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AN ESTIMATION OF THE VALUE OF SIX-QUARK STATE ADMIXTURE IN DEUTERON FROM ELASTIC pd-SCATTERING

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The existence of admixture of six-quark states in the wave function of the deuteron is considered now as an established fact and many attempts have been made [1] to estimate qualitatively the magnitude of this admixture. In particular it has been noted [2] that this admixture would possibly manifest itself in the processes of elastic scattering involving deuterons at high values of the momentum transfer.

With this purpose we analyze in the present paper the experimental data of ref. [3] on the elastic pd-scattering at the energy $\sqrt{s}=63$ GeV in the interval of transferred momenta $0.3 < t \le 1.8\ (\mathrm{GeV/c})^2$. The data were described by the authors of ref. [3] within the framework of the Glauber theory with the account of inelastic shadowing. It was found out that the contribution of inelastic shadowing depends significantly on the momentum transfer approaching the maximal value of 40% at $0.3 \le t \le 1\ (\mathrm{GeV/c})^2$; at $t > 1\ (\mathrm{GeV/c})^2$ its magnitude is less than 8-10%.

The idea about the possible manifestation of the admixture of six-quark bag in elastic pd-scattering is related with the existing opinion [4] that its rádius must be of the same order of magnitude as the radius of proton, i.e., much less than the size of deuteron.

As a consequence the cross-sections of elastic scattering of protons on deuteron and six-quark bag would have different t-dependence. The difference discussed should manifest itself in the differential cross-section of pd-scattering at sufficiently high values of the momentum transfer. Therefore we will consider the data of ref. [3] as belonging to the region $t \ge 1\ (\mathrm{GeV/c})^2$.

Let us consider the process of elastic pd-scattering within the framework of quark model with the account of the admixture of six-quark bag in the deuteron. The amplitude of this process is

$$\mathcal{F}(\vec q) = \frac{i}{2\pi}\int d\vec b\, e^{i\vec q\vec b} \langle \psi_p, \sqrt{\delta}\,\psi_d + \sqrt{\beta}\,\psi_{6q} | \Gamma(\vec b, \{\vec s\}, \{\vec{\bar s}\}) | \psi_p, \sqrt{\delta}\,\psi_d + \sqrt{\beta}\,\psi_{6q}\rangle \quad (1)$$

with normalization $\frac{d\sigma}{d\Omega} = \pi |\mathcal{F}(\vec q)|^2$, where $\vec q$ is transverse momentum transfer, $\{\vec s\} = \vec s_i$, $i = 1,2,3$; $\{\vec{\bar s}\} = \vec{\bar s}_k$, $k = 1,\dots,6$ is a set of radii-vectors of quarks in colliding systems projected in the impact

parameter plane. The deuteron wave function with admixture of six-quark state is normalized by the condition

$$\int |\sqrt{\delta}\,\psi_d + \sqrt{\beta}\,\psi_{6q}|^2 d^2\vec r = \delta \int |\psi_d|^2 d\vec r + \beta \int |\psi_{6q}|^2 d^2\vec r + \quad (2)$$

$$+ 2\sqrt{\delta\beta}\int |\psi_d \psi_{6q}|\, d^2\vec r = 1 .$$

We have mentioned above that the size of six-quark bag is of the same order of magnitude as the radius of nucleon. On the other hand, the existence of core in the nucleon-nucleon potential does not permit nucleons to be at very small distances in the deuteron. Therefore the overlap integral in equation (2) is a small quantity which may be neglected in comparison with two first terms [5]. In this approximation the normalization coefficients δ and β are related through equation $\delta = 1 - \beta$.

The profile function $\Gamma(\vec b, \{\vec s\}, \{\vec{\bar s}\})$ has the following structure

$$\Gamma(\vec b, \{\vec s\}, \{\vec{\bar s}\}) = 1 - \prod_{k=1}^{6}\prod_{i=1}^{3}(1 - \gamma(\vec b - \vec{\bar s}_k - \vec s_i)) =$$

$$= 1 - \prod_{k=1}^{3}\prod_{i=1}^{3}(1 - \gamma(\vec b - \vec{\bar s}_k - \vec s_i)) \prod_{k=4}^{6}\prod_{i=1}^{3}(1 - \gamma(\vec b - \vec{\bar s}_k - \vec s_i)) = \quad (3)$$

$$= 1 - \prod_{k=1}^{3}[1 - \Gamma_p(\vec b - \vec{\bar s}_k, \{\vec s\})] \prod_{k=4}^{6}[1 - \Gamma_n(\vec b - \vec{\bar s}_k, \{\vec s\})] ,$$

where

$$\Gamma_p(\vec b - \vec{\bar s}_k, \{\vec s\}) = 1 - \prod_{i=1}^{3}(1 - \gamma(\vec b - \vec{\bar s}_k - \vec s_i)) ,$$

$$\Gamma_n(\vec b - \vec{\bar s}_k, \{\vec s\}) = 1 - \prod_{i=1}^{3}(1 - \gamma(\vec b - \vec{\bar s}_k - \vec s_i))$$

are the profile functions corresponding to the scattering of the incident proton on quarks of proton (Γ_p) and neutron (Γ_n). After introducing designations

$$\tilde\Gamma_p(\vec b, \{\vec s\}, \{\vec{\bar s}\}) = 1 - \prod_{k=1}^{3}[1 - \Gamma_p(\vec b - \vec{\bar s}_k, \{\vec s\})] ,$$

$$\tilde\Gamma_n(\vec b, \{\vec s\}, \{\vec{\bar s}\}) = 1 - \prod_{k=4}^{6}[1 - \Gamma(\vec b - \vec{\bar s}_k, \{\vec s\})]$$

equation (3) may be written as

$$\Gamma(\vec b, \{\vec s\}, \{\vec{\bar s}\}) = \tilde\Gamma_p(\vec b, \{\vec s\}, \{\vec{\bar s}\}) + \tilde\Gamma_n(\vec b, \{\vec s\}, \{\vec{\bar s}\}) - \quad (4)$$

$$- \tilde\Gamma_p(\vec b, \{\vec s\}, \{\vec{\bar s}\})\, \tilde\Gamma_n(\vec b, \{\vec s\}, \{\vec{\bar s}\}) .$$

In equation (4) the first two terms describe the scattering of quarks of the projectile proton on quarks either on quarks of a proton ($\tilde{\Gamma}_p$), or on quarks of a neutron ($\tilde{\Gamma}_n$), whereas the third term describes the scattering on quarks of both proton and neutron. In the range of momentum transfers $t > 1$ $(\mathrm{GeV}/c)^2$ two first terms, corresponding in the usual Glauber formalism (not taking into account the quark structure of nucleons) to the single scattering are negligibly small in comparison with the third one. Neglecting them and substituting equation (4) in (1) one obtains

$$\mathcal{F}(\vec{q}) = \frac{i\delta}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}} \langle \psi_p, \psi_d | -\tilde{\Gamma}_p(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\})\, \Gamma_n(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\}) | \psi_p, \psi_d \rangle +$$

$$+ \frac{i\beta}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}} \langle \psi_p, \psi_{6q} | -\tilde{\Gamma}_p(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\}) \tilde{\Gamma}_n(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\}) | \psi_p, \psi_{6q} \rangle + \qquad (5)$$

$$+ \frac{2i\sqrt{\delta\beta}}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}} \langle \psi_p, \psi_d | -\tilde{\Gamma}_p(\vec{b}, \{\vec{s}\}\{\vec{\bar{s}}\})\, \Gamma_n(\vec{b}, \{\vec{s}\}\{\vec{\bar{s}}\}) | \psi_p, \psi_{6q} \rangle .$$

In this expression we have neglected the contribution of the third term in comparison with two first terms following the same reasons as in the case of normalization condition of the overlap integral. Thus we obtain the amplitude in the form of a sum of amplitudes corresponding to the scattering of the proton on the deuteron and six-quark bag.

Let us consider in detail the first term of equation (5) corresponding to pd-scattering

$$\mathcal{F}_{pd}(\vec{q}) = \frac{i\delta}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}} \langle \psi_p, \psi_d | -\tilde{\Gamma}_p \tilde{\Gamma}_n | \psi_p, \psi_d \rangle = \qquad (6)$$

$$= -\frac{i\delta}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}} \sum_f \langle \psi_d | \langle \psi_p | \tilde{\Gamma}_p | f \rangle \langle f | \tilde{\Gamma}_n | \psi_p \rangle | \psi_d \rangle .$$

The summation over f in (6) means summation over the full system $(\sum_f |f\rangle\langle f| = 1)$ of intermediate states of three quarks of the incident proton between rescatterings on quarks of proton and neutron. It should be noted that the account in the sum of the states differing from the ground state of the proton corresponds to the account of inelastic shadowing. Taking into account that the latter is small in the region of considered momentum transfers and neglecting it we obtain

$$\mathcal{F}_{pd}(\vec{q}) = -\frac{i\delta}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}} \langle \psi_d | \langle \psi_p | \tilde{\Gamma}(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\}) | \psi_p \rangle \times \qquad (7)$$

$$\times \langle \psi_p | \tilde{\Gamma}_n(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\}) | \psi_p \rangle | \psi_d \rangle .$$

Let us write the wave function of the deuteron as a product of wave functions of proton and neutron, depending on relative coordinates of quarks, on the wave function of relative motion of proton and neutron

$$\psi_d = \psi_p(\xi_p \eta_p)\psi_n(\xi_n, \eta_n)\psi(\vec{S}) , \qquad (8)$$

where (ξ_p, η_p), (ξ_n, η_n) are relative coordinates of quarks in proton and neutron, $\vec{S}$ is the relative coordinate of proton and neutron in deuteron. Substituting (8) in equation (7) and introducing designations

$$\tilde{\Gamma}_{pp}(\vec{b} - \frac{\vec{S}}{2}) = \langle \psi_n, \psi_p | \tilde{\Gamma}_p(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\}) | \psi_p, \psi_p \rangle , \qquad (9)$$

$$\tilde{\Gamma}_{pn}(\vec{b} + \frac{\vec{S}}{2}) = \langle \psi_n, \psi_p | \tilde{\Gamma}_n(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\}) | \psi_p, \psi_n \rangle$$

we obtain

$$\mathcal{F}_{pd}(\vec{q}) = -\frac{i\delta}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}}\, \tilde{\Gamma}_{pp}(\vec{b} - \frac{\vec{S}}{2}) \tilde{\Gamma}_{pn}(\vec{b} + \frac{\vec{S}}{2}) |\psi(\vec{S})|^2 d^2\vec{S} . \qquad (10)$$

Substituting in (10) the well-known relation

$$\Gamma(\vec{b}) = \frac{1}{2\pi i} \int d\vec{q}\, e^{-i\vec{q}\vec{b}} f(\vec{q}) ,$$

one obtaines

$$\mathcal{F}_{pd}(\vec{q}) = -\frac{i\delta}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}} \left(\frac{1}{2\pi i}\right)^2 \int d\vec{\Delta}_1 e^{-i(\vec{b} - \frac{\vec{S}}{2})\vec{\Delta}_1} f(\vec{\Delta}_1) \times \qquad (11)$$

$$\times \int d\vec{\Delta}_2 e^{-i(\vec{b} + \frac{\vec{S}}{2})\vec{\Delta}_2} f(\vec{\Delta}_2) |\psi(\vec{S})|^2 d^2\vec{S} =$$

$$= \frac{i\delta}{2\pi} f_{pp}(\frac{\vec{q}}{2}) f_{pn}(\frac{\vec{q}}{2}) \int S(\vec{\Delta}) d^2\vec{\Delta} =$$

$$= -i\delta f_{pp}(\frac{\vec{q}}{2}) f_{pn}(\frac{\vec{q}}{2}) \langle r^{-2} \rangle ,$$

where $S(\Delta)$ – form factor, $\langle r^{-2} \rangle$ – the average inverse square of the neutron-proton distance in deuteron and

$$f_{pp(n)}(\vec{q}) = \frac{i}{2\pi} \int d\vec{b}\, e^{i\vec{q}\vec{b}} \langle \psi_{p(n)}, \psi_p | \tilde{\Gamma}(\vec{b}, \{\vec{s}\}, \{\vec{\bar{s}}\}) | \psi_{p(n)}, \psi_p \rangle . \qquad (12)$$

In order to calculate the amplitudes $f_{pp}(\vec{q})$, $f_{pn}(\vec{q})$ in equation (12) and the amplitude of scattering of a proton on the

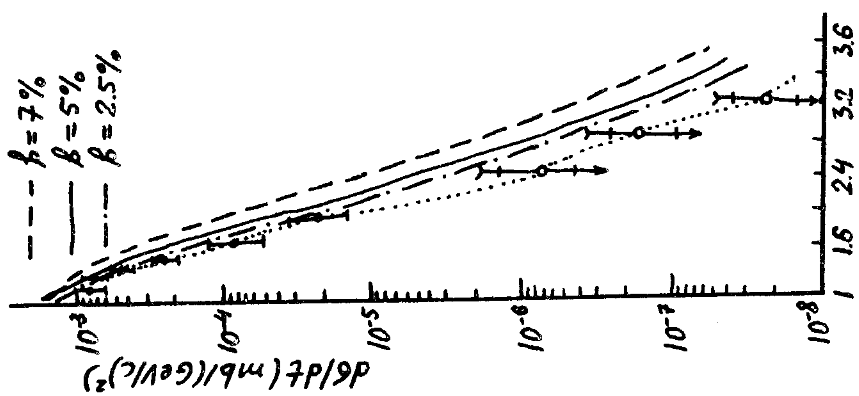

Fig.3

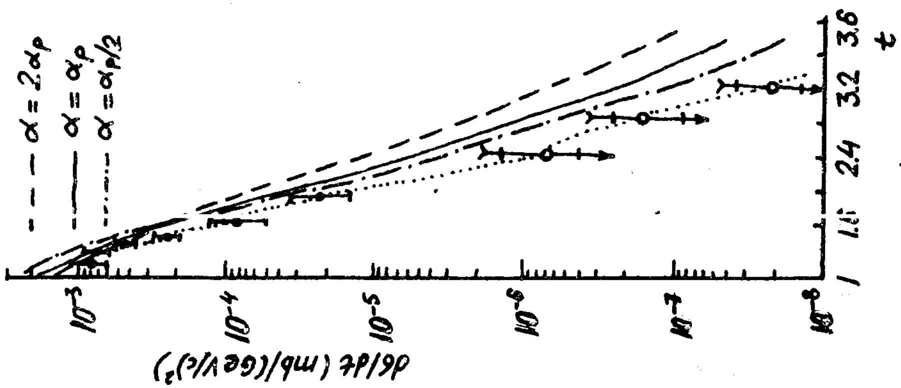

Fig.2

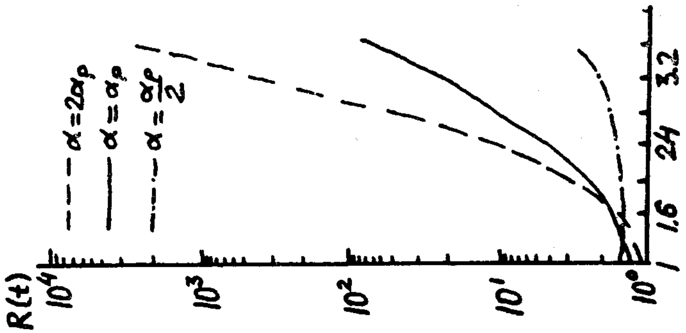

Fig.1

six-quark bag $\mathcal{F}_{p6q}(\vec{q})$ we take for the wave functions of three- and six-quark systems the wave functions of the relativistic harmonic oscillator [6]. It should be noted that making use of the same formalism in ref. [7] allowed one to describe successfully elastic pp-scattering in a wide range of primary energies and momentum transfers. The expression for $\mathcal{F}_{p6q}(\vec{q})$ is given in the appendix and the same for $f_{p(n)}(\vec{q})$ may be taken from ref. [7].

Let us now discuss the results of numerical calculations. First of all we would like to note that equation (11) describes within the experimental errors the magnitude of the cross section of pd-scattering at $t > 1$ $(\mathrm{GeV/c})^2$, where as had been said above the inelastic shadowing was neglected. Further as was expected the cross-section of the scattering of proton on the six-quark bag decreases slower than the pd-scattering one as t increases - see Fig.1, where we have plotted the ratio

$R(t) = \beta^2 (\frac{d\sigma}{dt})_{p6q} / (\frac{d\sigma}{dt})_{pd}$ for three values of parameter which

determines the size of the bag. In the region of momentum transfer $t > 2.5$ $(\mathrm{GeV/c})^2$ the cross section of pd-scattering is negligibly small in comparison with the p(6q)-scattering one.

In Fig.2 we display the quantity $\frac{d\sigma}{dt} = \left| \frac{\delta \mathcal{F}_{pd} + \beta \mathcal{F}_{p6q}}{\mathcal{F}_{pd}} \right|^2 (\frac{d\sigma}{dt})_{pd}$

for $\beta = 0.05$ and three values of the parameter α. It is seen that the results of calculations corresponding to $\alpha = \alpha_p/2$ agree with experiment. The curve corresponding to $\alpha = \alpha_p$ agrees with experiment within the limit of two experimental errors. And the deviation of the curve corresponding to $\alpha = 2\alpha_p$ from experimental points at $t > 1.6$ $(\mathrm{GeV/c})^2$ is larger than two errors. At once all curves differ considerably from each other as t increases.

In Fig.3 we have presented the results of calculations performed for $\alpha = \alpha_p$ and three different values of the parameter β. One can see that the value $\beta = 0.025$ agrees with experimental data, the value $\beta = 0.05$ agrees with the data within the two standard errors, whereas the curve corresponding to $\beta = 0.07$ deviates from experimental significantly.

It is followed from the above said that in order to draw more strict and confident conclusions about the magnitude of the parameter β and the size of six-quark bag it is necessary to measure the cross section of pd-scattering at values of t considerably larger than 2.0 $(\mathrm{GeV/c})^2$. In Figs.2,3 open circles show the results of calculations of the quantity $(\frac{d\sigma}{dt})_{pd}$ defined by expression (10). For these circles we plotted 50% and 100% error bars. All the theoretical curves lie beyond 100%

errors of the "theoretical experiment". If one takes $a = a_p$, then the results of calculations agree with theoretical predictions with 50% accuracy for $\beta \cong 0.024$ and with 100% accuracy for $\beta \cong 0.048$. For all that, since $(\frac{d\sigma}{dt})_{pd} \ll (\frac{d\sigma}{dt})_{p6q}$ in the region of t considered, the absolute magnitude of experimentally measured cross section will allow one to estimate the parameter (the magnitude of six-quark admixture); and the slope of $\frac{d\sigma}{dt}$, the size of the six-quark system.

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APPENDIX

We take the wave function of a six-quark system as a solution of the relativistic harmonic oscillator

$$\psi_{6q}(\xi_1,\ldots,\xi_5,P) = \frac{1}{(\pi a)^5}\exp\{\frac{1}{2a}\sum_{i=1}^{5}(\xi_i^2 - 2\lambda\frac{(\xi_i P)^2}{m_d^2})\},$$

where ξ_i ($i = 1, \ldots, 5$) - Jakobi coordinates, P - momentum, m_d - mass.

Substituting $\psi_{6q}(\xi_1,\ldots,\xi_5, P)$ into (5) and performing the integrations we obtain:

$$\mathcal{T}_{p6q}(\vec{\psi}) = \sum_{\substack{n_1,\ldots,n_7=0 \\ (0<n_1+\ldots+n_7\le 6)}}^{6} C_6^{n_1+\ldots+n_7}\frac{(n_1+\ldots+n_7)!}{n_1!\ldots n_7!}\times$$

$$\times(\frac{\sigma a}{2\pi})^{n_1+n_2+n_3+2(n_4+n_5+n_6)+3n_7} G_1G_2G_3G_4^{n_1+\ldots+n_7}\times$$

$$\times\frac{\pi}{\sqrt{|DetW_0 DetW_1|}}\, e^{-\frac{\vec{q}^2}{4}\frac{|DetW_2|}{|DetW_1|}+\frac{\vec{q}^2}{24(1+\vec{q}^2/m_d^2)a_p}+\frac{\vec{q}^2}{12(1+\vec{q}^2/m_p^2)a_p}}\times$$

$$\times\frac{(-1)^{n_1+n_2+n_3+2(n_4+n_5+n_6)+3n_7+1}}{[(1+\vec{q}^2/m_d^2)(1+\vec{q}^2/m_d'^2)]^6\,[(1+\vec{q}^2/m_p^2)(1+\vec{q}^2/m_p'^2)]^2},$$

where $m_d = 1.868$ GeV/c^2, $m_d' = 3.22$ GeV/c^2, $m_p = 0.934$ GeV/c^2, $m_p' = 1.61$ GeV/c^2 $(m_d'^2 = (2\lambda-1)\cdot m_d^2/\lambda)$.

$$G_1 = \begin{cases} a_p\sqrt{1+\frac{\vec{q}^2}{m_p^2}} & \text{when } n_1+n_5+n_6+n_7 \ne 0 \\ 1, & \text{when } n_1+n_5+n_6+n_7 = 0 \end{cases}$$

$$G_2 = \begin{cases} a_p\sqrt{1+\frac{\vec{q}^2}{m_p^2}}, & \text{when } n_2+n_4+n_5+n_7 \ne 0, \\ 1, & \text{when } n_2+n_4+n_5+n_7 = 0, \end{cases}$$

$$G_3 = \begin{cases} a_p\sqrt{1+\frac{\vec{q}^2}{m_p^2}}, & \text{when } n_3+n_4+n_6+n_7 \ne 0, \\ 1, & \text{when } n_3+n_4+n_6+n_7 = 0, \end{cases}$$

$$DetW_2 = Det\begin{pmatrix} C_{11} & C_{21} & C_{31} \\ C_{21} & C_{22} & C_{32} \\ C_{31} & C_{32} & C_{33} \end{pmatrix} \qquad G_4 = a\sqrt{1+\frac{\vec{q}^2}{m_d^2}};$$

$$C_{11} = -[\frac{n_1a^2}{T_1} + \frac{(n_5+n_6)a^2}{T_2} + \frac{n_7a^2}{T_3}] + E_1,$$

$$C_{21} = -[\frac{n_5a^2}{T_2} + \frac{n_7a^2}{T_3}],$$

$$C_{31} = -[\frac{n_6a^2}{T_2} + \frac{n_7a^2}{T_3}],$$

$$C_{22} = -[\frac{n_2a^2}{T_1} + \frac{(n_4+n_5)a^2}{T_2} + \frac{n_7a^2}{T_3}],$$

$$C_{32} = -[\frac{n_4a^2}{T_2} + \frac{n_7a^2}{T_3}],$$

$$C_{33} = -[\frac{n_3a^2}{T_1} + \frac{(n_4+n_6)a^2}{T_2} + \frac{n_7a^2}{T_3}] + E_3,$$

where

$$T_1 = a(1+\frac{\vec{q}^2}{m_d^2}) + a,\quad T_2 = a(1+\frac{\vec{q}^2}{m_d^2}) + 2a,\quad T_3 = a(1+\frac{\vec{q}^2}{m_d^2}) + 3a,$$

a - slope parameter of the quark-quark scattering amplitude

$$DetW_1 = Det\begin{pmatrix} C_{11} & C_{21} & C_{31} & C_{41} \\ C_{21} & C_{22} & C_{32} & C_{42} \\ C_{31} & C_{32} & C_{33} & C_{43} \\ C_{41} & C_{42} & C_{43} & C_{44} \end{pmatrix},$$

$$C_{14} = [\frac{n_1at}{T_1} + \frac{(n_5+n_6)at}{T_2} + \frac{n_7at}{T_3}],$$

$$C_{24} = [\frac{n_2at}{T_1} + \frac{(n_4+n_5)at}{T_2} + \frac{n_7at}{T_3}],$$

$$C_{34} = \left[\frac{n_3 at}{T_1} + \frac{(n_4+n_6)at}{T_2} + \frac{n_7 at}{T_3} \right],$$

$$C_{44} = -\left[\frac{n_1+n_2+n_3}{T_1} + \frac{n_4+n_5+n_6}{T_2} + \frac{n_7}{T_3} \right] t^2 + \sum_{i=1}^{7} n_i t + d,$$

$$E_1 = \alpha_p + a(n_1+n_5+n_6+n_7); \quad E2 = \alpha_p + a(n_2+n_4+n_5+n_7),$$

$$E_3 = \alpha_p + a(n_3+n_4+n_6+n_7);$$

$$E_1 = \begin{cases} E_1, & \text{when } n_1+n_5+n_6+n_7 \neq 0, \\ 1, & \text{when } n_1+n_5+n_6+n_7 = 0, \end{cases}$$

$$E_2 = \begin{cases} E_2, & \text{when } n_2+n_4+n_5+n_7 \neq 0, \\ 1, & \text{when } n_2+n_4+n_5+n_7 = 0, \end{cases}$$

$$E_3 = \begin{cases} E_3, & \text{when } n_3+n_4+n_6+n_7 \neq 0, \\ 1, & \text{when } n_3+n_4+n_6+n_7 = 0, \end{cases}$$

The matrix W_0 is obtained from W_1 by the substitution $T_1 = \alpha + a$, $T_2 = \alpha + 2a$, $T_3 = \alpha + 3a$.

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Оценка величины примеси шестикваркового состояния в дейтроне из упругого pd -рассеяния

В рамках модели составных кварков в формализме Глаубера рассчитано сечение pd -рассеяния с учетом примеси шестикваркового состояния. Из сравнения с экспериментальными данными при $\sqrt{s}$ =63 ГэВ и значениях переданного импульса $t > 1$ /ГэВ/с/^{2} для величины примеси шестикваркового состояния получена оценка $\beta < 5\%$. Показано, что наличие экспериментальной информации о сечении pd -рассеяния при значениях $t > 2$ /ГэВ/с/^{2} позволит наложить на величину параметра β более строгие ограничения, а также сделать некоторые заключения о размерах шестикваркового мешка.

Работа выполнена в Лаборатории ядерных проблем ОИЯИ.

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An Estimation of the Value of Six-Quark State Admixture in Deuteron from Elastic pd -Scattering

The pd -scattering cross-section has been evaluated within the framework of the constituent quark model in Glauber's formalism with allowance for the six-quark state admixture. The comparison with the experimental data at $\sqrt{s}$ =63 GeV and momentum transfer $t > 1$ (GeV/c)^2 for the six-quark state admixture has yielded β<5%. It is show that availability of the experimental data on the pd -scattering cross-section at $t > 2$ (GeV/c)^2 allows one to impose stricter limitations on the values of the parameter and draw some conclusions on the size of the six-quark bag.

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

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