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QUARK (DIQUARK) FRAGMENTATION IN SOFT π^-p-INTERACTIONS AT P=40 GeV/c

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1. INTRODUCTION

An analysis of the jet behaviour of secondary particles in soft hadron-hadron interactions for the total energy $\sqrt{s} \geq 4$ GeV and a comparison with similar data on e^+e^--annihilation and $\nu(\bar{\nu})p$-collisions have shown that hadron jets in these different processes have a number of universal properties [1-6].

The jet behaviour of secondary particles for π^-p-interactions at P = 40 GeV/c ($\sqrt{s}$ = 8.7 GeV) has been studied previously [5,7]. It has been shown that the production of two hadron jets is observed which can be interpreted as a result of the hadronization of quarks (diquarks) from primary particles (fig.1a). In this case values of collective variables, "sphericity" and "thrust", and characteristics of pions in jets are mainly in agreement with similar data on e^+e^- annihilation for equal energies in the c.m.s. There are significant differences only for proton fragmentation. This is likely to be due to the difference of initial states for these reactions (e^+e^--annihilation is free of protons). Therefore it is of interest to compare π^-p-data with experimental results for deep-inelastic $\nu(\bar{\nu})p$-collisions which have similar fragmentation schemes (fig.1b) [8]. In this paper we compare characteristics of quark (diquark) fragmentations into charged $\pi^{\pm}$-mesons for soft (π^-p) and hard ($\nu(\bar{\nu})p$) interactions. Quark (diquark) fragmentation functions for neutral K^N-mesons and Λ-hyperons in π^-p-interactions at 40 GeV/c are compared with similar e^+e^- data (fig. 1c).

Comparing quark and diquark fragmentations for different processes, we use fragmentation $D(x_F)$ and invariant $F(x_F)$ functions:

$$D(x_F) = \frac{1}{N_{ev}} \frac{dN}{dx_F}, \qquad (1)$$

$$F(x_F) = \frac{1}{\sigma_{ev}} \int E \frac{d\sigma}{d\vec{p}} dP_T^2 = \frac{1}{N_{ev}} \frac{E^*}{\pi P^*_{max}} \frac{dN}{dx_F} \underset{x_F \to 1}{\approx} \frac{1}{\pi} |x_F| D(x_F), \qquad (2)$$

where $x_F = P^*_{\parallel} / P^*_{max}$, N_{ev} is the number of events; N, the number of particles in these events; and P^*, E^*, the momentum and energy of the considered hadron in the c.m.s.

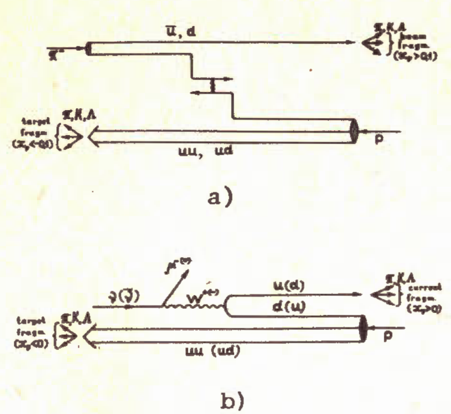
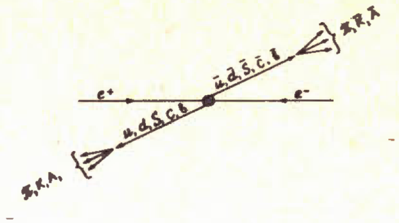

Fig.1. Scheme of π^-p-, $\nu(\bar{\nu})p$-, and e^+e^--interactions.

To compare the characteristics of K^N-mesons and Λ-hyperons in π^-p- and e^+e^--interactions, we use the fragmentation functions [9,10]:

$$\frac{1}{\sigma_{tot}(q\bar{q})\beta} \frac{d\sigma}{dx_E} \simeq 2D_q(x_E), \qquad (3)$$

with $\sigma_{tot}(q\bar{q})$ the total cross section of the process $e^+e^- \to q\bar{q}$, $x_E = 2E^*/\sqrt{s}$, $\beta = P^*/E^*$.

2. EXPERIMENTAL DATA

The analysis has been performed using statistics of ~14000 π^-p-interactions completely measured at P = 40 GeV/c. The experimental data have been obtained using the 2m propane bubble chamber exposed to a beam of negative pions at the Serpukhov accelerator. The method of selection of π^-p-interactions and a further event processing are described elsewhere [11,12]. 753 K^0_s-mesons ($K^0_s \to \pi^+\pi^-$) and 345 Λ-hyperons ($\Lambda \to p\pi^-$) were identified in these interactions [13,14].

For comparison we used the data obtained with the hydrogen bubble chamber BEBC [8] at CERN for the processes

$$\nu_\mu p \to \mu^- \pi^{\pm} + X, \qquad (4)$$

$$\bar{\nu}_\mu p \to \mu^+ \pi^{\pm} + X, \qquad (5)$$

with the effective mass of secondary hadrons W > 3 GeV and $x_B > 0.1$. Here $x_B = Q^2/2M(E_\nu - E_\mu)$ is the Bjorken variable with Q^2 the four-momentum transfer squared. M is the nucleon mass and E_ν, E_μ are the energies of neutrino and muon (<W> = 5.4 and 4.6 GeV).

3. QUARK AND DIQUARK FRAGMENTATION

To a first approximation, one can assume that for $\pi^- p$-interactions particles are mainly produced in the fragmentation of noninteracting $\bar{u}$ or d quarks at $x_F \geq 0.1$ and in the fragmentation of (uu) or (ud) diquarks at $x_F \leq -0.1$. For $|x_F| \geq 0.1$ the contribution from quark-quark interactions in hadron-hadron collisions is assumed to be small /5,7/ *.

Comparing the schemes of $\pi^- p$- and $\nu(\bar{\nu})p$-interactions (fig. 1a,b) and assuming that light quarks $\bar{u}$ and d interact identically, the following relations can be written for the fragmentation functions (formula (1))**.

$$D^{\pi^\pm}_{\pi^- p}(x_F) = \frac{1}{2} D^{\pi^\pm}_{\nu p}(x_F) + \frac{1}{2} D^{\pi^\pm}_{\bar{\nu} p}(x_F) \qquad \text{for } x_F \geq 0.1, \qquad (6)$$

$$D^{\pi^\pm}_{\pi^- p}(x_F) = \frac{1}{3} D^{\pi^\pm}_{\nu p}(x_F) + \frac{2}{3} D^{\pi^\pm}_{\bar{\nu} p}(x_F) \qquad \text{for } x_F \leq -0.1. \qquad (7)$$

Similar relations should also hold for the invariant functions $F^{\pi^\pm}(x_F)$ (formula (2)).

To verify these relations, inelastic $\pi^- p$-interactions ($n_\pm \geq 2$) were analyzed without diffraction processes. The latter were excluded taking into account the topology of enents ($n_\pm = 2$, 4,6) in the region $0.4 \leq |x_F| \leq 1$ /15/.

A similar approach can be applicable for describing the production of neutral K^N-mesons for $x_E \geq 0.15$ and of Λ-hyperons for $x_E \geq 0.3$***. In the framework of such an approach the characteristics of K^N-mesons and Λ-hyperons are compared for $\pi^- p$- and e^+e^--interactions (fig. 1a,c).

I. QUARK FRAGMENTATION

a) $\pi^\pm$-Mesons

Figures 2 and 3 present $D^{\pi^\pm}(x_F)$ at $x_F > 0$ for $\pi^- p$- and $\nu(\bar{\nu})p$ -interactions (6) normalized to the region $x_F \geq 0.1$. As is seen from the figures, the distributions obtained agree well, excluding the region $x_F \leq 0.15$ in which the contribution from quark-quark interactions in $\pi^- p$ is substantial (fig. 1a).

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* In data analysis we shall determine in more detail the region where the contribution from quark-quark interactions is large.

** Charge-conjugate relations for quark fragmentations $D^{\pi^+}_{\bar{u}}(x_F) = D^{\pi^-}_{u}(x_F)$ and $D^{\pi^-}_{\bar{u}}(x_F) = D^{\pi^+}_{u}(x_F)$ are taken into account.

*** These values of x_E correspond to $|x_F| \geq 0.1$ at 40 GeV/c.

Approximating the fragmentation functions by the expression:

$$D^{\pi^\pm}(x_F) = A \exp(-B|x_F|), \qquad (8)$$

we obtain that the values of parameters A and B are approximately equal for both processes (table 1).

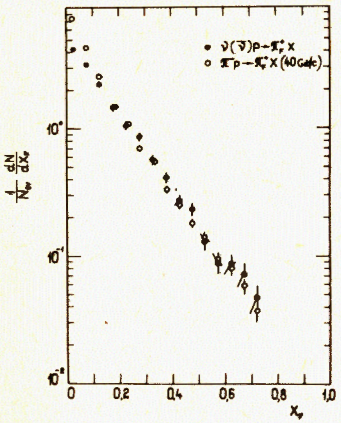

Fig. 2. Fragmentation function $D^{\pi^+}(x_F > 0)$: $\bullet - \frac{1}{2} D^{\pi^-}_{\nu p} + \frac{1}{2} D^{\pi^+}_{\bar{\nu} p}$; $\circ - D^{\pi^+}_{\pi^- p}$.

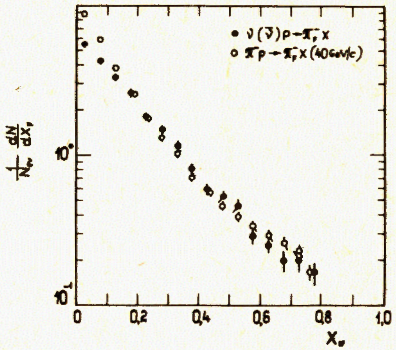

Fig. 3. Fragmentation function $D^{\pi^-}(x_F > 0)$: $\bullet - \frac{1}{2} D^{\pi^+}_{\nu p} + \frac{1}{2} D^{\pi^-}_{\bar{\nu} p}$; $\circ - D^{\pi^-}_{\pi^- p}$.

It should be noted that the average multiplicities of $\pi^\pm$-mesons determined by eq. (6) at $x_F \geq 0.2$ are approximately equal for these processes:

$$\langle n^{\pi^-}_{\pi^- p}(x_F \geq 0.2)\rangle = 0.50 \pm 0.01, \quad \langle n^{\pi^-}_{\nu(\bar{\nu})p}(x_F \geq 0.2)\rangle = 0.53 \pm 0.02;$$

$$\langle n^{\pi^+}_{\pi^- p}(x_F \geq 0.2)\rangle = 0.29 \pm 0.01, \quad \langle n^{\pi^+}_{\nu(\bar{\nu})p}(x_F \geq 0.2)\rangle = 0.26 \pm 0.01.$$

There is a good agreement for distributions of the invariant $F^{\pi^\pm}(x_F > 0)$ functions in the range $x_F \geq 0.15$ for $\pi^- p$ and $\nu(\bar{\nu})p$ interactions /16/. In quark-parton models /17-20/ the $F^{\pi^\pm}(x_F)$ invariant distributions can be approximated by the function

$$F^{\pi^\pm}(x_F) = A(1 - |x_F|)^n. \qquad (9)$$

where A and n are free parameters. It is seen from table 2 that the values of parameter n_{exp} are approximately equal for $\pi^- p$- and $\nu(\bar{\nu})p$ -interactions, and they do not contradict the theoretically expected values of n_T /18,19/.

Table 1

Approximation of $D^{\pi^\pm}(x_F)$ function by expression $A\exp(-B|x_F|)$

	Type of process	X_F range	A	B	X^2/N
$\pi^-(x_F<0)$	$\nu,\bar\nu p$	$-0.425 \le X_F \le -0.125$	5.5±0.6	9.4±0.5	4.9/7
	$\pi^- p$	$-0.425 \le X_F \le -0.125$	5.1± 0.2	9.0±0.2	4.8/7
$\pi^+(x_F>0)$	$\nu,\bar\nu p$	$0.125 \le X_F \le 0.725$	4.6±0.3	6.5±0.2	9.1/10
	$\pi^- p$	$0.125 \le X_F \le 0.725$	4.7±0.2	6.8±0.1	12.9/10
$\pi^-(x_F>0)$	$\nu,\bar\nu p$	$0.225 \le X_F \le 0.775$	5.5±0.4	4.9±0.2	13.3/12
	$\pi^- p$	$0.225 \le X_F \le 0.775$	4.2±0.2	4.4±0.1	62.6/12

Table 2

Approximation of $F^{\pi^\pm}(x_F)$ function by expression $A(1-|x_F|)^n$

	Type of process	X_F range	A	n_{exp}	X^2/N	n_T
$\pi^-(x_F<0)$	$\nu,\bar\nu p$	$-0.525 \le X_F \le -0.225$	0.20±0.04	4.6±0.5	6.3/7	4 + 5
	$\pi^- p$	$-0.525 \le X_F \le -0.225$	0.17±0.01	3.6±0.2	1.3/7	
$\pi^+(x_F>0)$	$\nu,\bar\nu p$	$0.225 \le X_F \le 0.775$	0.20±0.01	2.6±0.1	14.2/10	2
	$\pi^- p$	$0.225 \le X_F \le 0.775$	0.17±0.07	2.3±0.1	20.7/10	
$\pi^-(x_F>0)$	$\nu,\bar\nu p$	$0.325 \le X_F \le 0.775$	0.22±0.02	1.4±0.1	16.7/10	1
	$\pi^- p$	$0.325 \le X_F \le 0.775$	0.138±0.006	0.83±0.06	26.3/10	

b) Strange K^N- and Λ-Particles

Figure 4 pressents the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ function versus x_E for neutral K^N-mesons produced in $\pi^- p$-interactions in the forward hemisphere at 40 GeV/c. Also shown in this figure is a similar distribution of K^N-mesons for e^+e^--interactions at $\sqrt{s} = 14$ GeV /24/ (the distributions are normalized in the range $0.15 \le x_E \le 0.5$). It is seen that the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distributions of neutral K^N-mesons produced in the quark fragmentation in $\pi^- p$-interactions have the same character as those of neutral kaons in e^+e^--collisions.

For $x_E \ge 0.15$ the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distributions can be approximated by the dependence

$$\frac{1}{\beta}\frac{d\sigma}{dx_E} = A\exp(-B|x_F|). \qquad (10)$$

This approximation yields $B = 10 \pm 1$ (table 3) which is approximately equal to those for e^+e^--annihilation ($B \approx 8$) /21/.

For $0.2 \le x_E \le 0.5$ the multiplicity of K^N-mesons for $\pi^- p$ in the forward hemisphere is:

$$\langle n_{K^N}\rangle = 0.065 \pm 0.005. \qquad (11)$$

For the same interval the multiplicity of K^N-mesons in e^+e^--annihilation for one jet is

$$\langle n_{K^N}\rangle = 0.15 \pm 0.02 \quad \text{at } \sqrt{s} = 14 \text{ GeV}. \qquad (12)$$

The difference between (11) and (12) is not difficult for understanding as the following processes are the sources of K^N-mesons in e^+e^--annihilation:

1) fragmentation of primary quarks into K^N-mesons by the pickup of strange sea quarks;
2) fragmentation of primary $s(\bar{s})$ quarks;
3) weak decays of c and b quarks.

For $\pi^- p$-interactions the neutral kaons are produced only in the fragmentation of $\bar{u}$ and d quarks by strange sea quark pickup.

As was shown in /22/, approximately 50% of all the neutral kaons are produced by strange sea quarks in e^+e^--annihilation at $\sqrt{s} = 14$ GeV. In this case in e^+e^--annihilation the multiplicity of K^N-mesons, produced by strange sea quarks, is $\langle n_{K^N}\rangle \approx 0.075$ at $\sqrt{s} = 14$. This value is approximately equal to /11/.

For the quark-parton models of hadron-hadron collisions it is of interest to define the $\lambda_s = \langle n_K\rangle / \langle n_\pi\rangle$, which determines the relation of strange and nonstrange quark pickup probability

Table 3

Values of parameter B

Particles	forward	χ^2/N	backward	χ^2/N
K^N-mesons $\pi^- p$, 40 GeV/c	10 ± 1	0.5	9 ± 1	0.73
Λ-hyperons $\pi^- p$, 40 GeV/c	8 ± 3	0.6	3.6±0.4	0.4
Λ-hyperons $\pi^- p$, 16 GeV/c	10 ± 1	0.8	4.4±0.3	0.87
K^N-mesons and Λ-hyperons e^+e^-	~8			

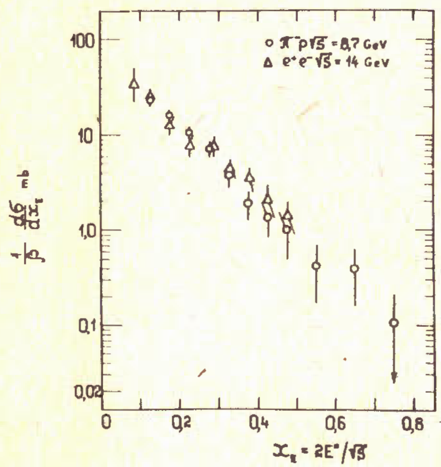

Fig.4. The $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distribution for K^N-mesons, produced in the forward direction of $\pi^- p$- and e^+e^--interactions in the c.m.s.

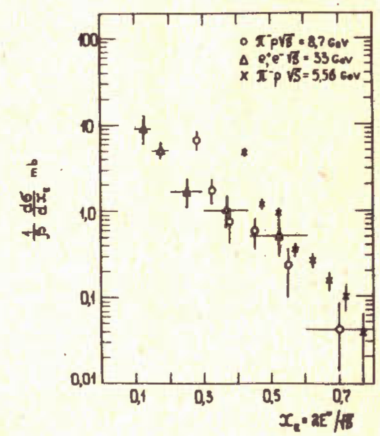

Fig.5. The $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distribution for Λ-particles, produced in the forward direction of $\pi^- p$- and e^+e^--interactions in the c.m.s.

from the sea. This value is $\lambda_s = 0.18 \pm 0.02$ for $x_E = 0.2 \div 0.5$ what is in agreement with that for e^+e^--annihilation ($\lambda_s \approx 0.17$)[21-24].

In fig.5 are presented the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distributions of Λ-hyperons for π^-p interactions in the forward hemisphere at 40 GeV/c and 16 GeV/c and for e^+e^--collisions at $\sqrt{s} = 33$ GeV (the distribuions are normalized in the range $0.3 \le x_E \le 0.6$ [24,25]). In table 3 are shown the results of approximation of these distributions by eq. (10) in the range $x_E \ge 0.3$ (π^-p, 40 GeV/c), $x_E \ge 0.45$ (π^-p, 16 GeV/c) and $x_E \ge 0.1$ (e^+e^-, 33 GeV/c)*.

As is seen, the slopes of the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distributions for the quark fragmentations into Λ-particles in the range $x_F \ge 0.1$ for hadron-hadron and e^+e^--collisions are the same. For $x_E \le 0.3 \div 0.45$ ($x_F \le 0.1$) the deviation of the distributions from the obtained exponential dependence (10) for π^-p events (P = 40 GeV/c and 16 GeV/c) is likely to be due to the influence of quark-quark interactions in the central region.

For the quark-parton models it is of interest to determine the value of relation $\lambda_{qq} = \langle n_\Lambda \rangle / \langle n_K \rangle$ for the fragmentation of primary quarks. A relative pickup probability of diquarks from the sea is characterized by this ratio. The multiplicity of K^N-mesons over the range $0.3 \le x_E \le 0.6$ (in the forward hemisphere) for π^-p-interactions at P = 40 GeV/c is equal to $\langle n_{K^N} \rangle = 0.026 \pm 0.004$. Assuming that $\langle n_{K^\pm} \rangle \approx \langle n_{K^N} \rangle$, we obtain $\lambda_{qq} = 0.14 \pm 0.03$ for the quark fragmentation.

II. DIQUARK FRAGMENTATION

a) $\pi^\pm$-Mesons

To analyze the diquark fragmentation in π^-p-interactions, the $x_F < 0$ distribution of π^--mesons for the $D^{\pi^-}(x_F)$ function is compared with similar $\nu(\bar{\nu})p$ data (7) (fig.6). A comparison of similar distributions for $\pi^\pm$-mesons ($x_F < 0$) cannot be made because in the π^-p experiment protons and π^+-mesons are practically not identified in this region. As is seen, there is a good agreement, except the region $|x_F| \le 0.15$, where the contribution from quark-quark interactions for π^-p is significant. The approximation of the $D^{\pi^-}(x_F < 0)$ function by the dependence (8) yields the value of parameters A and B which, within the errors, coincide for both processes (Table 1).

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* For π^-p interactions at P = 16 GeV/c $x_E \ge 0.45$ corresponds to $|x_F| \ge 0.1$.

The result of approximation of the $F^{\pi^-}(x_F < 0)$ distribution by the dependence (9) is given in Table 2[16]. The values of parameter n_{exp} are approximately equal for π^-p and $\nu(\bar{\nu})p$ interactions and do not contradict the theoretically expected values.

It is also interesting to note that the $D^{\pi^\pm}(x_F)$ and $F^{\pi^\pm}(x_F)$ distributions are broader in the region of quark fragmentation (the slopes are smaller) than in the region of diquark one.

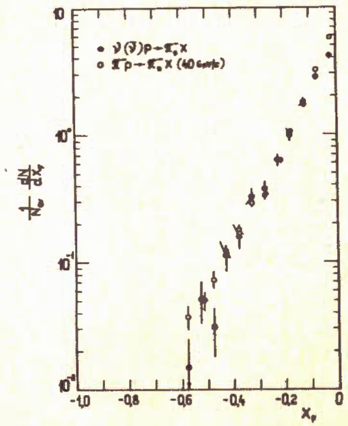

Fig.6. Fragmentation function $D^{\pi^-}(x_F < 0)$: $\bullet - \frac{1}{3} D^{\pi^-}_{\nu p} + \frac{2}{3} D^{\pi^-}_{\bar{\nu} p}$, $\circ - D^{\pi^-}_{\pi^- p}$.

b) Strange K^N- and Λ-Particles

Figures 7 and 8 present the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distributions of K^N-mesons and Λ-hyperons produced for π^-p-interactions in the backward hemisphere at P = 40 GeV/c and 16 GeV/c[25]. In the figures are also shown similar distributions for e^+e^--interactions at $\sqrt{s} = 14$ GeV and 33 GeV[24]. In addition, the figures give the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distributions of K^N-mesons and Λ-hypesons in pp-interactions at P = 205 GeV/c and 405 GeV/c[26,27] for one hemisphere in the region $x_E \ge 0.1$.

From the data presented the following conclusions can be drawn:

1. Within the experimental errors, the scaling behaviour of the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ function is observed for K^N-mesons and Λ-hyperons produced in the diquark fragmentation for π^-p- and pp-interactions from 16 to 405 GeV.

2. The $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distributions of K^N-mesons, produced in the diquark fragmentation in hadron-hadron interactions for

$0.15 \leq x_E \leq 0.5$, are of the same character as the distributions of K^N-mesons in e^+e^--collisions.

Approximating the $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distributions by the dependence (10) at $x_E \geq 0.15$ for K^N-mesons and at $x_E \geq 0.3$ for Λ-particles, we get $B_{K^N} = 9\pm1$ and $B_\Lambda = 3.6\pm0.4$. For the distributions of K^N-mesons and Λ-hyperons in e^+e^--annihilation $B = 8$ /21/.

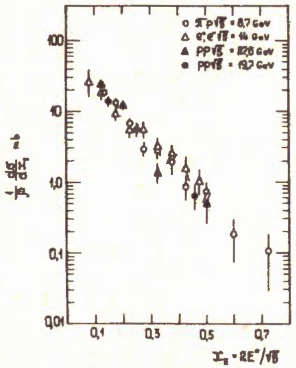

Fig.7. The $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distribution for K^N-mesons, produced in the backward direction of π^-p-, pp- and e^+e^--interactions in the c.m.s.

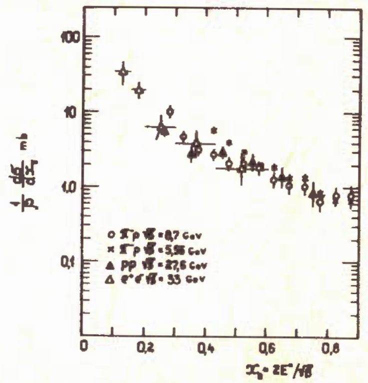

Fig.8. The $\frac{1}{\beta}\frac{d\sigma}{dx_E}$ distribution of Λ-particles, produced in the backward direction of π^-p-, pp- and e^+e^--interactions in the c.m.s.

It should be noted that the multiplicity of neutral K^N-mesons produced in the diquark fragmentation for π^-p-interactions ($\langle n_{K^N}\rangle = 0.039\pm0.003$ at $0.2 \leq x_E \leq 0.5$), is smaller than the multiplicity of their production in the quark fragmentation. The multiplicity of Λ-hyperons, produced in the diquark fragmentation, is approximately 4 times as large as that for the quark fragmentation.

The value of λ_s is ~ 0.17 for π^-p-interactions in the backward hemisphere at $P = 40$ GeV (for the diquark fragmentation) /23/.

4. CONCLUSIONS

The presented comparison of soft π^-p, deep-inelastic $\nu(\bar{\nu})p$- and e^+e^--interactions allows the following conclusions to be drawn:

1. Within the errors, the fragmentation functions $D^{\pi^\pm}(x_F)$ for π^-p- and $\nu(\bar{\nu})p$-interactions well agree at $|x_F| \geq 0.15$. The

excess of the $D^{\pi^\pm}(x_F)$ functions for π^-p-interactions at $|x_F| < 0.15$ is explained by the contribution of particles from quark-quark interactions. The approximation of these distributions by formula $D^{\pi^\pm}(x_F) = A\exp(-B|x_F|)$ yields the values of parameters A and B which are approximately equal for the two types of interaction.

2. Approximating the $F^{\pi^\pm}(x_F)$ functions by the dependence $F^{\pi^\pm}(x_F) = A(1-|x_F|)^n$, we obtain the values of parameter n approximately equal to those expected in the quark-parton models.

3. The fragmentation of diquarks into K^N- and Λ-particles in soft hadron-hadron interactions does not depend, within the experimental errors, on the energy of primary particles ($E = 16 \div 405$ GeV).

4. The x_E-dependence of the quark and diquark fragmentation function for K^N-mesons is similar for e^+e^-, soft π^-p- and pp-interactions. The average multiplicity of neutral kaons, produced by strange sea quarks, coincides, within the errors, in the quark fragmentation for these interactions. The multiplicity of K^N-mesons, produced in the diquark fragmentation, is smaller than that for the quark fragmentation.

The pickup coefficient of strange $s(\bar{s})$ quarks is $\lambda_s \simeq 0.17$.

5. The pickup coefficient of diquarks for the sea is $\lambda_{qq} \simeq 0.14\pm0.03$.

The data obtained show that the fragmentation of quarks and diquarks is similar for π^-p- and deep-inelastic $\nu(\bar{\nu})p$-interactions at $\sqrt{s} = W = 5 \div 9$ GeV.

The fragmentation of quarks and diquarks into K^N-mesons in soft hadron-hadron and e^+e^--interactions is universal in character. For more detailed analysis of quark and diquark fragmentation into Λ-particles new data on e^+e^--annihilation are required.

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Фрагментация кварков и дикварков в мягких $\pi^- p$ -взаимодействиях при $P = 40$ ГэВ/с

Изучается фрагментация кварков и дикварков в $\pi^\pm$-, K^H -мезоны и Λ-частицы в $\pi^- p$ -взаимодействиях при импульсе 40 ГэВ/с. Полученные фрагментационные $D^{\pi^\pm}(x_F)$ и инвариантные $F^{\pi^\pm}(x_F)$ функции сравниваются с аналогичными данными для глубоконеупругих $\nu(\bar{\nu})p$- взаимодействий. В области $|x_F| \geq 0,15$ они одинаковы для этих различных процессов. Зависимость функции фрагментации кварков и дикварков в нейтральные каоны от x_E в мягких $\pi^- p$- и pp -столкновениях имеет такой же характер, как в e^+e^- -аннигиляции. Определены коэффициенты подавления подхвата странного $s(\bar{s})$ -кварка (λ_s) и дикварка (λ_{qq}) из моря. Они оказались равны $\lambda_s = 0,17$ и $\lambda_{qq} = 0,14 \pm 0,03$.

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Quark (Diquark) Fragmentation in Soft $\pi^- p$ -Interactions at $P = 40$ GeV/c

The quark and diquark fragmentation into $\pi^\pm$-, K^N -mesons and Λ-hyperons in soft $\pi^- p$ -interactions at 40 GeV/c is studied. Fragmentation $D^{\pi^\pm}(x_F)$ and invariant $F^{\pi^\pm}(x_F)$ functions are compared with analogous data on $\nu(\bar{\nu})p$ -interactions. It is shown that a good agreement exists in the region $|x_F| \gtrsim 0.15$ for these different processes. The x_E -dependence of the quark and diquark fragmentation function for neutral kaons is similar to that in e^+e^- -annihilation. The pickup probability of strange $s(\bar{s})$ quark (λ_s) and diquark (λ_{qq}) relative to $u(\bar{u})$ and $d(\bar{d})$ quarks from the sea has been found to be $\lambda_s \approx 0.17$ and $\lambda_{qq} \approx 0.14 \pm 0.03$.

The investigation has been performed at the Laboratory of High Energies, JINR.

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