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ЕРЕВАНСКИЙ ФИЗИЧЕСКИЙ ИНСТИТУТ

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QUARK-GLUON MIXING AND INCLUSIVE SPECTRA
OF PSEUDOSCALAR AND TENSOR MESONS

ЦНИИАтоминформ

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Զվարճ-գիտություններն լավագույնը փոխադրվածներում եւ թեստավորվածներն
Մեջոններում եւ նրանց ինկլուզիվ սղեկներում

Հաշվի առնելով բարդ-զլուցողական խառնուրդ η , η' ,
L/1440/ փակուղիները f , f' , $\theta/1690/$ թեստավորված մեզոն-
ներում, բազմապարտության մոդելի շրջանակներում ստացված են այդ
մասնիկների ինկլուզիվ սպեկտրները պրոտոնի, պիոնի և կաոնի հատ-
վածավորման ոլորտներում: Ստացված արդյունքները հնարավորություն
են տալիս փորձարարական ժանապարհով ստուգել՝ հանդիսանում են արդ-
յոք L/1440/ և $\theta/1690/$ մասնիկները զլուցողական կապված վիճակ-
ներ /զլուցողներ/:

Երևանի Ֆիզիկայի ինստիտուտ

Երևան 1986

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КВАРК-ГЛЮОННЫЕ СМЕШИВАНИЯ И ИНКЛЮЗИВНЫЕ
СПЕКТРЫ ПСЕВДОСКАЛЯРНЫХ И ТЕНЗОРНЫХ МЕЗОНОВ

С учетом кварк-глюонного смешивания в псевдоскалярных η , η' , $\iota(1440)$ и тензорных f , f' , $\theta(1690)$ мезонах, в рамках многопартонной рекомбинационной модели получены инклюзивные спектры этих частиц в областях фрагментации протона, пиона и каона. Полученные результаты указывают на возможность экспериментальной проверки, являются ли $\iota(1440)$ и $\theta(1690)$ глоболами.

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QUARK-GLUON MIXING AND INCLUSIVE SPECTRA
OF PSEUDOSCALAR AND TENSOR MESONS

With regard for quark-gluon mixing in pseudoscalar η , η' , $\omega(1440)$ and tensor f , f' , $\theta(1690)$ mesons are obtained their inclusive spectra in the fragmentation region of proton, pion and kaon within the framework of multiparton recombination model. The obtained results give the possibility of an experimental verification if $\omega(1440)$ and $\theta(1690)$ are glueballs.

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1. Introduction

In Ref. [1], on the basis of multiparton recombination model (MRM) [2] are determined the inclusive spectra of pseudoscalar η , η' and $\omega(1440)$ mesons with account of quark-gluon mixing [3,4] in the fragmentation region of proton in hadron-hadron interactions. The present work is devoted to determination of inclusive spectra of pseudoscalar and tensor mesons in the fragmentation region of proton, pion and kaon, with account of quark-gluon mixing in these particles.

In different recombination models (RM) [5-7] and in the MRM too, the inclusive spectra of secondary hadrons with small transverse momenta are determined in terms of distribution functions of valence quarks and sea partons in the incident hadron and are poorly sensitive to the analogous distribution functions in the final hadron. Proton (neutron) distribution functions are directly determined by deep-inelastic scattering of leptons on proton (deuteron). We have much poorer information about parton distribution functions for pion and kaon. There are only data [8] obtained from the experiments on Drell-Yan pair production, relative to the distribution of the valence quark in the pion and of the nonstrange valence quark in the kaon. In paragraph 2 the distribution of valence and sea partons in pion and kaon are described in the framework of the

Kuti-Weisskopf model [9] and the MRM [10,11]. Paragraph 3 is devoted to a brief discussion of quark-gluon mixing mechanism in pseudoscalar and tensor sectors. In the last, fourth paragraph the obtained inclusive spectra of pseudoscalar and tensor mesons and contribution of gluon sea of fragmentating hadrons (proton, π and K-mesons) into these spectra are discussed. It is shown that the production cross sections of particles which are candidates of glueballs are considerably different in fragmentation regions of proton and meson.

2. Parton Distribution in Pion and Kaon

Distribution functions of valence quarks and sea partons in proton have been discussed in detail in Refs. [1,10]. In this paper, at determination of inclusive spectra of tensor f, f' and $\theta(1690)$ mesons in the fragmentation region of proton, there are used earlier determined [10] distribution functions of partons in proton.

The distribution of valence quarks and sea partons in meson $M(q_1, q_2)$, in the framework of the Kuti-Weisskopf model [9] is determined by the following expressions:

$$q_{1i}(x) = x^{-1+\beta_{q_1}} (1-x)^{-1+\gamma_M+\beta_{q_2}} B^{-1}(\beta_{q_1}, \gamma_M + \beta_{q_2}), \quad (1.a)$$

$$q_{2i}(x) = x^{-1+\beta_{q_2}} (1-x)^{-1+\gamma_M+\beta_{q_1}} B^{-1}(\beta_{q_2}, \gamma_M + \beta_{q_1}), \quad (1.b)$$

$$a_s(x) = g_a x^{-1} (1-x)^{-1+\gamma_M+\beta_{q_1}+\beta_{q_2}}, \quad (1.c)$$

where q_i ($i = 1, 2$) is quark or antiquark, $a = u, \bar{u}, d, \bar{d}, s, \bar{s}, G$

designate the sea parton kind, $\chi_M = \sum_a g_a$. $B(x,y)$ is Euler's beta function. Parameters β_q characterize the behaviour of the distribution function of valence quarks at $x \rightarrow 0$. For the valence quarks of pion and the nonstrange valence quark of kaon $\beta_{u(d)}^\pi = \beta_{u(d)}^K = 0.5$, and for the strange valence quark of kaon $\beta_s^K = 1$ [12], the value of χ_M being determined from data on Drell-Yan lepton pair production in pion and kaon beams [11]:

$\chi_\pi = 1.6$ and $\chi_K = 1.3$. In Ref. [11] the parameters g_a have been determined by comparing the MRM predictions on fragmentation of π and K-mesons into hadron resonances with the available experimental data on inclusive spectra of these resonances. These values are given in the table 1. In Fig.1 are presented the distribution functions of valence quarks and sea partons in pion and kaon at the values of these parameters given in table 1.

As already mentioned, inclusive spectra of secondary hadrons in the fragmentation region of proton, π and K-mesons in the framework of different RM are determined by distribution functions of partons in incident hadrons. It is assumed in the MRM framework, that in the formation of a final hadron contributes a certain multiparton formation, the distribution of which is determined by its valence composition and the portion of sea partons of incident hadron W ($0 \leq W \leq 1$) which belongs to the considered substate. The value of W determines the portion of the longitudinal momentum carried by sea partons of incident hadron into the sea of the final one. The characteristic feature of the MRM as compared with other RM, is the statistical account of the contribution of sea partons of fragment-

ating hadrons to the inclusive spectra of secondary hadrons (such contribution is decisive for secondary baryon spectra which are formed on the diquark of proton in its fragmentation region [10]). From this point of view the MRM is a rather well developed, phenomenological approach which allows to get information on the role of sea partons of incident (fragmentating) hadrons in the formation of secondary ones.

The invariant inclusive cross section $f(x) = \frac{1}{\pi} \int_{P_{\max}}^E \frac{d^2\sigma}{dx dP_T^2} dp_T^2$ of $M(a,b)$ -meson production, where a and b denote a quark, antiquark or a gluon, in the fragmentation region of H hadron in the MRM framework is determined by [10,11] :

$$\frac{\pi}{6_{in}} f(x) = \int [F_{VS}(x_1, x_2) + F_{SS}(x_1, x_2)] R_M\left(\frac{x_1}{x}, \frac{x_2}{x}\right) \delta\left(1 - \frac{x_1}{x} - \frac{x_2}{x}\right) dx_1 dx_2 \quad (2)$$

The first term (index - VS) in square brackets corresponds to the $H \rightarrow M$ fragmentation in case when the final meson and the incident hadron have a common valence quark; the second term (index - SS) describes the case when the final meson and the incident hadron have no common valence quarks. The function $F_{VS(SS)}(x_1, x_2)$ determines the distributions of two multiparton substates with x_1 and x_2 longitudinal momenta, the first of them containing quark a (the second one contains antiquark b) and an arbitrary number of sea partons which belong to this substate with $W_1(W_2)$ probability, where $W_1 + W_2 = W$.

It is shown in Ref.[10] , that at fragmentation of proton into meson, when the final meson and the incident proton have a common valence quark ($N_V = 1$, where N_V is the number of valence quarks common for the incident and final hadrons), the values of W_1 and W_2 are close to zero; in case of $N_V = 0$ -

- $W_1 = W_2 = 0$. The expressions for functions $F_{VS}(x_1, x_2)$ and $F_{SS}(x_1, x_2)$ corresponding to these cases, are given in Refs. [1, 10]. And in case of (\bar{N}, K) -meson fragmentation into a meson with one common valence quark $N_V = 1$, the parameter W , as shown in Ref. [11], is other than zero: $W = 0.2$. In this case the main portion of sea partons is carried by the common valence quark, i.e. $W_1 = W$ and $W_2 = 0$, in case of $N_V = 0 - W_1 = W_2 = 0$ [11]. The functions $F_{VS}(x_1, x_2)$ and $F_{SS}(x_1, x_2)$, determined with account of the made remarks for the case with fragmentation $M(q_1, q_2) \rightarrow M(a, b)$, are given below:

$$F_{VS}(x_1, x_2) = g_a (1-x)^{-1+(1-W)\gamma_M + \beta_{q_2}} x_1^{-1+W\gamma_M + \beta_{q_1}} x_2^{-1} \cdot B^{-1}(W\gamma_M + \beta_{q_1}, (1-W)\gamma_M + \beta_{q_2}), \quad (3.a)$$

$$F_{SS}(x_1, x_2) = g_a g_b (1-x)^{-1+(1-W)\gamma_M + \beta_{q_1} + \beta_{q_2}} (x_1 x_2)^{-1}. \quad (3.b)$$

Functions of recombination into meson $M(a, b)$ are from Refs. [10, 11] and have the following form:

$$R_M(z_1, z_2) = A_M z_1^{1+\alpha_a} z_2^{1+\alpha_b} B^{-1}(\alpha_a + 1, \alpha_b + 1), \quad (4)$$

where $z_1 + z_2 = 1$, $\alpha_a(b) = -1 + \gamma_M/2 + \beta_a(b)$, $\beta_u(d) = 0.5$, $\beta_s = 1$, $\gamma_M = 1.6$, for pseudoscalar mesons $A_M = 1$, for tensor ones $A_M = 1/2$ [10, 11]. The expressions (2), (3), (4) fully determine the inclusive spectrum of $M(a, b)$ meson in the fragmentation region of $M(q_1, q_2)$ meson in the framework of the MRM.

3. Quark-Gluon Mixing in Pseudoscalar and Tensor Mesons

In the model of quark-gluon mixing [3,4], the ideal basis contains state vectors of normal $N = \frac{1}{\sqrt{2}} |u\bar{u} + d\bar{d}\rangle$, strange $S = |S\bar{S}\rangle$ quarkonia and gluonium $G = |g\bar{g}\rangle$. The physical states of $|\Psi\rangle$ (in the pseudoscalar sector $\Psi = \eta, \eta', \omega(1440)$ in the tensor one - $\Psi = f, f', \theta(1690)$) are their linear combination:

$$|\Psi\rangle = x_\Psi |N\rangle + y_\Psi |S\rangle + z_\Psi |G\rangle, \quad (5)$$

where $x_\Psi^2 + y_\Psi^2 + z_\Psi^2 = 1$.

In QCD the quark-gluon mixing is due to annihilation of quark-antiquark pairs into gluons (in the lowest order of the perturbation theory the annihilation terms for pseudoscalar and tensor mesons consist of two gluons). Consequently, into the quadratic mass matrix of isoscalar mesons must be involved the parameters $\lambda_N, \lambda_S, \lambda_G$ corresponding to this annihilation:

$$\hat{M}_a = \begin{pmatrix} m_{Na}^2 + 2\lambda_{Na}^2 & \sqrt{2}\lambda_{Na}\lambda_{Sa} & \sqrt{2}\lambda_{Na}\lambda_{Ga} \\ \sqrt{2}\lambda_{Na}\lambda_{Sa} & m_{Sa}^2 + \lambda_{Sa}^2 & \lambda_{Sa}\lambda_{Ga} \\ \sqrt{2}\lambda_{Na}\lambda_{Ga} & \lambda_{Sa}\lambda_{Ga} & m_{Ga}^2 + \lambda_{Ga}^2 \end{pmatrix} \quad (6)$$

where the index $a = P, T$ designates the pseudoscalar and tensor sectors, respectively.

The physical states $|\Psi_a\rangle$ must satisfy the equation of eigenvalues:

$$\hat{M}_a |\Psi_{aj}\rangle = m_{aj}^2 |\Psi_{aj}\rangle, \quad (7)$$

where $j = \eta, \eta', l(1440)$ at $a = P$, $j = f, f', \theta(1690)$ at $a = T$, in result one obtains three equations expressing the annihilation parameters in terms of the mass of the ideal and physical states:

$$2\lambda_{Na}^2 = (m_{Ga}^2 - m_{Sa}^2) \{ m_{Na}^2 m_{Sa}^2 (m_{Sa}^2 - m_{Na}^2) + m_{Na}^2 m_{Ga}^2 (m_{Na}^2 - m_{Ga}^2) + m_{Sa}^2 m_{Ga}^2 (m_{Ga}^2 - m_{Sa}^2) \}^{-1} \{ m_{Na}^4 (m_{\eta,f}^2 + m_{\eta',f'}^2 + m_{l,\theta}^2 - m_{Na}^2) + m_{\eta,f}^2 m_{\eta',f'}^2 m_{l,\theta}^2 - m_{Na}^2 (m_{\eta,f}^2 m_{\eta',f'}^2 + m_{\eta,f}^2 m_{l,\theta}^2 + m_{\eta',f'}^2 m_{l,\theta}^2) \}, \quad (8.a)$$

$$\lambda_{Sa}^2 = [m_{Na}^2 (m_{Ga}^2 - m_{Sa}^2)]^{-1} [m_{\eta,f}^2 m_{\eta',f'}^2 m_{l,\theta}^2 - m_{Na}^2 m_{Sa}^2 m_{Ga}^2 - m_{Na}^2 m_{Sa}^2 \sum_a - 2\lambda_{Na}^2 m_{Sa}^2 (m_{Sa}^2 - m_{Na}^2)], \quad (8.b)$$

$$\lambda_{Ga}^2 = \sum_a - 2\lambda_{Na}^2 - \lambda_{Sa}^2, \quad (8.c)$$

where $\sum_a = m_{\eta,f}^2 + m_{\eta',f'}^2 + m_{l,\theta}^2 - m_{Na}^2 - m_{Sa}^2 - m_{Ga}^2$.

The matrix $U_a \hat{M}_a U_a^{-1}$ where U_a is the unitary matrix transforming the ideal basis into the physical one, must be a diagonal matrix with diagonal elements $m_{\eta}^2, m_{\eta'}^2, m_{l}^2$ or in tensor case $m_f^2, m_{f'}^2, m_{\theta}^2$. This condition leads to the following expression for U_a :

$$U_a = \begin{pmatrix} X_{\eta,f} & Y_{\eta,f} & Z_{\eta,f} \\ X_{\eta',f'} & Y_{\eta',f'} & Z_{\eta',f'} \\ X_{l,\theta} & Y_{l,\theta} & Z_{l,\theta} \end{pmatrix} \quad (9)$$

where $X_{aj} = \sqrt{2} \lambda_{Na} \lambda_{Ga} (m_{Sa}^2 - m_j) C_{aj}, \quad (10.a)$

$$y_{aj} = \lambda_{sa} \lambda_{ga} (m_{Na}^2 - m_j^2) C_{aj}, \quad (10.b)$$

$$z_{aj} = [2\lambda_{Na}^2 \lambda_{sa}^2 - (m_{Na}^2 + 2\lambda_{Na}^2 - m_j^2)(m_{sa}^2 + \lambda_{sa}^2 - m_j^2)] C_{aj}, \quad (10.c)$$

$$C_{aj} = \left\{ 2\lambda_{Na}^2 \lambda_{ga}^2 (m_{sa}^2 - m_j^2)^2 + \lambda_{sa}^2 \lambda_{ga}^2 (m_{Na}^2 - m_j^2)^2 + \right. \\ \left. + [2\lambda_{Na}^2 \lambda_{sa}^2 - (m_{Na}^2 + 2\lambda_{Na}^2 - m_j^2)(m_{sa}^2 + \lambda_{sa}^2 - m_j^2)]^2 \right\}^{-1/2}. \quad (10.d)$$

Thus, the weights x_ψ , y_ψ , z_ψ of ideal states $|N\rangle$, $|S\rangle$, $|G\rangle$ in the physical states $|\Psi\rangle$ are functions of masses of ideal and physical states, as the annihilation parameters are also functions of masses. In the framework of such an approach the analysis [3,4] of the available experimental data on two-particle decays containing η , η' , $\iota(1440)$ pseudoscalar and f , f' , $\theta(1690)$ tensor mesons has shown, that in the pseudoscalar sector there takes place a strong quark-gluon mixing: in η meson the normal and strange quarks are almost equally mixed and there is almost no gluon contribution, in η' meson there is a slight gluon admixture, $\iota(1440)$ by $\sim 85\%$ consists of gluonium with a slight admixture of normal and strange quarks. In the tensor meson sector the f -meson is almost a pure normal state, f' -meson - a pure $S\bar{S}$ state, and $\theta(1690)$ - a pure gluonium state, i.e. an ideal mixing takes place. All of these conclusions are based on the values of the weights x , y , z of ideal states in the physical ones, which have been determined in Ref.[4] and are given in the table 2.

4. Inclusive Spectra of Pseudoscalar and Tensor Mesons

In the framework of MRM the invariant inclusive cross sections in case of $M(a, q)$ meson fragmentation into $|a \bar{a}\rangle$ states, where $a = u, d, s$, containing valence quark a of the incident meson ($H_V = 1$), have the following form:

$$\frac{\pi}{6_{in}} f_1(x) = g_a x^{\beta_a + W\gamma_M} (1-x)^{-1 + \beta_q + (1-W)\gamma_M} \frac{B(\beta_a + W\gamma_M + \alpha_a + 1, \alpha_a + 1)}{B(\beta_a + W\gamma_M, \beta_q + (1-W)\gamma_M) B(\alpha_a + 1, \alpha_a + 1)} \quad (11.a)$$

in case of $M(q_1, q_2)$ -meson fragmentation into $|a, \bar{a}\rangle$ states not containing a valence quark of the incident meson ($H_V = 0$):

$$\frac{\pi}{6_{in}} f_0(x) = g_a g_{\bar{a}} (1-x)^{-1 + \beta_{q_1} + \beta_{q_2} + \gamma_M} \quad (11.b)$$

Then the invariant inclusive cross sections of $M(q_1, q_2)$ -meson fragmentation into $|N\rangle$, $|S\rangle$, $|G\rangle$ states are determined by:

$$f_N(x) = \frac{1}{2} [(f_1(x) + f_0(x))_{M \rightarrow |u\bar{u}\rangle} + (f_1(x) + f_0(x))_{M \rightarrow |d\bar{d}\rangle}], \quad (12.a)$$

$$f_S(x) = [f_1(x) + f_0(x)]_{M \rightarrow |s\bar{s}\rangle}, \quad (12.b)$$

$$f_G(x) = \frac{6_{in}}{\pi} \frac{(\Delta g_G)^2}{2!} (1-x)^{-1 + \beta_{q_1} + \beta_{q_2} + \gamma_M} \quad (12.c)$$

Analogous expressions for proton fragmentation into the same states are given in Ref. [1].

Invariant cross sections of production of pseudoscalar and tensor mesons are determined in terms of mixing parameters of

nonstrange, strange and gluonium components x_j, y_j, z_j ($j = \eta, \eta', \iota(1440)$ or $j = f, f', \theta(1690)$) and invariant cross sections $f_N(x), f_S(x), f_G(x)$ by the following expression:

$$f_j(x) = x_j^2 f_N(x) + y_j^2 f_S(x) + z_j^2 f_G(x). \quad (13)$$

As already mentioned, the parameter W determines the portion of the longitudinal momentum introduced by the sea partons of incident hadron into final states $|N\rangle, |S\rangle$ or $|G\rangle$. However, one can expect [1] that only a certain part of sea gluons of incident hadron can take part in the production of gluon component in the final meson. In the expression (12.c) the parameter Δ determines the portion of the gluon sea of the fragmenting particle which takes part in the production of the gluon component of final meson. The value of the parameter Δ can be determined by inclusive spectra of pseudoscalar and tensor mesons. In Fig.2 are shown the comparison of model predictions with the experimental data on inclusive spectra of f-meson in the fragmentation regions of proton and kaon at energies of 32 GeV [13,14] and 405 GeV [15]. As the f-meson is almost a pure $|N\rangle$ state, i.e. the gluon component is minute ($z_f = -0.0307$), the theoretical curves shown in Fig.2 are practically the same at different Δ ($\Delta = 0.1$ and $\Delta = 1$). That is why it is impossible to determine the parameter Δ by the inclusive spectra of f-meson as well as by those of η -meson (see Figs.3-6). In contrast to this, the inclusive spectra of $\iota(1440)$ and $\theta(1690)$ mesons in the fragmentation regions of each of incident particles, are sensitive to the parameter Δ as are the inclusive spectra of η' and f' mesons in the

fragmentation region of proton (see Figs.3-6) and can give quite a definite information about the parameter Δ . Besides, the spectra of the same particles can be used for more exact definition of the gluon distribution in incident hadrons, which is rather important especially for pion and kaon.

In Figs.3-6 the calculated invariant inclusive cross sections of pseudoscalar η , η' , $\iota(1440)$ and tensor $f, f', \theta(1690)$ mesons are given in πp and Kp interactions in the range of $-1 \leq x \leq 1$. As seen in these figures, in the proton fragmentation region the production cross sections for particles ($\iota(1440)$, $\theta(1690)$), which are candidates of glueballs are markedly larger than in the fragmentation region of meson.

Regardless the fact, that in proton as well as in π^- and K^- mesons approximately half of the longitudinal momentum is taken away by the sea partons (60%, 62%, 46% [10,11], respectively), in proton $\sim 85\%$ [10] of this momentum is carried away by gluons, while in mesons they carry $\sim 14\%$ [11] of the whole momentum carried away by the sea particles (see also Refs.[6,7,16;17]). This circumstance is the reason for the noticeable difference in the production cross sections of particles which can be candidates of glueballs in the fragmentation regions of proton and meson. Indeed, as seen from the tables 3 and 4, where are presented the production cross sections of pseudoscalar and tensor mesons at different values of Δ in πp and Kp interactions at 100 GeV/c, cross sections of production of $\iota(1440)$ and $\theta(1690)$ in the proton fragmentation region, are considerably larger than in fragmentation regions of mesons.

Thus, an experimental measurement of the ratio of particle production cross sections in the fragmentation regions of proton and meson (π or K) can answer the question if the given particle is a glueball.

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Table 1

Parameters of parton distribution in π and K mesons

M	$\beta_{u(d)}$	β_s	$g_{u(d)} = g_{\bar{u}(\bar{d})}$	$g_s = g_{\bar{s}}$	g_G	$\gamma = \sum_a g_a$
π	0.5	-	0.31	0.07	0.22	1.6
K	0.5	1	0.25	0.06	0.18	1.3

Table 2

Weights x, y, z in pseudoscalar and tensor mesons

	Pseudoscalar	Tensor
	$\eta(549)$	$f(1270)$
x	0.730	0.999
y	-0.679	-0.0293
z	-0.0751	-0.0307
	$\eta'(958)$	$f'(1525)$
x	-0.617	-0.0251
y	-0.703	-0.991
z	0.353	0.129
	$L(1440)$	$\theta(1690)$
x	-0.292	-0.0342
y	-0.211	-0.128
z	-0.933	-0.991

Table 3

Production cross sections for pseudoscalar and tensor mesons in πp interactions
 at 100 GeV/c ($\sigma_{in} = 2.3$ mb)

Cross sections	Δ	η	η'	$L(1440)$	f	f'	$\theta(1690)$
$\sigma(\pi \rightarrow M)$ mb	1.0	1.81	1.24	0.57	1.38	0.043	0.18
	0.3	1.81	1.20	0.26	1.38	0.039	0.018
	0.1	1.81	1.18	0.22	1.38	0.039	0.0039
$\sigma(p \rightarrow M)$ mb	1.0	0.79	4.26	22.94	0.45	0.20	11.77
	0.3	0.61	0.73	2.23	0.45	0.020	1.06
	0.1	0.59	0.41	0.30	0.45	0.0035	0.12
$\sigma(\pi p)$ mb	1.0	2.60	5.50	23.51	1.83	0.25	11.96
	0.3	2.42	1.93	2.50	1.83	0.059	1.07
	0.1	2.40	1.58	0.53	1.83	0.042	0.12

Table 4

Production cross sections for pseudoscalar and tensor mesons in
Kp interactions at 100 GeV/c ($\sigma_{in} = 17.1 \text{ mb}$)

Cross sections	Δ	η	η'	$\rho(1440)$	f	f'	$\sigma(1690)$
$\sigma(K \rightarrow M)$ mb	1.0	1.18	0.87	0.24	0.72	0.22	0.097
	0.3	1.18	0.86	0.077	0.72	0.22	0.013
	0.1	1.18	0.86	0.062	0.72	0.22	0.0053
$\sigma(P \rightarrow M)$ mb	1.0	0.67	3.59	19.32	0.38	0.17	9.92
	0.3	0.51	0.62	1.88	0.38	0.017	0.89
	0.1	0.50	0.34	0.24	0.38	0.0029	0.099
$\sigma(KP)$ mb	1.0	1.85	4.46	19.56	1.09	0.39	10.02
	0.3	1.69	1.47	1.96	1.09	0.24	0.90
	0.1	1.68	1.20	0.32	1.09	0.23	0.10

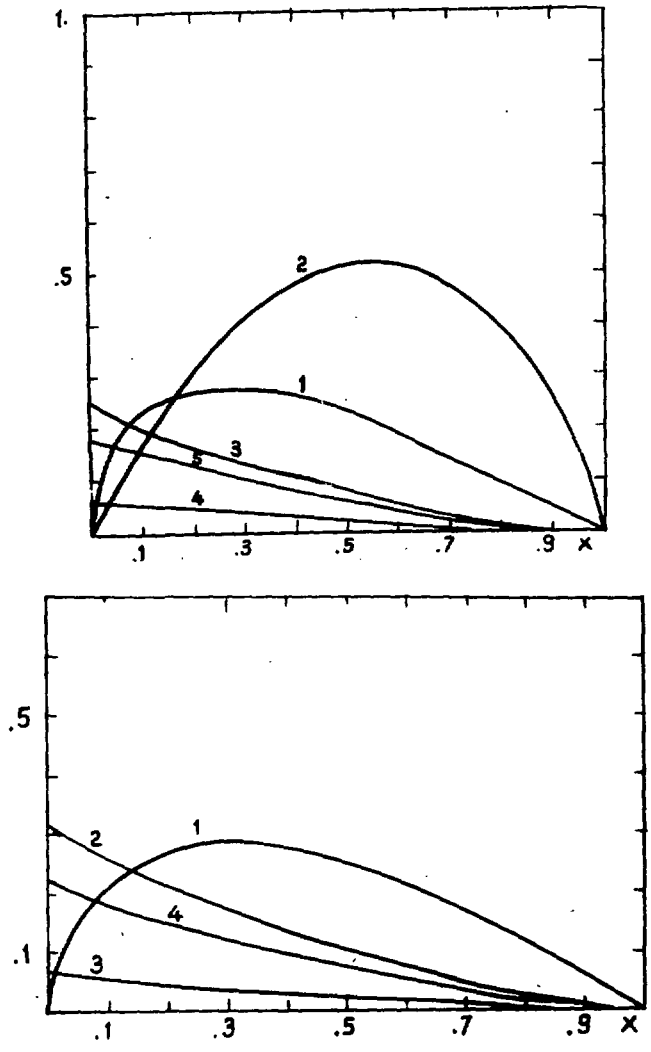


Fig.1 Distribution of valence quarks $xq(x)$ and sea partons $x\bar{q}_s(x)$

a. in pion: valence quark - curve 1; sea partons: non-strange quark - curve 2, strange quark - curve 3, gluons - curve 4.

b. in kaon: quarks; nonstrange - curve 1, strange - curve 2; sea partons: nonstrange quarks - curve 3, strange quarks - curve 4, gluons - curve 5.

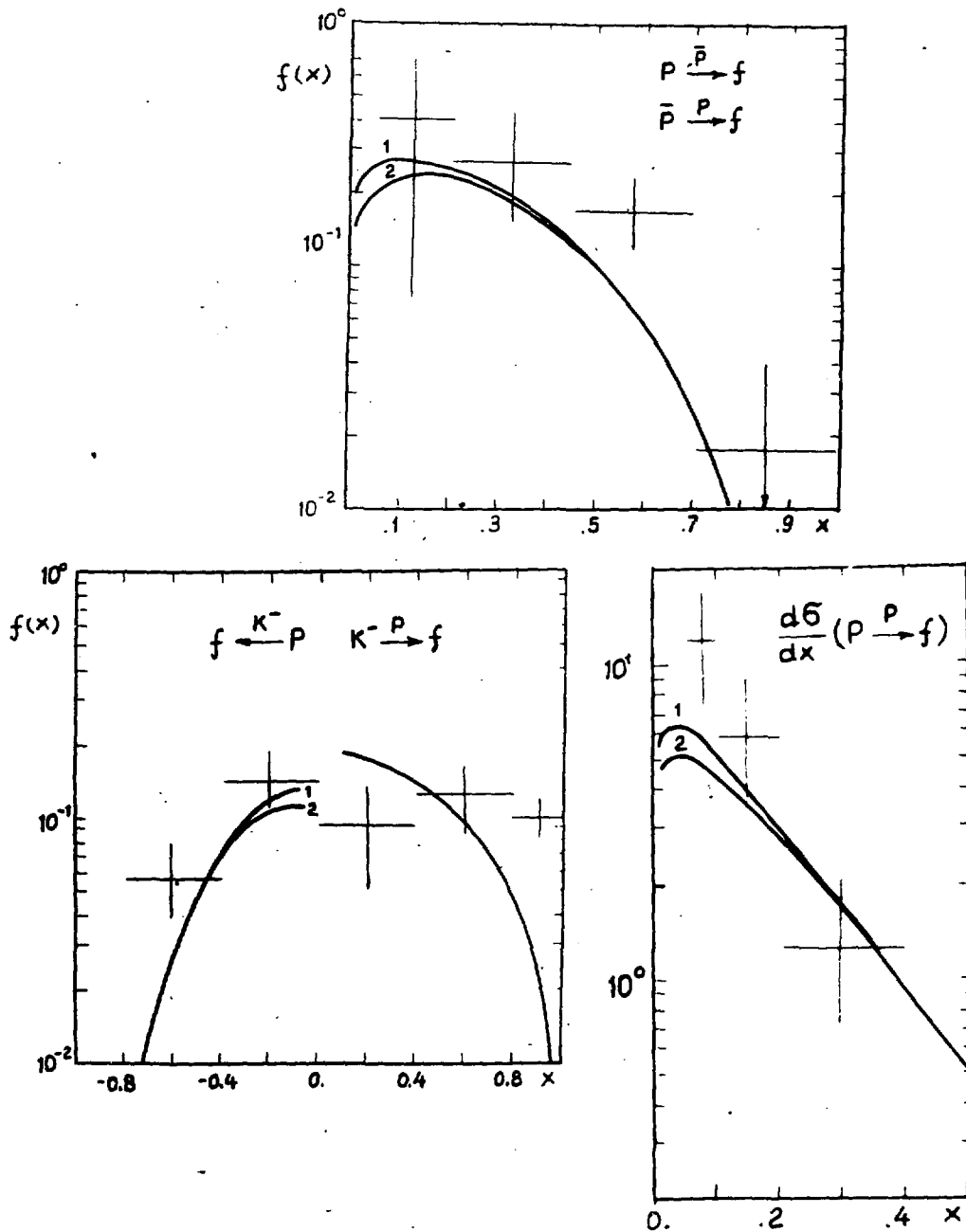


Fig.2 Inclusive spectra of f -meson in fragmentation regions of p, \bar{p} and K -mesons. a, b - at 32 GeV; c - at 405 GeV. Curve 1 - $\Delta = 1$, Curve 2 - $\Delta = 0.1$.

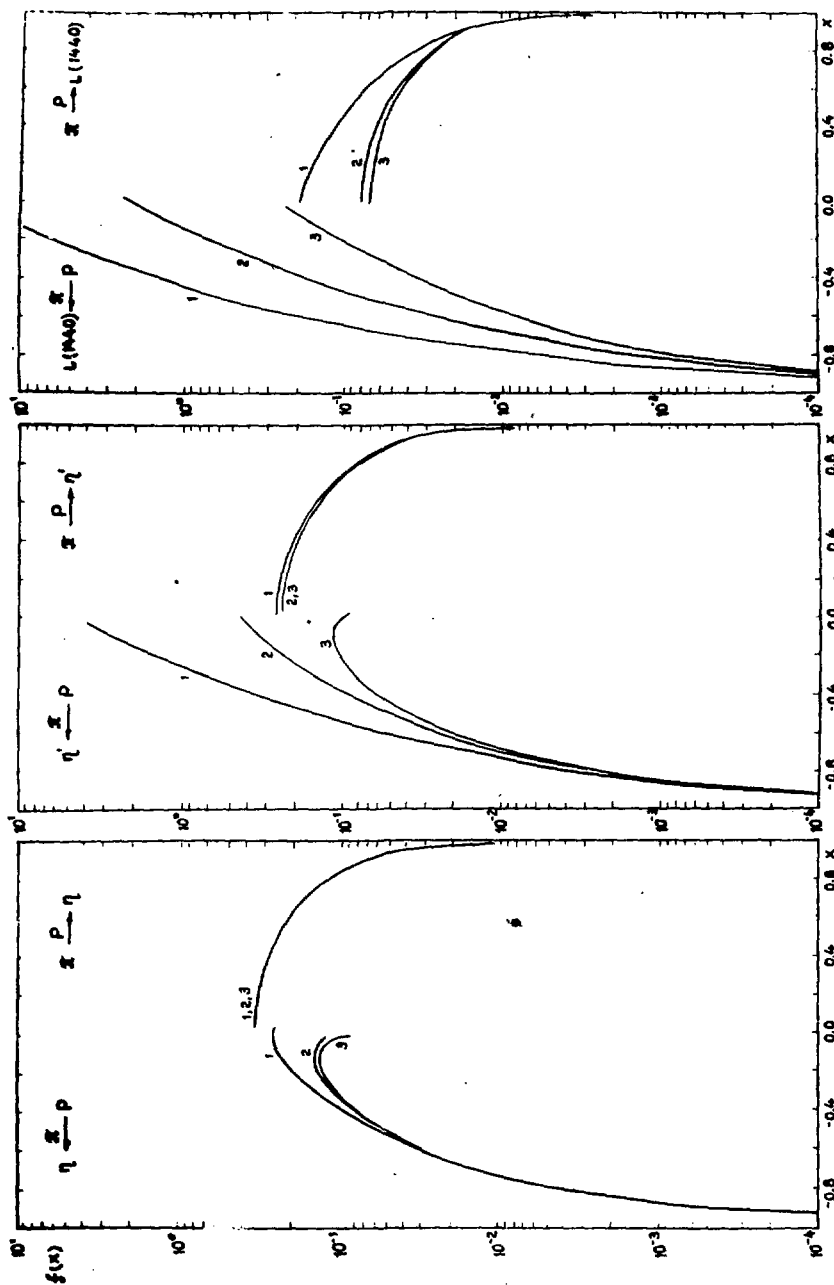


Fig.3 Inclusive spectra of pseudoscalar η , η' , L-mesons
in πp interactions. Curve 1 - $\Delta = 1$, curve 2 -
- $\Delta = 0.3$, curve 3 - $\Delta = 0.1$.

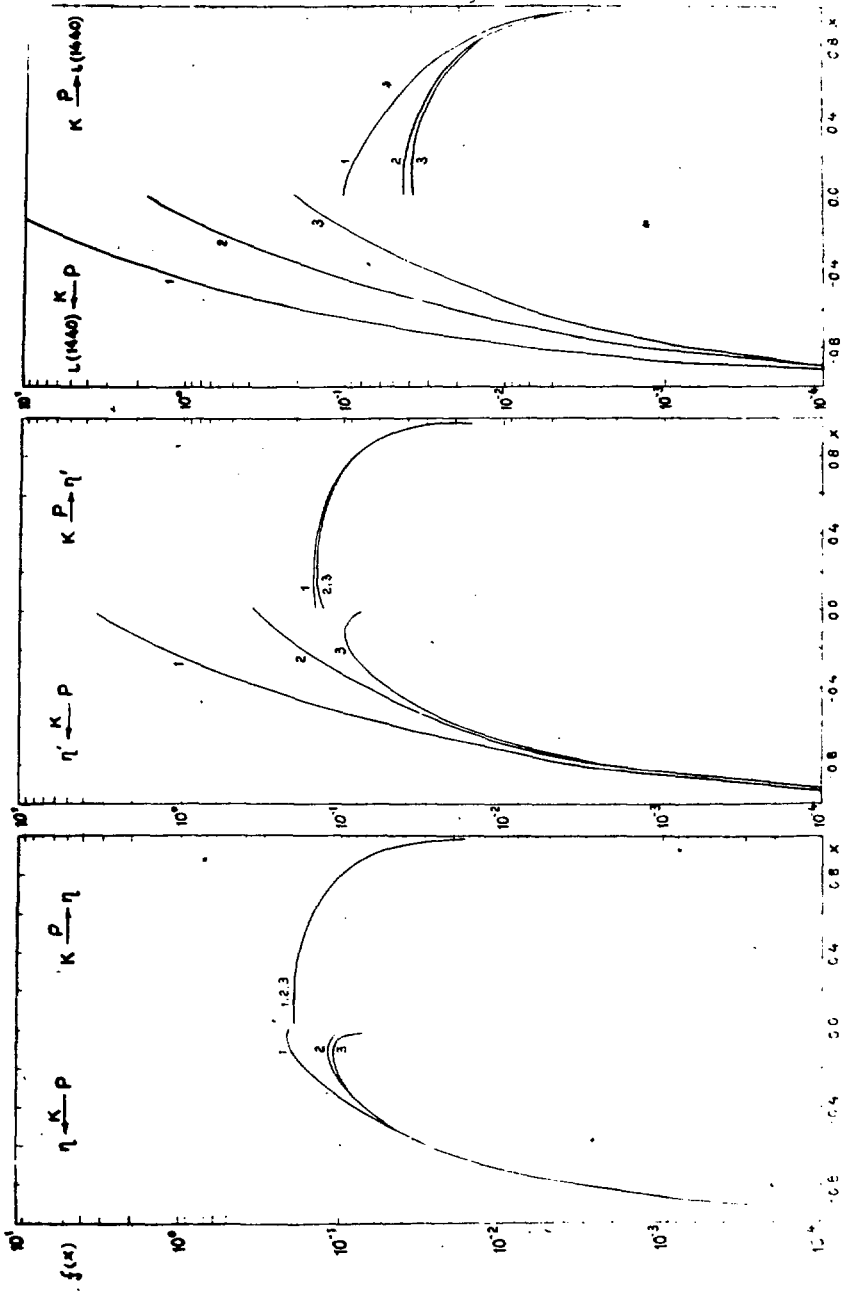


Fig.4 Inclusive spectra of pseudoscalar η , η' , $\eta(1440)$ -mesons in Kp interactions. Curve 1 - $\Delta = 1$, curve 2 - $\Delta = 0.3$, curve 3 - $\Delta = 0.1$.

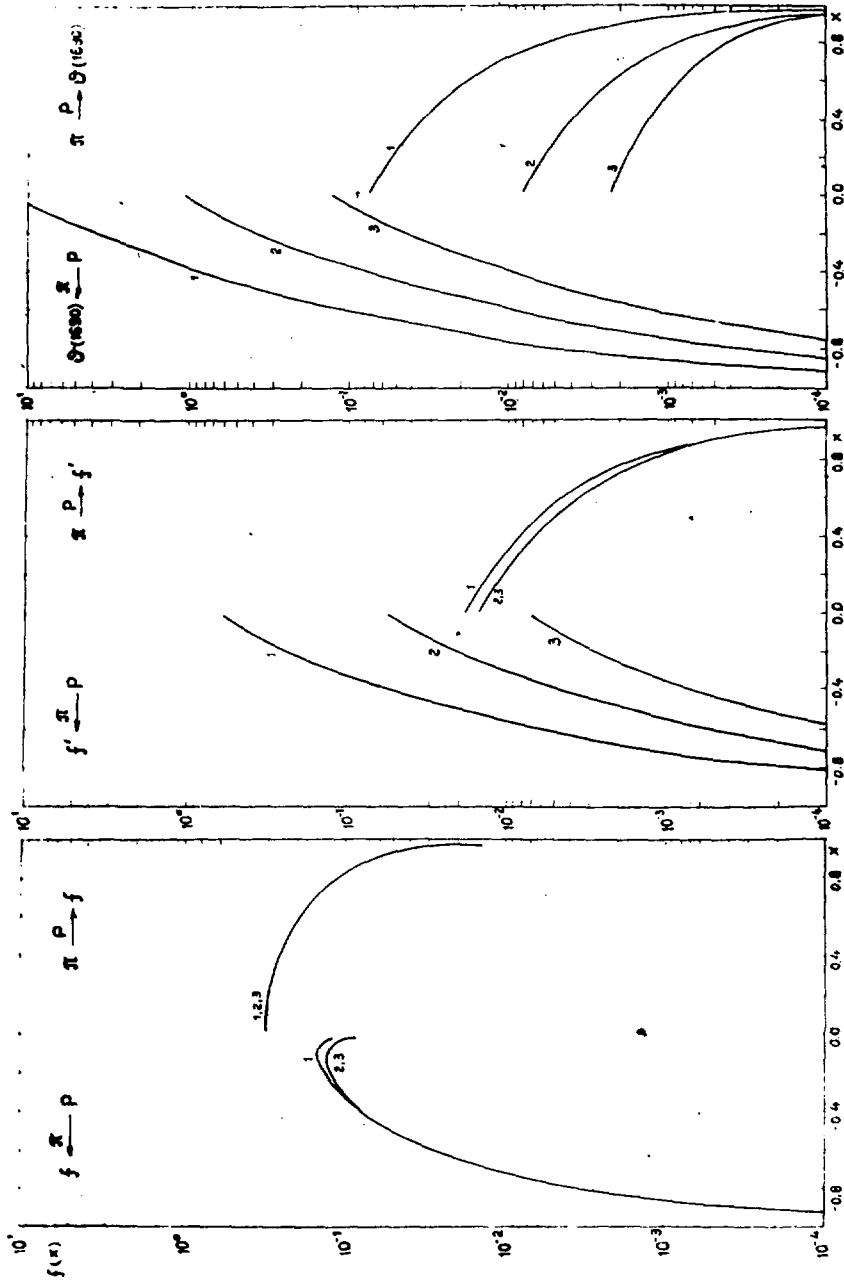


Fig.5 Inclusive spectra of tensor $f, f', 0$ mesons in πp interactions. Curve 1 - $\Delta = 1$, curve 2 - $\Delta = 0.3$, curve 3 - $\Delta = 0.1$.

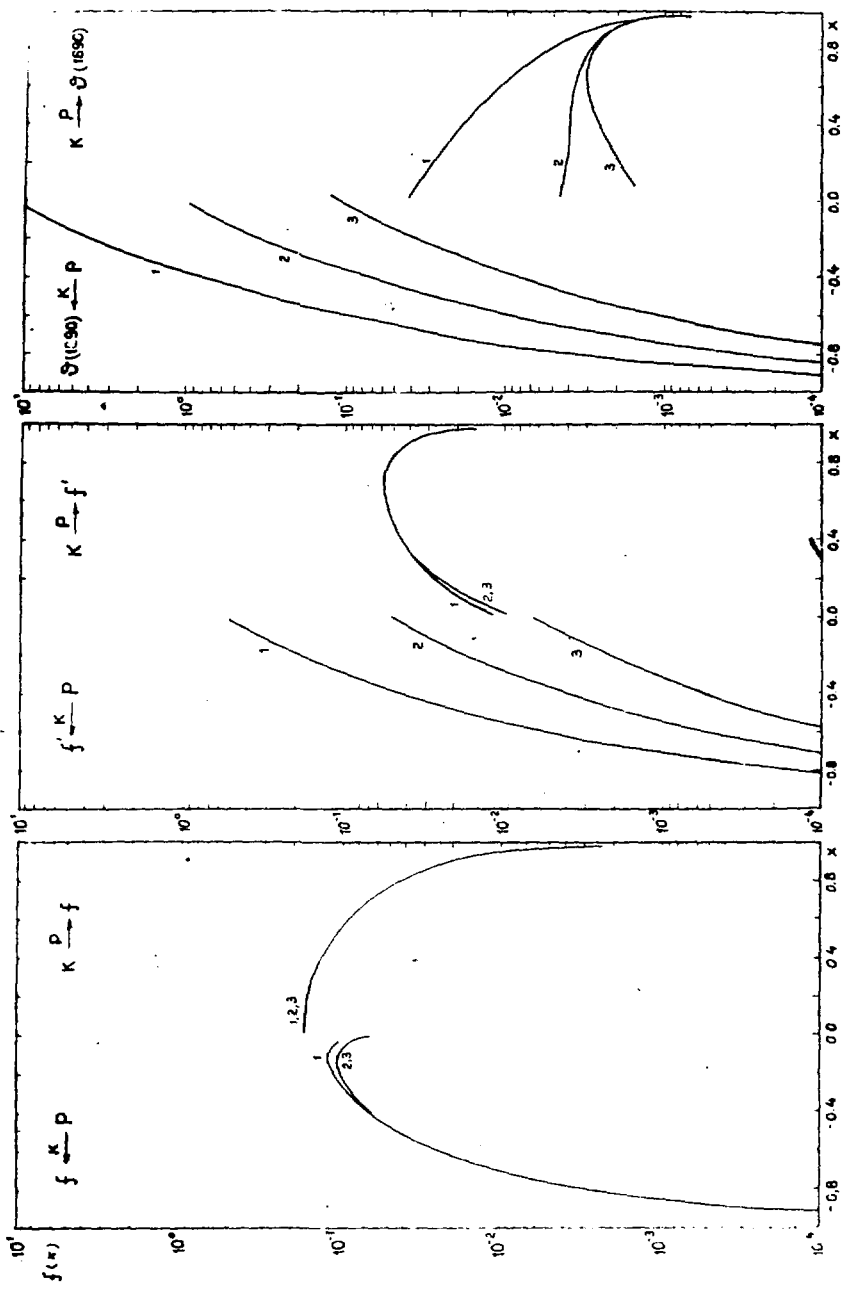


Fig.6 Inclusive spectra of tensor f, f', O mesons in Kp interactions. Curve 1 - $\Delta = 1$, curve 2 - $\Delta = 0.3$, curve 3 - $\Delta = 0.1$.

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ПСЕВДОСКАЛЯРНЫХ И ТЕНЗОРНЫХ МЕЗОНОВ

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