A STUDY OF INCLUSIVE Ξ^- , $\Xi(1530)$ AND Ω^- PRODUCTION
IN K^-p INTERACTIONS AT 8.25 GeV/c

Birmingham¹(*)-CERN²-Glasgow³(*)-Michigan State⁴(**)-Paris⁵(***) Collaboration

M. Baubillier⁵, I.J. Bloodworth¹, G.J. Bossen², A. Burns²,
J.N. Carney¹, G.F. Cox¹, U. Dore²(+), J.B. Kinson¹,
K. Knudson², F. Levy⁵, H. McCann³(++), M. MacDermott¹(+++),
P.J. Negus³, B.Y. Oh⁴, M. Prapat⁴, E. Quercigh², M. Rivoal⁵, J.M. Scarr³,
J.C. Shiers¹, G.A. Smith⁴, D. Teodoro⁵(o), O. Villalobos-Baillie¹,
M.F. Votruba¹, J. Whitmore⁴ and R. Zitoun^{2,5}

- ¹ Physics Department, University of Birmingham, Birmingham, U.K.
- ² CERN, European Organization for Nuclear Research, Geneva, Switzerland.
- ³ Department of Natural Philosophy, University of Glasgow, Glasgow, U.K.
- ⁴ Michigan State University, East Lansing, Michigan, U.S.A.
- ⁵ LPHNE, University of Paris VI, Paris, France.

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(***) Laboratory associated to IN2P3.
(+) And Roma University.
(++) Now at Manchester University.
(+++). Now at Rutherford Laboratory.
(o) On leave from Genova University.

ABSTRACT

Inclusive Ξ^- production is studied in K^-p interactions at 8.25 GeV/c using about 8000 events. An analysis based on the triple Regge model shows that the $\Lambda_\alpha - \Lambda_\gamma$ and $\Sigma_\beta - \Sigma_\delta$ exchanges explain the forward Ξ^- production. $\Xi(1530)$ properties are also studied and are found to be similar to those of Ξ^- 's. Finally, a study of the production of Ω^- based on 67 events shows that Ω^- 's are also produced by hyperon exchange.

1. INTRODUCTION

The production of $S = -2$ and $S = -3$ hyperons has not been extensively studied, and few papers exist which deal with either exclusive or inclusive Ξ^- production [1-3]. This is mainly due to the complicated topology of the events which makes them difficult to study using electronic techniques. Due to low production cross sections only high statistics bubble chamber experiments, such as the present one, can yield relevant information.

In this paper, we present results on the three reactions

$$K^- p \rightarrow \Xi^- + X^+ \quad (1)$$

$$K^- p \rightarrow \Xi(1530)^0 + X^0 \quad (2)$$

and

$$K^- p \rightarrow \Omega^- + X^+ \quad (3)$$

at 8.25 GeV/c. The exchange mechanism for Ξ^- production is studied in the framework of the triple Regge model. This model has been shown to account successfully for the Λ inclusive properties in the same experiment [4].

The Ξ^- data used in this paper are described in sect. 2. The inclusive properties of Ξ^- production are given in sect. 3 and the triple Regge analysis is performed in sect. 4. Properties of the $\Xi(1530)$ are studied in sect. 5 and Ω^- production is described in sect. 6. Conclusions are drawn in sect. 7.

2. EXPERIMENTAL Ξ^- SAMPLE AND CROSS SECTIONS

2.1 Ξ^- selection

The data come from exposures of the CERN 2 m bubble chamber to an RF separated beam of 8.25 GeV/c K^- mesons. The present study is based on about 4 million pictures corresponding to a sensitivity of about 150 events per microbarn. For this work, we have considered only those events in which the decay chain

is completely visible and fitted by the kinematics program. This requirement leaves us with 9588 Ξ^- events.

2.2 Ξ^- weighting

There are losses at the scanning-processing stage when:

- (a) the projected Ξ^- decay angle is below 7.5° ,
- (b) the projected Ξ^- length is less than 0.7 cm,
- (c) the projected distance of the Λ vertex from the Ξ^- decay vertex is less than 0.4 cm.

These were corrected in the following way. Events with projected lengths below 0.7 cm (Ξ^-) and 0.4 cm (Λ) were rejected. The remaining events were individually weighted to compensate for the above cuts and an efficiency function was used for events with a Ξ^- opening angle below 7.5° . The resulting number of events in the fiducial volume is 8121 and the average weight is 1.78. In the following, all the results are corrected for losses using this weighting procedure.

2.3 Cross sections

The cross section normalization has been determined from the observed number of beam τ decays within the fiducial volume and gives a total inclusive cross section for Ξ^-

$$\sigma(K^- p \rightarrow \Xi^- + X^+) = 157 \pm 10 \text{ } \mu\text{b.}$$

This value is plotted in fig. 1 together with data at various incident momenta in the range 4 to 16 GeV/c [2,3,4-8]. An s^{-n} law with

$$n = 0.11 \pm 0.05$$

appears to fit the data well between 4.2 and 16 GeV/c. This small value, which reflects the slow variation of the cross section over the studied range, contrasts with higher values of n in other inclusive channels ($n = 0.45 \pm 0.04$ for Λ [9]) and exclusive channels especially if baryon exchange is involved. Such a behaviour is due to the opening of new channels as can be seen from the topological cross sections (table 1 and fig. 2). For example we note that the two to four-prong ratio is 2:1 at 4.2 GeV/c, 1:2 at our energy and 1:3.5 at 16 GeV/c.

3. Ξ^- INCLUSIVE PROPERTIES

3.1 Momentum distributions

The invariant distribution of the Feynman variable $x = p_L/p_{Lmax}$ is defined as

$$F(x) = \frac{1}{\pi p_{max}^2} \int_E \frac{d^2\sigma}{dx dp_T^2} dp_T^2$$

where E , p_T , and p_{max} are respectively the energy, the transverse momentum and the maximum momentum of the Ξ^- in the overall c.m.s. This function is plotted in fig. 3(a) together with its value at 4.2 GeV/c [2] and is tabulated in table 2. The mean weighted x value in our experiment is $\langle x \rangle_E = 0.24 \pm 0.01$ and is approximately constant in the p_{lab} range from 4.2 to 16 GeV/c (table 1).

This positive value is consistent with the assumption that Ξ^- 's are mainly produced in the c.m.s. forward direction by hyperon exchange.

The $d\sigma/dp_T^2$ distribution (fig. 3(b)) follows the exponential law

$$d\sigma/dp_T^2 = A e^{-Bp_T^2}$$

in the p_T^2 range from 0 to 1.6 (GeV/c)². The slope parameter, as obtained by a maximum likelihood fit, is $B = 3.09 \pm 0.03(\text{GeV/c})^{-2}$ and the corresponding $\langle p_T^2 \rangle$ and $\langle p_T \rangle$ values are respectively $0.333 \pm 0.003(\text{GeV/c})^2$ and 0.512 ± 0.003 GeV/c. As can be seen in

table 1, the mean transverse momentum of the Ξ^- increases steadily between 4.2 and 16 GeV/c. Similar behaviour has been observed in inclusive Λ and $\Sigma(1385)^+$ production [4].

Fig. 4 and table 2 show that the transverse momentum has a mean value essentially independent of x .

3.2 Recoiling mass system

The distribution of the missing mass M recoiling against the Ξ^- (fig. 5) indicates little two-body production. The K^+ and $K(890)^+$ signals are visible; they are mostly produced in the beam fragmentation region ($|u_{p\Xi}| < 2.0 \text{ GeV}^2$).

3.3 Ξ^- polarization

The polarization P_Ξ of the Ξ^- is given by

$$P_\Xi = \frac{3}{\alpha} \frac{\sum_{i=1}^N w_i \vec{q}_i \cdot \vec{n}_i}{\sum_{i=1}^N w_i}$$

where $\vec{q}$ is the unit vector along the direction of the Λ in the Ξ^- rest frame, $\vec{n}$ the normal to the production plane, i.e. $\vec{n} \sim \vec{q}_\Xi \times \vec{q}_{K_{in}}^-$ and w the weight of an event; α is the Ξ^- decay asymmetry parameter taken as -0.403 [10] (its measured value in our experiment is -0.38 ± 0.06) [11].

The polarization has been calculated as a function of x (table 2 and fig. 6). We can see that its value is slightly negative in the forward hemisphere ($\langle P_\Xi \rangle = -0.14 \pm 0.04$ for $x > 0$) and consistent with zero in the backward hemisphere ($\langle P_\Xi \rangle = -0.04 \pm 0.10$ for $x < 0$).

Recently, there has been some interest in the polarization of hyperons inclusively produced in the proton fragmentation region. The prediction has been made by H.I. Miettinen [12] that

$$P_\Lambda = P_\Xi$$

In our experiment, neither Λ nor Ξ^- are polarized in the proton fragmentation region, but are in the K^- fragmentation region. In particular, the polarization seems to increase with p_T in the same way for Λ and Ξ^- (fig. 7).

4. TRIPLE REGGE ANALYSIS OF Ξ^- PRODUCTION

As has been noted before, there is evidence that hyperon exchange is the main mechanism for Ξ^- production. This can be tested further using the triple Regge model. In this formalism, the invariant double differential cross section can be written as

$$\frac{d^2\sigma}{du d(M^2/s)} = G(u) \left(\frac{M^2}{s}\right)^{\alpha(0) - 2\alpha_Y(u)} s^{\alpha(0) - 1} \quad (4)$$

where u is the square of the 4-momentum transfer from K^- to Ξ^- . $G(u)$ is a product of coupling constants and Regge residues, and M is the mass of the system recoiling against the Ξ^- . The Regge trajectories α and α_Y are defined in fig. 8. Such a model has been shown to account very well for Λ inclusive production in the same experiment [4].

The analysis is performed in two stages: we first determine

$$b(u) = \alpha(0) - 2\alpha_Y(u)$$

by fitting the experimental $d^2\sigma/du d(M^2/s)$ distribution to formula (4) for a fixed value of s . Then, we study the s dependence of the differential cross section for fixed u and M^2/s ; this yields the value of $\alpha(0) - 1$.

4.1 Fixed s analysis of the M^2 distribution

Fig. 9 shows the result of χ^2 fits to formula (4) to the experimental $d\sigma/d(M^2/s)$ distribution in four of the nine u bins used in this study (table 3). These fits are restricted to the region $0.1 \leq M^2/s \leq 0.4$ to reject contributions from the resonance region and to remain in the validity range of the model ($M^2/s \ll 1$). In addition, we have corrected for phase space limitations as in ref. [13]. We see that the experimental distributions are well reproduced by the fits.

The resulting values of $b(u)$ and of the product $\bar{G}(u) = G(u)s^{\alpha(0)-1}$ are given in table 3 and a straight line fit to $b(u)$ yields

$$b(u) = (0.71 \pm 0.07) - (1.40 \pm 0.04)u.$$

This result is compatible with that of Ganguli et al. [2] at 4.2 GeV/c where, assuming a slope equal to 1.4, they found $b(0) \approx 0.5 \pm 0.3$.

For subsequent use we have also parametrized $\bar{G}(u)$ as

$$\bar{G}(u) \equiv G(u)s_0^{\alpha(0)-1} = 510 e^{-0.71u} \mu\text{bGeV}^{-2}$$

where the subscript in s_0 refers to our total energy squared ($s_0 = 16.65 \text{ GeV}^2$).

The limits of validity of eq. (4), i.e. the region in which triple Regge mechanism is dominant, can be tested by using eq. (4) to predict the corresponding $F(x)$ and $\langle p_T \rangle(x)$ functions, since we have

$$\frac{E}{\pi p_{\text{max}}} \frac{d^2\sigma}{dx dp_T^2} = \frac{2p^*}{\pi\sqrt{s}} \frac{d^2\sigma}{du d(M^2/s)} = \frac{2p^*}{\pi\sqrt{s}} s^{\alpha(0)-1} G(u) \frac{M^2}{s} b(u) \quad (5)$$

where p^* is the incident K^- momentum in the c.m.s. These predicted functions are superimposed on fig. 3(a) and 4. We see that they reproduce fairly well the data for $x \gtrsim 0.4$.

4.2 $\alpha(0)$ determination

In principle, one could obtain $\alpha(0)$ by fitting $d^2\sigma/du d(M^2s)$ distributions at different energies to the $s^{\alpha(0)-1}$ power law. However, owing to the lack of suitable data, we have used the published $F(x)$ values of which the dependence on s is given, according to eq. (5), by

$$F(x) = \frac{2p^*}{\pi\sqrt{s}} \left(\frac{s}{s_0}\right)^{\alpha(0)-1} \int \bar{G}(u) \left(\frac{M^2}{s}\right)^{b(u)} dp_T^2$$

In this expression, the integral can be computed for each x and s values using the analytical expressions of $b(u)$ and $\bar{G}(u)$. In this way, the s/s_0 dependence can be extracted for fixed x . For $0.6 < x < 0.8$ and $4.2 < p_{\text{lab}} < 16 \text{ GeV/c}$, a χ^2 fit to the power law gives

$$\alpha(0) = -0.48 \pm 0.07.$$

A value compatible within errors, although less significant, has been obtained in the 0.4-0.6 x bin.

Such a low value corresponds to an exotic exchange in the $Y_p \rightarrow Y_p$ elastic scattering (fig. 8) and is not unexpected [14-16].

4.3 Effective trajectory

Using the expression (4) for $b(u)$ and the above value of $\alpha(0)$, the effective α_Y trajectory exchanged in E^- production is (fig. 10)

$$\alpha_Y(u) = (-0.60 \pm 0.05) + (0.70 \pm 0.02)u.$$

We note that the slope of the trajectory, although not equal to one, has a value close to that obtained for Λ inclusive production [4]. In addition we see that the intercept of this trajectory lies between the $\Lambda_\alpha - \Lambda_\gamma$ and the $\Sigma_\beta - \Sigma_\delta$ trajectories, excluding the $\Sigma_\alpha - \Sigma_\gamma$ exchange.

The existence of a negative E^- polarization in the forward direction can be used to support the fact that the exchange is slightly dominated by the natural parity $\Lambda_\alpha - \Lambda_\gamma$ trajectory. It has indeed been shown [17] that the polarization P in a baryonic exchange process is related to the natural (σ^+) and unnatural (σ^-) contributions by

$$\sigma^\pm = \frac{1}{2} \sigma(1 \mp P)$$

Finally, we can see that the triple Regge model reproduces the $F(x)$ data at 4.2 GeV/c fairly well (fig. 3(a)). It also predicts a rise in the $\langle p_T \rangle$ value with incident momentum (fig. 11), a fact that is compatible with the experimental data, although this model does not account for the whole of E^- production.

5. $\Xi(1530)^0$ INCLUSIVE PRODUCTION

5.1 Total cross section

The inclusive distribution of the $\Xi^-\pi^+$ mass (fig. 12(a)) shows a large $\Xi(1530)^0$ production. No other resonance seems abundantly produced. The $\Xi(1530)^0$ cross section has been calculated by fitting the mass distribution in 2 MeV bins to the sum of a relativistic Breit-Wigner function corrected for phase space, with an energy-independent width, and a background term parameterized as the product of a threshold factor $(M - M_{th})^a$ and a polynomial. The fitted mass and width of the $\Xi(1530)^0$ are

$$M = (1532.1 \pm 0.6)\text{MeV} \quad \text{and} \quad \Gamma = (12.8 \pm 1.0)\text{MeV} .$$

The mass resolution in the $\Xi(1530)$ region is about 5 MeV at FWHM and has been verified by a Monte-Carlo method to have no appreciable effect on the mass and width. Identical values were obtained when restricting the fit to kinematically constrained events (47% of the total). Our fitted mass is in good agreement with the world average value $M = (1531.8 \pm 0.3)\text{MeV}$ [10]; the width is slightly higher than the world average value $\Gamma = (9.1 \pm 0.5)\text{MeV}$ [10] but it is compatible with that found in quasi-two-body reactions at 4.2 GeV/c ($\Gamma = 11 \pm 1 \text{ MeV}$) [18].

The fitted number of weighted $\Xi(1530)^0$ events is 2772 ± 60 corresponding to a cross section (corrected for neutral decay mode),

$$\sigma(K^- p \rightarrow \Xi(1530)^0 + X) = 45 \pm 3 \text{ } \mu\text{b} .$$

In contrast to $\Xi^-\pi^+$, the $\Xi^-\pi^0$ mass spectrum (fig. 12(b)) obtained from the π^0 1C channels (30% of the events) does not exhibit a strong structure in the $\Xi(1530)^-$ region. This can be partly explained by the fact that Ξ^{*-} decays to $\Xi^-\pi^0$ half as much as Ξ^{*0} does. We note that an $I = 1(\Sigma)$ exchange would favour Ξ^{*0} over Ξ^{*-} production by a factor of 4.

5.2 Differential cross section

Fig. 13 shows the invariant cross section $F(x)$ and the transverse momentum squared distribution for the $\Xi(1530)^0$. The x and p_T^2 distributions for $\Xi(1530)^0$ production have been obtained in the

following way. For different x and p_T^2 intervals, the $\Xi^- \pi^+$ effective mass has been plotted and the corresponding number of $\Xi(1530)^0$ determined. From the invariant cross section (fig. 13(a)), we see that the Ξ^* is mainly produced in the forward hemisphere, supporting hyperon exchange; the corresponding $\langle x \rangle_E$ value is 0.16 ± 0.03 . The p_T^2 distribution follows an exponential law up to $1.6(\text{GeV}/c)^2$, with a slope parameter equal to $B = 2.59 \pm 0.06(\text{GeV}/c)^{-2}$. The associated mean values of p_T^2 and p_T are respectively $(0.30 \pm 0.02)(\text{GeV}/c)^2$ and $(0.51 \pm 0.02)\text{GeV}/c$.

6. STUDY OF Ω^- INCLUSIVE PRODUCTION

6.1 Selection, weighting and cross section

The following results are based on a subsample (110 evt/ μb) in which 67 events have the complete decay chain

visible inside a restricted fiducial volume. A unique interpretation of this decay is provided by a kinematical fit and a visual estimate of the ionization. The projected length of the Ω^- track is required (as for Ξ^- 's) to be more than 0.7 cm and the projected length of the Λ to be more than 0.4 cm. The events are weighted to correct for these losses. Angular losses were carefully studied and an efficiency function depending on track length was used. The resulting mean weight is 1.86. Correcting for neutral Λ decay and other Ω^- decays [10] leads us to the inclusive cross section

$$\sigma(K^- p \rightarrow \Omega^- + X) = 2.1 \pm 0.3 \mu\text{b} \quad .$$

This cross section is plotted in fig. 14 with data at other energies [19] and confirms that the cross section is rising in the 4-10 GeV/c range.

Details on the Ω^- properties (mass, lifetime and spin) may be found elsewhere [11].

6.2 Production characteristics

The Ω^- hyperons appear to be produced with a low number of charged particles with

$$\langle n_c \rangle = 2.88 \pm 0.09$$

even if we compare it to the mean charged multiplicity in Ξ^- production ($\langle n_c \rangle \sim 3.2$) at an energy (~ 6.4 GeV/c) for which the Q-value is comparable (1.5 GeV).

The invariant x distribution (fig. 15) shows that the Ω^- is produced preferentially in the forward hemisphere, a fact which is reflected in the mean value

$$\langle x \rangle_E = 0.19 \pm 0.02.$$

This value is comparable to the same quantity in Ξ^- production.

Finally, the mean p_T and p_T^2 values are respectively $\langle p_T \rangle = 0.56 \pm 0.03$ GeV/c and $\langle p_T^2 \rangle = 0.36 \pm 0.02$ (GeV/c)². We note that the mean p_T value of hyperons seems to increase with their mass from Λ (0.48 GeV/c) [3] to Ω^- (fig. 16).

7. CONCLUSIONS

The results in this paper can be summarized as follows:

- (a) The total Ξ^- production cross section decreases slowly in the 4-15 GeV/c range with an s^{-n} power law with $n = 0.11 \pm 0.05$. The Ξ^- 's are predominantly produced in the forward hemisphere with limited transverse momentum. This is consistent with the hypothesis of an $S = -1$ hyperon exchange.

- (b) A triple Regge model reproduces our data for $x > 0.4$, as well as data at other energies. The analysis, together with a polarization argument, suggests that the exchanged hyperon is mainly the $\Lambda_\alpha - \Lambda_\gamma$ trajectory and, to a lesser extent, the $\Sigma_\beta - \Sigma_\delta$ trajectory.

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TABLE CAPTIONS

TABLE 1 Topological cross sections, mean charged multiplicity, mean Feynman x value, and mean transverse momentum in E^- inclusive production at 4.2 GeV/c [2], 8.25 GeV/c (this experiment), 10 and 16 GeV/c [3] and 14.3 GeV/c [8].

TABLE 2 Number of weighted events, invariant cross section, mean transverse momentum and polarization of E^- as a function of x .

TABLE 3 Fitted values of $b(u)$ and $\bar{G}(u) = G(u)s^{\alpha(0)-1}$.

TABLE 1

P_{lab} (GeV/c)	4.2	8.25	10	14.3	16
Cross sections (μb)					
Total	157 ± 8	157 ± 10	172 ± 20	127 ± 9	135 ± 15
2-prong	106.6 ± 5.6	47.5 ± 3.0	38 ± 9	14 ± 2	18 ± 5
4-prong	49.6 ± 2.8	90.4 ± 5.8	101 ± 15	63 ± 6	61 ± 9
6-prong	0.7 ± 0.2	18.8 ± 1.2	31 ± 8	44 ± 6	47 ± 3
8-prong	-	0.3 ± 0.1	2 ± 2	6 ± 3	9 ± 4
$\langle n \rangle_c$	2.65 ± 0.05	3.64 ± 0.04	4.0 ± 0.1	4.7 ± 0.2	4.7 ± 0.1
$\langle x \rangle_E$	0.24 ± 0.01	0.24 ± 0.01	0.23 ± 0.04	0.16 ± 0.05	0.22 ± 0.02
$\langle p_T \rangle$ (GeV/c)	0.448 ± 0.003	0.512 ± 0.003	0.52 ± 0.01	0.44 ± 0.04	0.59 ± 0.01

TABLE 2

x interval	Weighted events	F(x) (μb)	$\langle p_T \rangle$ (GeV/c)	P_{Ξ}
-1.0 -0.9	9 ± 4	0.4 ± 0.1	$\{ 0.49 \pm 0.07 \}$	-0.84 ± 0.48
-0.9 -0.8	18 ± 5	0.7 ± 0.2		
-0.8 -0.7	58 ± 10	2.1 ± 0.4	$\{ 0.46 \pm 0.03 \}$	
-0.7 -0.6	144 ± 15	5.1 ± 0.5		
-0.6 -0.4	222 ± 18	7.3 ± 0.6	0.47 ± 0.02	-0.19 ± 0.22
-0.5 -0.4	372 ± 23	11.7 ± 0.7	0.47 ± 0.02	
-0.4 -0.3	509 ± 27	15.4 ± 0.8	0.52 ± 0.01	0.30 ± 0.15
-0.3 -0.2	682 ± 31	19.8 ± 0.9	0.51 ± 0.01	
-0.2 -0.1	972 ± 38	27.6 ± 1.1	0.52 ± 0.01	-0.10 ± 0.12
-0.1 0.0	1237 ± 44	34.6 ± 1.2	0.52 ± 0.01	
0.0 0.1	1234 ± 44	34.6 ± 1.2	0.54 ± 0.01	-0.03 ± 0.11
0.1 0.2	1471 ± 49	41.7 ± 1.4	0.51 ± 0.01	
0.2 0.3	1445 ± 50	42.1 ± 1.5	0.52 ± 0.01	-0.28 ± 0.12
0.3 0.4	1350 ± 50	41.1 ± 1.5	0.52 ± 0.01	
0.4 0.5	1305 ± 52	41.6 ± 1.7	0.53 ± 0.01	-0.11 ± 0.14
0.5 0.6	1153 ± 50	38.9 ± 1.7	0.52 ± 0.01	
0.6 0.7	880 ± 45	31.2 ± 1.6	0.47 ± 0.01	-0.20 ± 0.19
0.7 0.8	687 ± 44	26.2 ± 1.7	0.55 ± 0.02	
0.8 0.9	427 ± 34	17.1 ± 1.4	0.47 ± 0.02	0.06 ± 0.29
0.9 1.0	271 ± 28	11.4 ± 1.2	0.39 ± 0.02	

TABLE 3

$ u $ interval (GeV ²)	0.0-0.5	0.5-0.75	0.75-1.0	1.0-1.25	1.25-1.5	1.5-1.75	1.75-2.0	2.0-2.25	2.25-2.50
$b(u)$	0.91±0.19	1.51±0.11	1.97±0.11	2.45±0.11	2.77±0.12	2.99±0.15	2.93±0.21	3.54±0.21	4.32±0.25
Log $\bar{G}(u)$ (μbGeV^{-2})	6.84±0.37	7.78±0.19	7.94±0.16	8.26±0.14	8.59±0.14	8.47±0.18	8.10±0.20	8.66±0.24	9.44±0.28

FIGURE CAPTIONS

- Fig. 1 Inclusive Ξ^- cross section as a function of total energy and incident momentum. The curve is the result of an s^{-n} fit as described in text.
- Fig. 2 Total and topological cross section as a function of p_{lab} . Lines are drawn to guide the eye.
- Fig. 3 (a) Invariant cross section for inclusive Ξ^- . Dots refer to data at 4.2 GeV/c [2]. The two curves come from the triple Regge analysis described in sect. 4 and correspond to our data (solid line) and to the 4.2 GeV/c data (dashed line).
(b) p_T^2 distribution for inclusive Ξ^- . The line results from an exponential fit (see text).
- Fig. 4 Average transverse momentum of Ξ^- as a function of x . The line comes from a triple Regge analysis described in sect. 4.
- Fig. 5 Recoiling mass spectrum. The shaded histogram corresponds to forward Ξ^- ($|u| < 2.0 \text{ GeV}^2$).
- Fig. 6 Ξ^- polarization as a function of x .
- Fig. 7 Ξ^- and Λ polarization as a function of p_T . Λ data come from ref. [4].
- Fig. 8 Triple Regge diagram for Ξ^- production.
- Fig. 9 $d\sigma/d(M^2/s)du$ distribution for different u bins (u in GeV^2). Error bars are statistical only. The curves result from the fit described in the text.
- Fig. 10 $\alpha_Y(u)$ values as function of u . The left hand side line is the result of a linear fit to $\alpha_Y(u)$. The right hand side lines are the different Λ and Ξ trajectories assuming slope one.

FIGURE CAPTIONS (Cont'd)

Fig. 11 $\langle p_T \rangle$ values at different energies. The line indicates the $\langle p_T \rangle$ value predicted by the triple Regge model.

Fig. 12 Effective mass distribution for (a) $\Xi^- \pi^+$ and (b) $\Xi^- \pi^0$ system.

Fig. 13 (a) Invariant x distribution and
(b) transverse momentum squared distribution for $\Xi(1530)^0$.
The line is the result of an exponential fit.

Fig. 14 Inclusive Ω^- cross section. Data at $p_{lab} > 5$ GeV are calculated from ΛK decays using $BR(\Lambda K) = 0.686$ [10].

Fig. 15 Invariant x distribution for Ω^- .

Fig. 16 $\langle p_T \rangle$ values of hyperons as a function of their masses.

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8

FIG. 9

FIG. 10

FIG. 11

FIG. 12

FIG. 13

FIG. 14

FIG. 15

FIG. 16