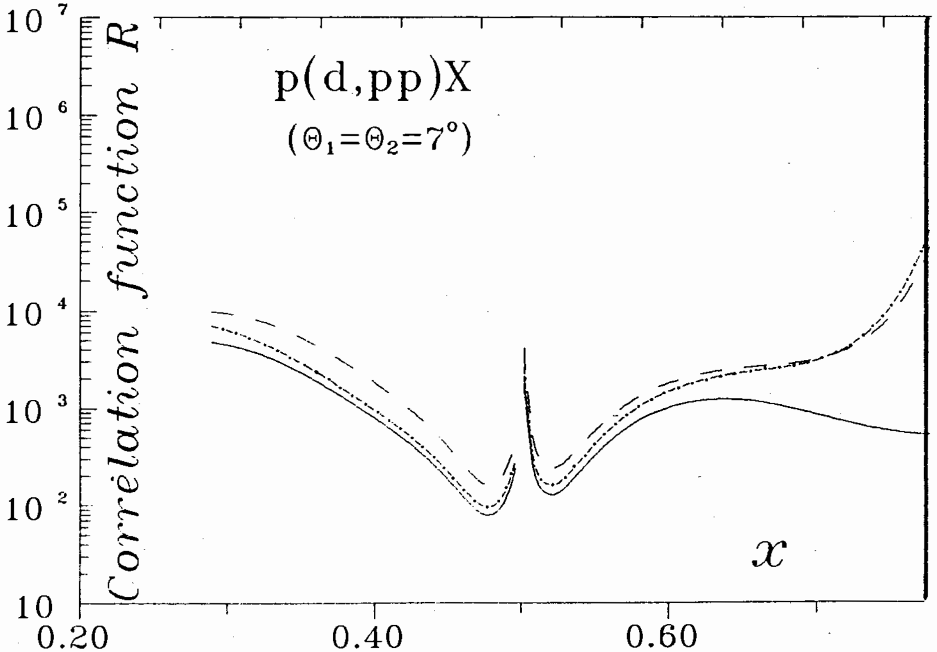

Fig.5. The same as in Fig.3, but for $\theta_1 = 7^o$ and $\theta_2 = 7^o$.

kinematics eliminates secondary interaction effects. There is a hope that the above consideration is suitable for $dp \to ppX$ reaction at moderate energies due to the main contribution of elastic channels in subprocesses.

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Appendix A

The experimental data [17] were used to parametrize the σ^{np}_{tot}, $\left(\frac{d\sigma}{dt'}\right)^{np}_{el}$ and $\left(\frac{d\sigma}{dt'}\right)^{pp}_{el}$ cross sections.

1. The parametrization of the total cross section for the n-p interaction in the p^{beam}_{lab} region from 0.2 to 10 Gev/c was taken in the following form

$$\sigma^{np}_{tot}(mb) = \begin{cases} exp(8.57 - 14.37 \cdot p + 10.566 \cdot p^2) & , \ at\ p \leq 0.66\ (Gev/c) \\ 40 & , \ at\ p > 0.66\ (Gev/c). \end{cases}$$

2. The parametrization of the $\left(\frac{d\sigma}{dt'}\right)^{np}_{el}$ elastic cross section in the p^{beam}_{lab} region from 1.26 to 6.5 Gev/c is

$$\left(\frac{d\sigma}{dt'}\right)^{np}_{el} = A\,exp\,(at' + bt'^2 + ct'^3),$$

where

$$\begin{aligned} A &= -1566.82728 + 661.3355275\,s' - 79.1214071\,s'^2 + 2.9376385\,s'^3 \\ a &= -29.133999 + 14.9313095\,s' - 1.80687\,s'^2 + 0.06760491\,s'^3 \\ b &= 15.543675 - 1.4586209\,s' - 0.05262461\,s'^2 + 0.00638351\,s'^3 \\ c &= 5.0158815 - 1.0077129\,s' - 0.0666055\,s'^2 - 0.00139486\,s'^3\ . \end{aligned}$$

3. The parametrization of the $\left(\frac{d\sigma}{dt'}\right)^{pp}_{el}$ in the region of $p^{beam}_{lab} \in [1.75; 12.1]$ Gev/c seems to be rather cumbersome,but it quite well fits the experimental data. To take account of the symmetry of the angular distribution in the elastic p-p scattering (see the subprocess $bA \to CD$ in Fig. 2b) with

respect to $\theta^* = 90^o$ in the center-of-mass frame for the region $|t'| > t_0$, where

$$t_0 = \frac{\lambda(s'^2, m_A^2, l_b^2)}{2\,s'},$$

one must use, instead of t', the quantity $(-2\,t_0 - t')$. In the region $|t'| < t_0$ for different intervals of the incident proton momentum p_{lab}^{beam} the parametrization of the $\left(\frac{d\sigma}{dt'}\right)^{pp}_{el}$ given in Table 1 was used.

The parameters $a_1, \ldots, a_4, b_1, \ldots, b_4, c_1, \ldots, c_4, t_1, \ldots, t_5, A_1, A_2, A_3$ and n are expressed through s' as follows :

$$\begin{aligned}
a_1 &= 5.449 - 0.0926\,s', \\
a_2 &= 5.02 - 0.0393\,s', \\
a_3 &= 9.2877 - 1.0934\,s' + 0.02565\,s'^2, \\
a_4 &= 4.2149 - 0.2363\,s' - 0.00361\,s'^2, \\
b_1 &= 7.279 + 0.0706\,s', \\
b_2 &= 4.828 + 0.4088\,s' - 0.01054\,s'^2, \\
b_3 &= 4.2667 - 0.2885\,s' + 0.00744\,s'^2, \\
b_4 &= 1.0984 + 0.1421\,s' - 0.004865\,s'^2, \\
c_1 &= 7.189 - 0.519\,s', \\
c_2 &= 2.936 - 0.0449\,s', \\
c_3 &= 0.17043 - 0.00658\,s', \\
c_4 &= 0.1242 + 0.00694\,s' - 0.000344\,s'^2, \\
t_1 &= -1.4208 + 0.6612\,s' - 0.04506\,s'^2, \\
t_2 &= -3.307 + 0.6107\,s' - 0.0187\,s'^2, \\
t_3 &= -3.059 + 0.422\,s' - 0.00837\,s'^2, \\
t_4 &= 26.9309 - 3.18\,s' + 0.10675\,s'^2, \\
t_5 &= -0.1383 + 0.5858\,s' - 0.01617\,s'^2, \\
A_1 &= 44.3369 - 11.19824\,s' + 0.71574\,s'^2, \\
A_2 &= 5.7121 - 1.0438\,s' + 0.04837\,s'^2, \\
A_3 &= 0.817 - 0.1007\,s' + 0.00325\,s'^2, \\
n &= -1.7894 + 0.366\,s' - 0.00535\,s'^2.
\end{aligned}$$

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Ефремов А.В., Канафин А.Б., Ким В.Т. E2-90-368
Корреляции двух протонов в релятивистских
dp-соударениях

Рассмотрены двухпротонные корреляции в dp → ppn взаимодействиях релятивистских дейтронов с протонами. Данные корреляции дают больше информации, чем инклюзивные протонные спектры, описанные в рамках различных моделей структурной функции дейтрона, для которых существуют неопределенности в расчетах вклада вторичных взаимодействий /процессы перерассеяния, взаимодействия в конечном состоянии/. Представлены предсказательные расчеты, показывающие различное поведение корреляционной функции для различных моделей структурной функции дейтрона в кинематической области, где вклады вторичных взаимодействий малы.

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Efremov A.V., Kanafin A.B., Kim V.T. E2-90-368
Correlations of Two Protons
in Relativistic dp-Collisions

Two-proton correlations in the dp → ppn collisions of relativistic deuterons with protons are considered. These correlations give more information than inclusive proton spectra described in the framework of different deuteron structure function models bacause of uncertainty in the calculation of secondary interaction contribution /rescattering processes and final state interactions/. We present the predictable calculations which show different behaviour of the correlation function for different deuteron structure function models in the kinematic region where contributions of secondary interactions are negligible.

The investigation has been performed at the Laboratory of Theoretical Physics, JINR.

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