SU(3,1) AS A DYNAMICAL GROUP FOR MESON-BARYON STRONG INTERACTIONS

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ABSTRACT

SU(3,1) AS A DYNAMICAL GROUP FOR MESON-BARYON STRONG INTERACTIONS

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The dynamical group SU(3,1) is used to obtain an equation for two body meson-baryon strong interaction cross-sections. Experimental data is fitted to the equation. The results indicate that SU(3,1) can be used to describe the dynamics of the hadronic interaction.

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CHAPTER 1

INTRODUCTION

At the present time, Quantum chromodynamics (QCD)* is assumed to provide the framework for a theoretical description of strong interactions physics on the basis of confined colored quarks and gluons. Color gauge invariance using the gauge group $SU(3)^c$ is exactly conserved, implying that the associated gauge bosons (gluons) are massless. While not as well defined a quantum field theory as Quantum electrodynamics, thus far no area has been found where the theory has failed experimental verification (1).

In addition to QCD, we have a well-developed phenomenology which helps to classify particles and correlate observations. It consists mainly of three areas - Unitary symmetry, The analyticity of the scattering amplitude and The Regge pole theory.

QCD does not give the exact form of the potential for strong interactions. Thus, explicitly writing down a dynamical equation can only be attempted on a phenomenological basis.

The Unitary symmetry scheme based on SU(3), proposed independently by Gell-Mann (2) and Ne'eman (3), together with its subsequent development provides such a basis.

Using dynamical group methods, Kalman and Jakimow (4 to 8) have successfully applied discrete representations of the group SU(3,1), SU(4) (non charm) and SU(4,1), SU(5) (charm included) to the calculation of the mass spectrum of the hadrons.

In the work presented here, a continuous representation of the dynamical group SU(3,1) (non charm) is used to derive an equation for high energy, two body meson-baryon cross-sections. The resulting theoretical model suggests that a fit to the cross-sections can be made to the form,

$$[1.] \quad \sigma^{\frac{1}{2}} = C_{M_1} C_{M_2}\left[A + B\,(P_{LAB}/P_0)^{-n} + C(P_{LAB}/P_0)^{-2n}\right].$$

where σ is the cross-section.

C_{M_1} C_{M_2} are constants associated with the mesons M_1 and M_2 of the initial and final states respectively.

A, B, C are constant functions of the parameters of the representation.

P_{LAB} is the laboratory momentum.

P_0 is a constant required to preserve dimensional consistency.

n is a positive constant.

Experimentally observed cross-sections are found to fit the model reasonably well.

The SU(3) symmetry scheme is reviewed in Chapter 2. Continuous series representations of the group SU(3,1) in the Gel'fand-Cetlin basis are introduced in Chapter 3.

The dynamical model is developed in Chapter 4. The fit to experiment, our analysis and conclusions are presented in Chapter 5.

CHAPTER 2

SU(3) UNITARY SYMMETRY OF THE HADRONS

The classification scheme of the hadrons (strongly interacting particles) based on SU(3) symmetry (the eight-fold way), first proposed by Gell-Mann (2) and Ne'eman (3), has had great success in classifying the observed hadrons, predicting some of their properties and in some instances predicting their existence, notably the case of the Ω^-. The group SU(3) is characterized by two additive quantum numbers, which, for hadrons are identified with the third component of isospin I_3 and the hypercharge Y. In 1974, Aubert et al (9) and Augustin et al (10) discovered a heavy vector meson named the J/ψ particle with an unusually narrow width (less that 1% of the width of a typical heavy meson). Within eighteen months, it was generally agreed that to accomodate this particle, an enlargement of the SU(3) scheme was necessary, by the inclusion of a new additive quantum number "charm". This was confirmed in 1976 with the discovery of charmed mesons and baryons by Goldhaber et al(11) and Knapp et al(12) respectively. With the inclusion of charm, the symmetry scheme was enlarged to the group SU(4), an earlier version of which had been proposed be Bjorken and Glashow(13).

With increasing energies being used in experiments, it is possible that hadrons will be discovered which require more additive quantum numbers and further enlargement of the symmetry group.

There is very little data on the production cross-section of the J/ψ and charmed particles and therefore, we have restricted our discussion to SU(3).

The electric charge Q of a hadron in units of the electron charge is given by the Gell-Mann-Nishijima relation

[2] $Q = I_3 + Y/2$

The strangeness S is defined as

[3] $S = Y - B$ (non charm)

where B is the baryon number

A hadron with $B = 1$ is called a baryon and a hadron with $B = 0$ is called a meson. A baryon with $Y \neq 1$ is called a hyperon. A hadron with $S \neq 0$ is called a strange particle.

2.1. BARYONS

Baryons are fermions with half-integral spin, and all except the proton are unstable. We denote a baryon by a symbol which depends on the value of its isospin I and hypercharge Y according to Table 2.1. The electric charge is indicated by a superscript except for the case of N where we use p for proton and n for neutron. The symbol appearing in Table 2.1. denotes the state of lowest mass. To denote excited states, we use an asterisk superscript or we indicate the mass in parentheses (e.g. Σ (1385)). An antiparticle is indicated by a bar over the symbol. If a particle has quantum numbers J, B, I, I_3, Y, then the antiparticle has quantum numbers J, -B, I, $-I_3$, -Y.

The lowest mass baryon is the proton p, which together with the neutron n constitute the nucleon doublet N. The N belongs in a baryon octet together with the Ξ hyperon doublet, the Λ hyperon singlet and the Σ hyperon triplet. The octet is shown on a weight diagram in Fig. 2.1. Some properties of the baryon octet adapted from a compilation of the Particle Data Group (14) are given in Table 2.2.

Another well established baryon multiplet is the baryon decuplet, the weight diagram of which is shown in Fig. 2.2. In Table 2.3., some properties of the baryon decuplet, also adapted from a compilation of the Particle Data Group are given.

TABLE 2.1.

NOMENCLATURE FOR BARYONS

Symbol	Isopin I	Hypercharge Y
N	$\frac{1}{2}$	1
Λ	0	0
Σ	1	0
Ξ	$\frac{1}{2}$	-1
Δ	$\frac{3}{2}$	1
Ω	0	-2

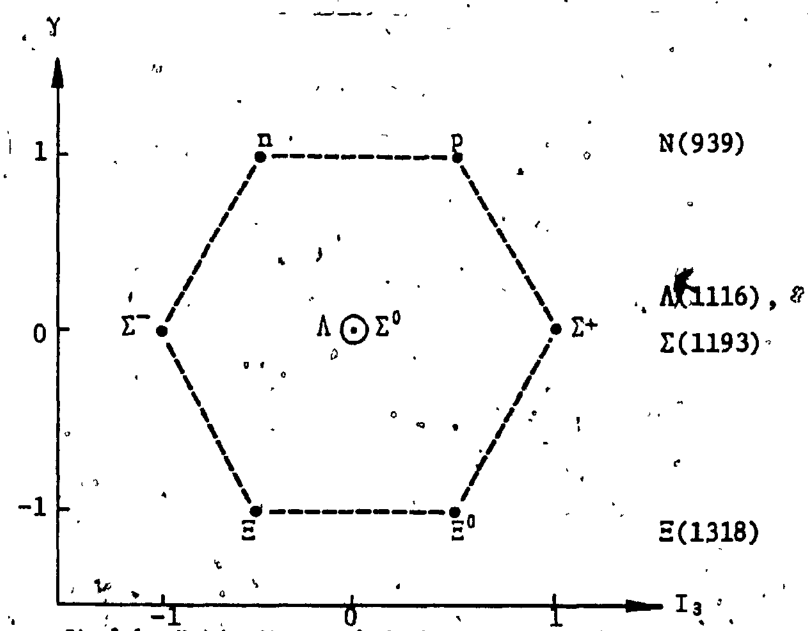

Fig. 2.1. Weight diagram of the baryon octet with spin, and parity $J^P = \frac{1}{2}^+$. The average mass in MeV of each isospin multiplet is also given.

TABLE 2.2.

SOME PROPERTIES OF THE BARYON OCTET

Symbol	Mass (MeV)	Mean life (sec)	Principal decay modes
p	938.28	Stable	
n	939.57	918 ± 14	$pe^-\nu$
Λ	1115.6 ± 0.1	$(2.58 \pm 0.02) \times 10^{-10}$	$p\pi^-$ 64% $n\pi^0$ 36%
Σ^+	1189.4 ± 0.1	$(0.80 \pm 0.01) \times 10^{-10}$	$p\pi^0$ 52% $n\pi^+$ 48%
Σ^0	1192.5 ± 0.1	$< 10^{-14}$	$\Lambda\gamma$
Σ^-	1197.3 ± 0.1	$(1.48 \pm 0.03) \times 10^{-10}$	$n\pi^-$
Ξ^0	1314.9 ± 0.7	$(3.0 \pm 0.1) \times 10^{-10}$	$\Lambda\pi^0$
Ξ^-	1321.3 ± 0.2	$(1.65 \pm 0.02) \times 10^{-10}$	$\Lambda\pi^-$

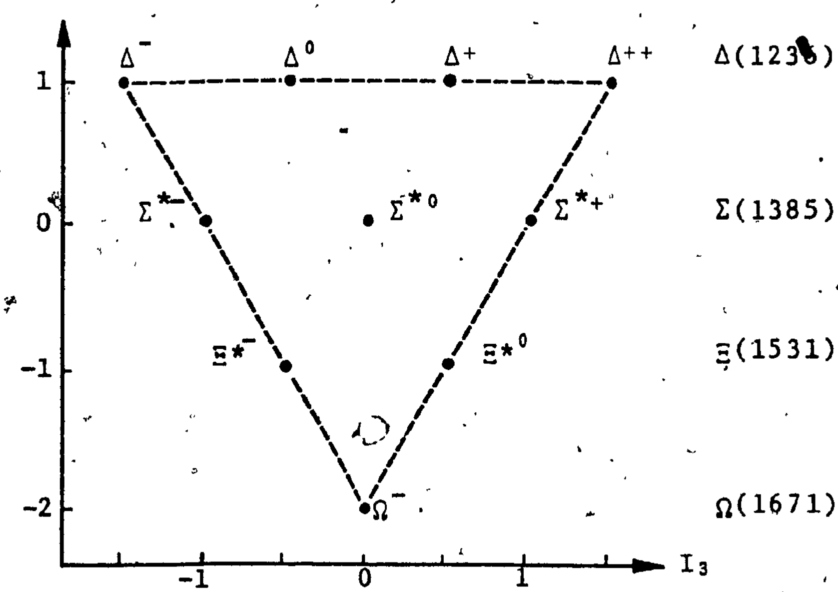

Fig.2.2. Weight diagram of the baryon decuplet with $J^P = \frac{3}{2}^+$. The Σ* is often called Y*.

TABLE 2.3.

SOME PROPERTIES OF THE BARYON DECUPLET

Symbol	Mass(MeV)	Full width(MeV) or mean life (sec)	Principal decay modes
Δ^{++}	1231 ± 1		
Δ^{+}	1231 ± 1	120 ± 10 MeV	$N\pi$
Δ^{0}	1232 ± 2		
Δ^{-}	1239 ± 8		
Σ^{*+}	1382 ± 1	35 ± 2 MeV	
Σ^{*0}	1381 ± 2	39 ± 6 MeV	$\Lambda\pi$ (88 ± 2)% $\Sigma\pi$ (12 ± 2)%
Σ^{*-}	1386 ± 2	42 ± 4 MeV	
Ξ^{*0}	1532 ± 1	9 ± 1 MeV	$\Xi\pi$
Ξ^{*-}	1535 ± 1	10 ± 2 MeV	
Ω^{-}	1672 ± 1	$(1.3 \pm 0.3) \times 10^{-10}$ sec	$\Xi^0\pi^-$ $\Xi^-\pi^0$ ΛK^-

In general, for every SU(3) baryon multiplet, there will exist an SU(3) antibaryon multiplet belonging to the conjugate weight diagram. In the case of the octet, the weight diagram is self-conjugate. The baryon octet is distinguished from the antibaryon octet by opposite baryon number and intrinsic parity.

2.2. MESONS

Mesons are bosons with integral spin and are unstable. The meson multiplets of SU(3) differ from the baryon multiplets in the following manner.

(i) All observed mesons belong only to either a singlet or an octet.

(ii) Mesons and their antiparticles are contained in the same SU(3) multiplet. i.e. there are no distinct conjugate multiplets. In addition, the particle and antiparticle have the same values for quantum numbers outside the group. i.e. spin, parity and baryon numbers.

(iii) SU(3) mixing occurs to a greater degree in the meson states than in the baryon states.

In Table 2.4., the nomenclature for the mesons is shown. The weight diagram of the pseudoscalar meson octet with $J^P = 0^-$, which is the meson multiplet of lowest average mass is shown in Fig. 2.3.

Some properties of the pseudoscalar meson octet are given in Table 2.5.

TABLE 2.4.

NOMENCLATURE FOR THE MESONS

Symbol	I	Y	SU(3) multiplicity
Π	1	0	8
K	½	1	8
η	0	0	Mixed 8 and 1, mostly 8
η′	0	0	Mixed 8 and 1, mostly 1

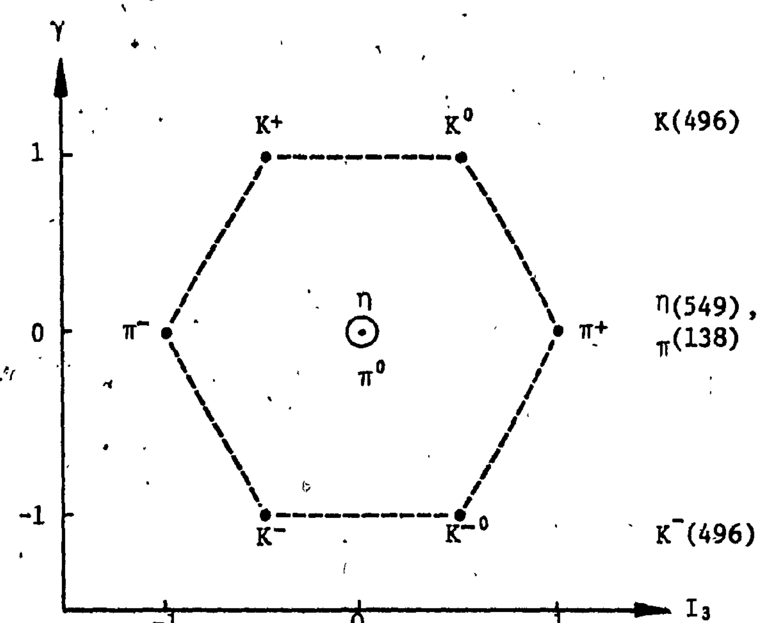

Fig. 2.3. Weight diagram of pseudoscalar meson octet. The average mass in MeV of each isospin multiplet is also given.

TABLE 2.5.
SOME PROPERTIES OF THE PSEUDOSCALAR MESON OCTET

SU(3) Assignment	Symbol	Mass (MeV)	Mean life (sec) or width	Principal decay modes[b]
8	π^+	139.57 ± 0.01	$(2.603 \pm 0.003) \times 10^{-8}$	
	π^0	134.96 ± 0.01	$(0.83 \pm 0.06) \times 10^{-16}$	
	$K^\pm$	493.71 ± 0.04	$(1.237 \pm 0.003) \times 10^{-8}$	$\mu\nu$(63.6 ± 0.2)%
				$\pi^\pm\pi^0$(21.0 ± 0.2)%
				$\pi^\pm\pi^+\pi^-$ (5.6 ± 0.1)%
				$\pi^\pm\pi^0\pi^0$(1.7 ± 0.1)%
				$\mu\pi^0\nu$(3.2 ± 0.1)%
				$e\pi^0\nu$(4.8 ± 0.1)%
	$K^0,\bar{K}^0$	497.7 ± 0.2	50% K_1, 50% K_S	
	(K_S)		$(0.893 \pm 0.003) \times 10^{-10}$	$\pi^+\pi^-$(68.7 ± 0.3)%
				$\pi^0\pi^0$(31.3 ± 0.3)%
	(K_1)		$(5.18 \pm 0.04) \times 10^{-8}$	$3\pi^0$(21.4 ± 0.7)%
				$\pi^+\pi^-\pi^0$(12.2 ± 0.2)%
				$\pi\mu\nu$(27.1 ± 0.5)%
				$\pi e\nu$(39.0 ± 0.5)%
	η	548.8 ± 0.6	$(0.8 \pm 0.2) \times 10^{-3}$ MeV	$\gamma\gamma$(38 ± 1)%
				$\pi^0\gamma\gamma$(3 ± 1)%
				$3\pi^0$(30 ± 1)%

CHAPTER 3

CONTINUOUS PARAMETER IRREDUCIBLE UNITARY REPRESENTATIONS OF THE GROUP SU(3,1) IN THE GEL'FAND-CETLIN BASIS (15)

Let $L^{n-1,1}$ be the real lie algebra of the group SU(n-1,1). Giving the representation of the algebra $L^{n-1,1}$ is equivalent to giving the operator E_{kl}, k,l 1,.... n in a Hilbert space H, satisfying the commutation relations

[4] $$[E_{ik}, E_{kl}] = E_{il} \text{ for } i \neq l ;$$

$$[E_{ik}, E_{ki}] = E_{ii} - E_{kk} ;$$

$$[E_{i_1k_1}, E_{i_2k_2}] = 0 \text{ for } k_1 \neq i_2, \; i_1 \neq k_2 .$$

The operators E_{kl} act in the infinite dimensional vector space in which as an orthonormal basis we have all possible triangular arrays.

$$m = \begin{bmatrix} m_{1n} & \cdots\cdots\cdots & m_{nn} \\ m_{1,n-1} & \cdots & m_{n-1,n-1} \\ & \cdots\cdots & \\ & \cdots & \\ & m_{11} & \end{bmatrix}$$

where the m_{ij} parameters satisfy the conditions

(i) $m_{in} = -(n-1)/2 + \gamma, \; m_{nn} = (n-1)/2 + \overline{\gamma}$

where γ is a complex number.

(ii) All elements m_{ij} other than m_{1n} and m_{nn} are integers.

(iii) All elements m_{ij} other than m_{1n} and m_{nn} satisfy the inequalities $m_{i,j+1} \geq m_{ij} \geq m_{i+1,j+1}$

The representation is determined by specifying the top row of the array m, i.e., by the complex number γ and the n-2 integers $m_{2,n} \geq \ldots \geq m_{n-1,n}$

The operators E_{kk}, $E_{k,k-1}$, $E_{k-1,k}$ are given by

[5] $E_{kk}m = (r_k - r_{k-1})m,$

where $r_k = m_{1k} \ldots m_{kk}$ for $k = 1, \ldots, n$; $r_o = 0$

[6] $E_{k,k-1}m = a^1_{k-1}\, m^1_{k-1} + \ldots + a^{k-1}_{k-1}\, m^{k-1}_{k-1}$

where m^j_{k-1} is the array obtained from m on replacing $m_{j,k-1}$ by $m_{j,k-1} - 1$;

$$a^j_{k-1} = \left[- \frac{\prod_{i=1}^{k} (m_{ik} - m_{j,k-1} - i+j+1) \prod_{i=1}^{k-2} (m_{i,k-2} - m_{j,k-1} - i+j)}{\prod_{i\neq j}^{k-1} (m_{i,k-1} - m_{j,k-1} - i+j+1)(m_{i,k-1} - m_{j,k-1} - i+j)} \right]^{1/2}$$

[7] $E_{k-1,k}m = b_{k-1}\, m_{k-1} + \ldots + b^{k-1}_{k-1}\, \hat{m}^{k-1}_{k-1}$,

where $\tilde{m}^j_{k-1}$ is the array obtained from m on replacing $m_{j,k-1}$ by $m_{j,k-1} + 1$;

$$b^{j}_{k-1} = \left[- \frac{\prod_{i=1}^{k} (m_{ik} - m_{j,k-1} - i + j) \prod_{i=1}^{k-2} (m_{i,1-2} - m_{j,k-1} - i + j - 1)}{\prod_{i \neq j}^{k-1} (m_{i,k-1} - m_{j,k-1} - i + j)(m_{i,k-1} - i + j - 1)} \right]^{1/2}$$

Here the co-efficients a^{j}_{k-1}, b^{j}_{k-1} are, for $k < n-1$, real positive numbers while a^{j}_{n-1}, b^{j}_{n-1} are purely imaginary numbers. The condition for the representation $L^{n-1,1}$ to be unitary is given by

[8] $E^{*}_{kk} = E_{kk}$; $k = 1, \ldots, n$;

$E^{*}_{k,k-1} = E_{k-1,k}$ for $k \neq n-1$;

$E^{*}_{n-1,n} = - E_{n,n-1}$

In the case of the algebra $L^{3,1}$ we consider triangular arrays of the form

$$m = \begin{bmatrix} -3/2+\gamma & m_{24} & m_{34} & 3/2+\bar{\gamma} \\ & m_{13} & m_{23} & m_{33} \\ & & m_{12} & m_{22} \\ & & & m_{11} \end{bmatrix}$$

In these arrays, the top row is fixed; it specifies the representation itself. The elements of the remaining rows can assume arbitrary admissible values.

The operators E_{kl} where $k,l = 1, 2, 3, 4$ give, in the space H, an irreducible unitary representation of the algebra $L^{3,1}$.

CHAPTER 4

CROSS-SECTIONS FOR TWO BODY MESON-BARYON STRONG INTERACTIONS

In strong interaction physics, where the Hamiltonian is not explicitly known, dynamical group methods can be used to describe the interacting systems.

The use of such methods is illustrated by the case of the hydrogen atom (in the non relativistic limit) whose so called accidental degeneracy of the levels of the principal quantum number is due to the symmetry of the Hamiltonian H under the four dimensional rotation group O(4). It is possible to find a larger group, containing O(4) as a subgroup, that has an irreducible representation that is the direct sum of the irreducible representations of O(4) belonging to the eigenvalues of H, each representation being contained only once. This group SO(4,2) then describes simultaneously within one irreducible representation all the energy levels with their degeneracies (16). Since different eigenvalues of H appear in the representation, the group is not a symmetry group of the hydrogen atom. The Casimir operator of SO(4,2) provides the dynamical solution by giving a functional dependence of H on the Casimir operator of O(4).

Another example of the use of these methods is given by the three dimensional harmonic oscillator (17). In this case, the symmetry group is SU(3) and at least two dynamical groups, the non compact Lie groups Sp(3,R) and SU(3,1) are known to exist.

Bander and Itzykson (18, 19) have used discrete and continuous parameter representations of a single dynamical group to describe the bound and scattering states of the hydrogen atom. Kalman (5) has demonstrated that a discrete parameter representation of the group SU(3,1) can be used to describe hadron bound states. In our model, we use a continuous parameter representation of the group SU(3,1) to describe hadron scattering states.

A process $B_1 \longrightarrow MB_2$, where B_1 and B_2 are baryons and M a meson can be characterized by the matrix element $\langle B_1 | B_2 M \rangle$

$\langle B_1 | M_{op} | B_2 \rangle$ where M_{op} is a operator corresponding to a meson (23).

We write

[9] $M_{op} = C_m \bar{q}_i q_j$, where $\bar{q}_i$, q_j are antiquark, quark operators and C_m is a constant associated with the meson M.

Now if A_{ij} ; i,j = 1,2,3 are the generators of SU(3),

[10] $\left[A_{ij}, A_{kl} \right] = \delta_{il} A_{kj} - \delta_{jk} A_{il}$ i,j,k,l = 1,2,3

[11] $\sum_{i=1}^{3} A_{ii} = 0$

[12] $\left[A_{ij}, q_k \right] = \delta_{ik} q_j$ i,j,k = 1,2,3

[13] $\left[A_{ij}, \bar{q}_k \right] = -\delta_{jk} \bar{q}_i$ i,j,k = 1,2,3

The algebra of q s and A s is closed if

[14] $\left[q_i, \bar{q}_j \right] = \theta(\delta_{ij} A_{44} - A_{ji})$ i,j = 1,2,3

where $\theta = +1$ corresponds to the Lie algebra of SU(4);

$\theta = -1$ corresponds to the Lie algebra of SU(3,1);

$\theta = 0$ corresponds to the Lie algebra of $T_7 \otimes SU(3)$;

and A_{44} is a "diagonal" generator in addition to A_{ii}; $i = 1,2,3$ needed to complete the above Lie algebra.

The group $T_7 \otimes SU(3)$ cannot be used to predict transitions between elementary particles and the group SU(4) does not contain continuous parameter representations.

We identify the Gel'fand-Cetlin basis vectors of a continuous parameter SU(3,1) representation with the elements of a baryon octet as in Table 4.1. The parameters of the arrays are related to the physical quantum numbers as follows (7)

hypercharge, $Y = m_{12} + m_{22} - 2(m_{13} + m_{23} + m_{33})/3$

isospin, $I = (m_{12} - m_{22})/2$

$I_3 = m_{11} - (m_{12} + m_{22})/2$

charge, $Q = m_{11} + m_{22} - (m_{13} + m_{23} + m_{33})/3$

A representation of a baryon decuplet is obtained by replacing the m_{13}, m_{23} and m_{33} elements of the basis vector arrays by $m_{13} + 1$, $m_{13} - 2$ and $m_{13} - 2$ respectively. Table 4.2. identifies the baryon states.

A 27 - plet representation is also obtained by replacing the m_{13}, m_{23} and m_{33} elements of the basis vector arrays by $m_{13} + 1$, $m_{13} - 1$ and $m_{13} - 3$ respectively. The identification with baryon states is made in Table 4.3. Additional symbols have been defined to describe baryon states that are not found in octet and decuplet representations. This nomenclature appears in Table 4.4.

The representation operators are identified with the quark, antiquark operators of equation [9]. The meson operators corresponding to the elements of a meson octet are then constructed as in Table 4.5.

The scattering cross-section for a reaction of the type

$$M_1 + B_1 \longrightarrow M_2 + B_2$$

where M_1, M_2 are octet mesons and B_1, B_2 are octet baryons is, from first order time dependent perturbation theory, given by

$$[15] \quad \sigma_{TOTAL} = \left| \sum_{\substack{INT.\\STATES}} \langle B_{FINAL} | M_{op_2} | B_{INTER} \rangle \langle B_{INTER} | M_{op_1} | B_{INITIAL} \rangle \right|^2$$

We note here that the intermediate states $|B\rangle$ can be octet, decuplet or 27 - plet baryon states. For example, we consider the reaction $K^-P \longrightarrow \bar{K}^o N$. First we construct the expressions $K^-_{op} |P\rangle$ and $\bar{K}^o_{op} |N\rangle$, where K^-_{op} and $\bar{K}^o_{op}$ are meson operators acting on baryon octet states $|P\rangle$ and $|N\rangle$ respectively. Table 4.5. gives the identification of the meson operators with the operators of a continuous representation of SU(3,1) in the Gel'fand-Cetlin basis.

$$K^-_{op} |P\rangle \longrightarrow C_{K^-} I_{34} I_{41} |P\rangle$$

$$\bar{K}^o_{op} |N\rangle \longrightarrow C_{\bar{K}^o} I_{34} I_{42} |N\rangle$$

From the commutation relations [4].

$$I_{41} = \left[I_{43}, I_{31}\right] = \left[I_{43}, \left[I_{32}, I_{21}\right]\right]$$

and $I_{42} = \left[I_{43}, I_{32}\right]$.

The commutator $\left[I_{32}, I_{21}\right]$ acting on the basis vector m gives,

$$\left[I_{32}, I_{21}\right] m = \left(I_{32} \cdot \left(I_{21} m\right) - I_{21} \cdot \left(I_{32} m\right)\right)$$

Using the operator defining relation [6] this becomes

$$\left[I_{32}, I_{21}\right] m = I_{32}\left(a_1^1 m_1^1\right) - I_{21}\left(a_2^1 m_2^1 + a_2^2 m_2^2\right)$$

$$= a_1^1\left(\left(a_{1,1}\right)_2^1 \left(m_1^1\right)_2^1 + \left(a_{1,1}\right)_2^2 \left(m_1^1\right)_2^2\right)$$

$$-\left(a_2^1 \left(a_{1,2}\right)_1^1 \left(m_2^1\right)_1^1 + a_2^2 \left(a_{2,2}\right)_1^1 \left(m_2^2\right)_1^1\right)$$

where the $a_{i,\ell}$ are the co efficients resulting from the action of the representation operators on the basis vector arrays obtained from m on replacing the element $m_{i,\ell}$ by $m_{i,\ell} - 1$. We note from the definition in [6] that $\left(m_\ell^i\right)_k^j = \left(m_k^j\right)_\ell^i$ i.e. The array obtained from m on replacing $m_{i,\ell}$ by $m_{i,\ell} - 1$ and $m_{j,k}$ by $m_{j,k} - 1$.

Grouping together identical basis vectors we get

$$\left[I_{32}, I_{21}\right] m = \left(a_1^1 \left(a_{1,1}\right)_2^1 - a_2^1 \left(a_{1,2}\right)_1^1\right)\left(m_1^1\right)_2^1$$

$$+ \left(a_1^1 \left(a_{1,1}\right)_2^2 - a_2^2 \left(a_{2,2}\right)_1^1\right)\left(m_1^1\right)_2^2$$

The co-efficient of the $\left(m_1^1\right)_2^2$ term can be written out explicitly as follows,

$$\left(-\left(m_{12} - m_{11} + 1\right)\left(m_{22} - m_{11}\right)\right)^{1/2} \left[\frac{-\left(m_{13} - m_{12} + 1\right)\left(m_{23} - m_{12}\right)\left(m_{33} - m_{12} - 1\right)\left(m_{11} - m_{12} - 1\right)}{\left(m_{22} - m_{12}\right)\left(m_{22} - m_{12} - 1\right)}\right]$$

$$- \left[\frac{-(m_{13}-m_{12}+1)(m_{23}-m_{12})(m_{33}-m_{12}-1)(m_{11}-m_{12})}{(m_{22}-m_{12})(m_{22}-m_{12}-1)}\right]^{1/2}\left(-(m_{12}-m_{11})(m_{22}-m_{11})\right)^{1/2}$$

$$= \left(-(m_{12}-m_{11}+1)(m_{22}-m_{11})\right)^{1/2} \left[\frac{-(m_{13}-m_{12}+1)(m_{23}-m_{12})(m_{33}-m_{12}-1)(m_{11}-m_{12})}{(m_{22}-m_{12})(m_{22}-m_{12}-1)}\right]^{1/2}.$$

$$\left(\left[\frac{(m_{11}-m_{12}-1)}{(m_{11}-m_{12})}\right]^{1/2} - \left[\frac{(m_{12}-m_{11})}{(m_{12}-m_{11}+1)}\right]^{1/2}\right)$$

$$= a_1^1 a_2^1 \left(\frac{(m_{11}-m_{12}-1)^{1/2}(m_{12}-m_{11}+1)^{1/2} - (m_{12}-m_{11})^{1/2}(m_{11}-m_{12})^{1/2}}{(m_{11}-m_{12})^{1/2}(m_{12}-m_{11}+1)^{1/2}}\right)$$

$$= a_1^1 a_2^1 \left(\frac{\left(-(m_{11}-m_{12}-1)^2\right)^{1/2} - \left(-(m_{11}-m_{12})^2\right)^{1/2}}{(m_{11}-m_{12})^{1/2}(m_{12}-m_{11}+1)^{1/2}}\right)$$

$$= a_1^1 a_2^1 \left(\frac{(m_{11}-m_{12}-1-m_{11}+m_{12})\,i}{(m_{11}-m_{12})^{1/2}(m_{12}-m_{11}+1)^{1/2}}\right)$$

$$= \left(i\, a_1^1 a_2^1\right) \Big/ \left((m_{11}-m_{12})^{1/2}(m_{12}-m_{11}+1)^{1/2}\right)$$

$$= \alpha_{1,2}^{1,1}$$

This is the product $a_1^1\, a_2^1$ multiplied by $(-1)^{\frac{1}{2}}$ and divided by the terms containing m_{12} in a_1^1 and the terms containing m_{11} in a_2^1.

Similarily the co efficient of the $\left(m_1^1\right)_2^2$ term can be written as $\alpha_{1,2}^{1,2}$ with the equivalent interpretation. Therefore,

$$\left[I_{32}, I_{21}\right] m = \alpha_{1,2}^{1,1}\, m_{1,2}^{1,1} + \alpha_{1,2}^{1,2}\, m_{1,2}^{1,2}$$

In the same manner it can be shown that

$$I_{41}\, m = \left[I_{43}, \left[I_{32}, I_{21}\right]\right] = \alpha_{1,2,3}^{1,1,1}\, m_{1,2,3}^{1,1,1} + \alpha_{1,2,3}^{1,1,2}\, m_{1,2,3}^{1,1,2} + \alpha_{1,2,3}^{1,1,3}\, m_{1,2,3}^{1,1,3} + \alpha_{1,2,3}^{1,2,1}\, m_{1,2,3}^{1,2,1} + \alpha_{1,2,3}^{1,2,2}\, m_{1,2,3}^{1,2,2} + \alpha_{1,2,3}^{1,2,3}\, m_{1,2,3}^{1,2,3}$$

This result can be generalized to apply to any number of nested commutators of "lowering" operators (The term lowering operator is used here in the sense of an operator which lowers the magnitude of the array elements e.g. $m_{j,k} \longrightarrow (m_{j,k} - 1)$)

A similar result can be obtained for commutators of "raising" operators. In this case we make the substitutions

$$a \longrightarrow b$$
$$\alpha \longrightarrow \beta$$

$m^{j_1,j_2,\ldots}_{k_1,k_2,\ldots} \longrightarrow {}^{j_1,j_2,\ldots}_{k_1,k_2,\ldots}m$ where writing the superscripts and subscripts to the left are to be interpreted as raising the respective array elements by 1 e.g.

$$m_{j_i,k_i} \longrightarrow m_{j_i,k_i} + 1$$

The generalized co efficients α and β for SU(3,1) are listed in Tables A.1 & A.2.

We then construct the expressions for the meson operators acting on the octet baryon states

$$K^-_{op}|P\rangle = c_{K^-}\left(\beta^1_3 \cdot {}^1_3(I_{41}|P\rangle) + \beta^2_3 \cdot {}^2_3(I_{41}|P\rangle) + \beta^3_3 \cdot {}^3_3(I_{41}|P\rangle)\right)$$

$$= c_{K^-}\left(\beta^1_3 \alpha^{1,1,1}_{1,2,3} \,|\, {}^1_3 P^{1,1,1}_{1,2,3}\rangle + \cdots + \cdots\right)$$

$$\bar{K}^0_{op}|N\rangle = c_{\bar{K}^0}\left(\beta^1_3 \cdot {}^1_3(I_{42}|N\rangle) + \beta^2_3 \cdot {}^2_3(I_{42}|N\rangle) + \beta^3_3 \cdot {}^3_3(I_{42}|N\rangle)\right)$$

$$= c_{\bar{K}^0}\left(\beta^1_3 \alpha^{1,1}_{2,3} \,|\, {}^1_3 N^{1,1}_{2,3}\rangle + \cdots + \cdots\right)$$

It should be noted that in this particular case since I_{34} is a single level raising operator $\beta^i_j \equiv b^i_j$

The expressions for meson operators acting on baryon octet states are listed in Appendix B. The notation used to describe the basis vectors and their associated co efficients is explained in Appendix A.

If we consider any baryon state as represented in Tables 4.1., 4.2. and 4.3. we note that the array elements m_{jk}, other than m_{14} and m_{44}, are written in terms of m_{13}. Upon substituting in the expressions for the α and β co efficients of Tables A.1 and A.2 we find that all factors other than those containing m_{14} and m_{44} terms become integers. Factors which include m_{14} and m_{44} terms can be written as $\left(-(m_{13} \pm C) \pm i\gamma\right)$ where C is a half integer constant. The co-efficients a^j_{n-1} and b^j_{n-1} are purely imaginary numbers (see after equation [7]), hence the products of the factors which include m_{14} and m_{44} terms are real numbers. Therefore, these factors are complex conjugates and their product is of the form $\left((m_{13} \pm C)^2 + \gamma^2\right)$

The α and β co efficients in Appendix B all include m_{14} and m_{44} terms as indicated by the subscript 3, and are thus of the general form $K\left(-\left((m_{13} \pm C)^2 + \gamma^2\right)\right)^{1/2}$ where K is a constant. The $(M_{13} \pm C)$ components of the α and β co efficients depend on the third row of the basis vector arrays (since the top row is fixed for the representation), and are thus uniquely defined for a particular multiplet.

Since each term of an $M_{op}|B\rangle$ expression includes a product $\alpha\beta$ the inner products in [15]′ are of the form

$$K'\left(-\left((m_{13} \pm C_1)^2 + \gamma^2\right)\right)\left(-\left((m_{13} \pm C_2)^2 + \gamma^2\right)\right)$$

We substitute in [15] to get

$$[16] \quad \sigma_{TOTAL} = C^2_{M_1} C^2_{M_2} \left[A(m_{13}) + B(m_{13})\gamma^2 + C\gamma^4 \right]^2$$

where C_{m_1}, C_{m_2} are the constants associated with the meson operators.

A,B,C are constants. A and B being functions of the discrete parameters m_{13} of the representation.

γ is the continuous parameter of the representation.

We identify the parameter γ with the laboratory momentum P_{lab} as follows

$$[17] \qquad \gamma^2 = (P_{LAB}/P_o)^{-n}$$

where P_o is some constant having the dimensions of momentum and n is a positive constant.

Substituting for γ^2 in equation [16], we get for the cross-section

$$\sigma_{TOTAL} = C_{M_1}^2 C_{M_2}^2 \left[A + B(P_{LAB}/P_o)^{-n} + C(P_{LAB}/P_o)^{-2n} \right]^2$$

TABLE 4.1.

$$p = \begin{bmatrix} -\frac{3}{2}+\gamma & m_{24} & m_{34} & \frac{3}{2}+\bar{\gamma} \\ m_{13} & m_{13}-1 & m_{13}-2 & \\ m_{13} & m_{13}-1 & & \\ m_{13} & & & \end{bmatrix} \qquad n = \begin{bmatrix} -\frac{3}{2}+\gamma & m_{24} & m_{34} & \frac{3}{2}+\bar{\gamma} \\ m_{13} & m_{13}-1 & m_{13}-2 & \\ m_{13} & m_{13}-1 & & \\ m_{13}-1 & & & \end{bmatrix}$$

$$\Lambda = \begin{bmatrix} -\frac{3}{2}+\gamma & m_{24} & m_{34} & \frac{3}{2}+\bar{\gamma} \\ m_{13} & m_{13}-1 & m_{13}-2 & \\ m_{13}-1 & m_{13}-1 & & \\ m_{13}-1 & & & \end{bmatrix}$$

$$\Sigma^{+} = \begin{bmatrix} -\frac{3}{2}+\gamma & m_{24} & m_{34} & \frac{3}{2}+\bar{\gamma} \\ m_{13} & m_{13}-1 & m_{13}-2 & \\ m_{13} & m_{13}-2 & & \\ m_{13} & & & \end{bmatrix} \quad \Sigma^{0} = \begin{bmatrix} -\frac{3}{2}+\gamma & m_{24} & m_{34} & \frac{3}{2}+\bar{\gamma} \\ m_{13} & m_{13}-1 & m_{13}-2 & \\ m_{13} & m_{13}-2 & & \\ m_{13}-1 & & & \end{bmatrix} \quad \Sigma^{-} = \begin{bmatrix} -\frac{3}{2}+\gamma & m_{24} & m_{34} & \frac{3}{2}+\bar{\gamma} \\ m_{13} & m_{13}-1 & m_{13}-2 & \\ m_{13} & m_{13}-2 & & \\ m_{13}-2 & & & \end{bmatrix}$$

$$\Xi^{0} = \begin{bmatrix} -\frac{3}{2}+\gamma & m_{24} & m_{34} & \frac{3}{2}+\bar{\gamma} \\ m_{13} & m_{13}-1 & m_{13}-2 & \\ m_{13}-1 & m_{13}-2 & & \\ m_{13}-1 & & & \end{bmatrix} \qquad \Xi^{-} = \begin{bmatrix} -\frac{3}{2}+\gamma & m_{24} & m_{34} & \frac{3}{2}+\bar{\gamma} \\ m_{13} & m_{13}-1 & m_{13}-2 & \\ m_{13}-1 & m_{13}-2 & & \\ m_{13}-2 & & & \end{bmatrix}$$

IDENTIFICATION OF THE ELEMENTS OF BARYON OCTET
WITH A CONTINUOUS REPRESENTATION OF SU(3,1)

TABLE 4.2.

Identification of the elements of a baryon decuplet with a continuous representation of SU(3,1)

$$\begin{bmatrix} -3/2+\gamma & & m_{13}-1 & & m_{13}-2 & & 3/2+\gamma \\ & m_{13}-1 & & m_{13}-2 & & m_{13}-2 & \\ & & m_{12} & & m_{22} & & \\ & & & m_{11} & & & \end{bmatrix}$$

Baryon	m_{12}	m_{22}	m_{11}
Δ^{++}	$m_{13}+1$	$m_{13}-2$	$m_{13}+1$
Δ^{+}	$m_{13}+1$	$m_{13}-2$	m_{13}
Δ^{0}	$m_{13}+1$	$m_{13}-2$	$m_{13}-1$
Δ^{-}	$m_{13}+1$	$m_{13}-2$	$m_{13}-2$
Σ^{*+}	m_{13}	$m_{13}-2$	m_{13}
Σ^{*0}	m_{13}	$m_{13}-2$	$m_{13}-1$
Σ^{*-}	m_{13}	$m_{13}-2$	$m_{13}-2$
Ξ^{*0}	$m_{13}-1$	$m_{13}-2$	$m_{13}-1$
Ξ^{*-}	$m_{13}-1$	$m_{13}-2$	$m_{13}-2$
Ω^{-}	$m_{13}-2$	$m_{13}-2$	$m_{13}-2$

TABLE 4.3.

Identification of the elements of a baryon 27-plet with a continuous representation of SU(3,1)

$$\begin{bmatrix} -3/2+\gamma & m_{13}-1 & m_{13}-2 & 3/2+\gamma \\ & m_{13}+1 \quad m_{13}-1 \quad m_{13}-3 & & \\ & m_{12} \quad m_{22} & & \\ & m_{11} & & \end{bmatrix}$$

Baryon	m_{12}	m_{22}	m_{11}
A^{++}	$m_{13}+1$	$m_{13}-1$	$m_{13}+1$
A^{+}	$m_{13}+1$	$m_{13}-1$	m_{13}
A^{0}	$m_{13}+1$	$m_{13}-1$	$m_{13}-1$
Δ^{*++}	$m_{13}+1$	$m_{13}-2$	$m_{13}+1$
Δ^{*+}	$m_{13}+1$	$m_{13}-2$	m_{13}
Δ^{*0}	$m_{13}+1$	$m_{13}-2$	$m_{13}-1$
Δ^{*-}	$m_{13}+1$	$m_{13}-2$	$m_{13}-2$
T^{++}	$m_{13}+1$	$m_{13}-3$	$m_{13}+1$
T^{+}	$m_{13}+1$	$m_{13}-3$	m_{13}
T^{0}	$m_{13}+1$	$m_{13}-3$	$m_{13}-1$
T^{-}	$m_{13}+1$	$m_{13}-3$	$m_{13}-2$
T^{--}	$m_{13}+1$	$m_{13}-3$	$m_{13}-3$
N^{*+}	m_{13}	$m_{13}-1$	m_{13}
N^{*0}	m_{13}	$m_{13}-1$	$m_{13}-1$
B^{+}	m_{13}	$m_{13}-2$	m_{13}
B^{0}	m_{13}	$m_{13}-2$	$m_{13}-1$
B^{-}	m_{13}	$m_{13}-2$	$m_{13}-2$
E^{+}	m_{13}	$m_{13}-3$	m_{13}
E^{0}	m_{13}	$m_{13}-3$	$m_{13}-1$
E^{-}	m_{13}	$m_{13}-3$	$m_{13}-2$
E^{--}	m_{13}	$m_{13}-3$	$m_{13}-3$
Λ^{*0}	$m_{13}-1$	$m_{13}-1$	$m_{13}-1$
Ξ^{*0}	$m_{13}-1$	$m_{13}-2$	$m_{13}-1$
Ξ^{*-}	$m_{13}-1$	$m_{13}-2$	$m_{13}-2$
H^{0}	$m_{13}-1$	$m_{13}-3$	$m_{13}-1$
H^{-}	$m_{13}-1$	$m_{13}-3$	$m_{13}-2$
H^{--}	$m_{13}-1$	$m_{13}-3$	$m_{13}-3$

TABLE 4.4.

ADDITIONAL NOMENCLATURE FOR 27-PLET BARYONS

Symbol	Isospin I	Hypercharge Y
A	1	2
T	2	0
B	3/2	0
E	2	-1
H	1	-2

TABLE 4.5.

Identification of the elements of a meson octet with the operators of a continuous representation of SU(3,1).

$$\pi^- \rightarrow C_{\pi^-} I_{24} I_{41}$$

$$\pi^+ \rightarrow C_{\pi^+} I_{14} I_{42}$$

$$\pi^0 \rightarrow C_{\pi^0} (I_{14} I_{41} - I_{24} I_{42})/\sqrt{2}$$

$$K^0 \rightarrow C_{K^0} I_{24} I_{43}$$

$$\bar{K}^0 \rightarrow C_{\bar{K}^0} I_{34} I_{42}$$

$$K^+ \rightarrow C_{K^+} I_{14} I_{43}$$

$$K^- \rightarrow C_{K^-} I_{34} I_{41}$$

$$\eta \rightarrow C_{\eta} (I_{14} I_{41} + I_{24} I_{42} - 2 I_{34} I_{43})\sqrt{6}$$

CHAPTER 5

RESULTS AND CONCLUSIONS

The equation for the cross-section $\sigma(P_{LAB})$ obtained in the previous chapter is a quartic equation in P_{LAB}^{-n}. The co efficients contain two unknown parameters, the array integer m_{13} and the dimensional constant P_0^{-n}, in addition to the eight constants associated with the octet of pseudoscalar mesons. A fit of experimental data from eight selected reactions involving the eight meson constants allows us to determine the unknowns in the co efficients, once the "right" n is known.

To illustrate the method, we consider the reaction $K^- P \rightarrow K^+ \Xi^-$

$$\sigma = \left[\sum_{INT} \langle \Xi^- | K^+ | INT \rangle \langle INT | K^- | P \rangle \right]^2$$

We define the terms

$$R^{\pm} = \left[- \left(\left(m_{13} \pm \frac{7}{2} \right)^2 + \gamma^2 \right) \right]^{1/2}$$

$$S^{\pm} = \left[- \left(\left(m_{13} \pm \frac{1}{2} \right)^2 + \gamma^2 \right) \right]^{1/2}$$

$$T^{\pm} = \left[- \left(\left(m_{13} \pm \frac{3}{2} \right)^2 + \gamma^2 \right) \right]^{1/2}$$

Then we write out, as in the previous chapter, the expressions for the meson operators acting on the baryon states

$$K^-|P\rangle = C_{K^-}\left[\sqrt{\tfrac{3}{2}}\left(\frac{(S^+)^2}{4}+\frac{(R^-)^2}{20}\right)|\Lambda\rangle_8 + \sqrt{\tfrac{1}{2}}\left(\frac{(T^-)^2}{6}+\frac{(R^-)^2}{10}\right)|\Sigma^0\rangle_8 + \frac{T^+T^-}{3\sqrt{10}}|\Sigma^{*0}\rangle_{10} + \frac{T^+R^-}{5\sqrt{6}}|\Lambda^{*0}\rangle_{27} + \frac{\sqrt{2}\,T^+R^-}{15}|B^0\rangle_{27}\right]$$

$$K^+|\Xi^-\rangle = C_{K^+}\left[\sqrt{\tfrac{3}{2}}\left(\frac{(S^+)^2}{8}+\frac{(T^-)^2}{12}+\frac{3(R^-)^2}{40}\right)|\Lambda\rangle_8 + \sqrt{\tfrac{1}{2}}\left(\frac{3(S^+)^2}{8}+\frac{(T^-)^2}{12} + \frac{(R^-)^2}{40}\right)|\Sigma^0\rangle_8 + \frac{T^+T^-}{3\sqrt{10}}|\Sigma^{*0}\rangle_{10} + \frac{T^+R^-}{5\sqrt{6}}|\Lambda^{*0}\rangle_{27} + \frac{\sqrt{2}\,T^+R^-}{15}|B^0\rangle_{27}\right]$$

Substituting in the equation for the cross-section we get

$$\sigma = C_{K^+}^2 C_{K^-}^2\left[\frac{3}{2}\left(\frac{(S^+)^2}{8}+\frac{(T^-)^2}{12}+\frac{3(R^-)^2}{40}\right)\left(\frac{(S^+)^2}{4}+\frac{(R^-)^2}{20}\right) + \frac{1}{2}\left(\frac{3(S^+)^2}{8}+\frac{(T^-)^2}{12}+\frac{(R^-)^2}{40}\right)\left(\frac{(T^-)^2}{6}+\frac{(R^-)^2}{10}\right) + \frac{(T^+)^2(T^-)^2}{90} + \frac{(T^+)^2(R^-)^2}{150} + \frac{2(T^+)^2(R^-)^2}{225}\right]^2$$

Which simplifies to

$$\sigma = C_{K^+}^2 C_{K^-}^2\left[\frac{3(S^+)^4}{64} + \frac{18}{320}(S^+)^2(R^-)^2 + \frac{11}{1600}(R^-)^4 + \frac{6}{480}(T^-)^2(R^-)^2 + \frac{(T^-)^4}{144} + \frac{6}{96}(S^+)^2(T^-)^2 + \frac{(T^+)^2(T^-)^2}{90} + \frac{7(T^+)^2(R^-)^2}{450}\right]^2$$

Writing out $R^\pm$, $S^\pm$ and $T^\pm$ explicitly in terms of m_{13} and we get

$$\sigma = \frac{C_{K^+}^2 C_{K^-}^2}{(14400)^2}\left[\left(3148\, m_{13}^4 - 9992\, m_{13}^3 + 17858\, m_{13}^2 - 12882\, m_{13} + 30336.75\right) + \left(6296\, m_{13}^2 - 9992\, m_{13} + 22166\right)\gamma^2 + 3148\,\gamma^4\right]^2$$

We make the substitution $\gamma^2 = \left(\frac{P_{LAB}}{P_0}\right)^{-n}$ and write out

$$\sigma^{1/2} = c_{K^+} c_{K^-} \left[A' + B' P_{LAB}^{-n} + C' P_{LAB}^{-2n} \right]$$

where $A' = \frac{(3148\, m_{13}^4 - 9992\, m_{13}^3 + 17858\, m_{13}^2 - 12882\, m_{13} + 30336.75)}{14400}$

$$B' = \frac{(6296\, m_{13}^2 - 9992\, m_{13} + 22166)}{14400\, P_0^{-n}}$$

$$C' = \frac{3148}{14400\, P_0^{-n}}$$

We fit data for this reaction to the parameterization

[18] $$\sigma^{1/2} = A'' + B'' P_{LAB}^{-n} + C'' P_{LAB}^{-2n}$$

The value of m_{13} can then be obtained from the equality $\frac{(B')^2}{A'C'} = \frac{(B'')^2}{A''C''}$, by solving the resulting quartic equation and selecting m_{13}. This value can then be substituted in the ratio $\frac{B'}{C'}$ and equated to $\frac{B''}{C''}$ to give P_0^{-n}. The product $c_{K^+} c_{K^-}$ can be obtained from $c_{K^+} c_{K^-} = \frac{A''}{A'}$ by substituting m_{13} in A'. In the same manner, we can obtain other combinations of meson constants in product form. We require a minimum of three related combinations of the form,

$$C_{M_1} C_{M_2} = K_1$$

$$C_{M_2} C_{M_3} = K_2$$

$$C_{M_1} C_{M_3} = K_3$$

to enable us to solve for specific meson constants. Here K_1, K_2 and K_3 are known values.

We divide the first product by the second

$$\frac{C_{M_1}}{C_{M_3}} = \frac{K_1}{K_2}$$

We then multiply by the third product to obtain

$$C_{M_1}^2 = \frac{K_1 K_3}{K_2}$$

Therefore,

$$C_{M_1} = \left(\frac{K_1 K_3}{K_2}\right)^{\frac{1}{2}}$$

We then substitute in the first and second products to get C_{M_2} and C_{M_3} respectively.

While attempting to determine a value for m_{13} as previously outlined, we discovered that difficulties arose as a result of the sensitivity of ratio $\frac{(B'')^2}{A''C''}$ to experimental error. as well as to the choice of the "right" n. Consequently, we were unable to obtain a value for m_{13} and our efforts were concentrated at determining the exponent n.

A least squares fit to the parameterization [18] using n = 1/16, 1/8, 1/4, 1/2, 1, 2, was made separately for each of the meson-baryon reactions where data was available. The results are summarized in Tables 5.1. and 5.2.

The fit is good over the entire range of selected values of n. An example is shown in Fig. 5.1. While this suggests that the expression for the cross-section derived from the dynamical model does satisfy the experimental observations, it also indicates that goodness of fit criteria are not restrictive enough to allow us to select the "right" n. However, certain regularities are apparent in Tables 5.1. and 5.2., which could be interpreted as pointing out further restrictions on the permissible values of n.

The model predicts some asymptotic value $(A'')^2$ for the cross-section at high laboratory momentum. Since with increasing energy, the number of available inelastic channels increases, it is expected that this value be small. A comparison of A'' for different n shows rapid decrease of magnitude with increasing n in the range $1/16 \leqslant n \leqslant 1$ followed by an increase in the magnitude of A'' for $n > 1$. Furthermore, it is observed that the χ^2 statistic decreases slowly in the same range, then increases rapidly for $n > 1$. The above would indicate that n lies in the range $n \leqslant 1$.

It is also observed that for $n \leqslant 1/4$, the parameters of the fit are related by $(B''^2/4A''C'') \simeq 1$. This would mean that equation [18] has a double root at $P_{LAB}^{-n} = -B''/2C''$ and that $\sigma^{\frac{1}{2}}$ is otherwise always positive. If this relation did not exist, then equation [18] would have roots at $P_{LAB}^{-n} = -B''/2C'' \pm \sqrt{\dfrac{B''^2 - 4A''C''}{2C''}}$ and $\sigma^{\frac{1}{2}}$ would acquire negative values within a certain range of P_{LAB}^{-n}.

Substituting $B''^2 = 4A''C''$ in equation [18] we get

$$[19] \qquad \sigma^{1/2} = C''(P_{LAB}^{-n} + B''/2C'')^2$$

The cross-section is then written as

[20] $\sigma = C''^2 (P_{LAB}^{-n} + B''/2C'')^4$

which for $P_{LAB}^{-n} \gg B''/2C''$ further reduces to

[21] $\sigma \simeq C''^2 P_{LAB}^{-4n}$

We choose n = 1/4. This gives

[22] $\sigma = C''^2 P_{LAB}^{-1}$

We note that Regge Pole exchange models (21) predict for total cross-sections an energy dependence of the form $P_{LAB}^{2\langle\alpha\rangle -2}$ where $\langle\alpha\rangle$ is the average value of the trajectory of the exchange. The condition $0 < \langle\alpha\rangle < 1$ gives $n < 1/2$ which lends support to our choice of n.

We therefore make the following conclusions:

(i) The expression for meson-baryon cross-sections derived using SU(3,1) as the dynamical group for strong interactions, satisfies the experimental observations.

(ii) The choice of n = 1/4 compares favorably with the predictions of other theoretical models.

TABLE 5.1.

PARAMETERS OF LEAST SQUARES FIT

SUMMARY I

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-P:NKO

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	25.2115	61.9470-	36.2155	25.1039	.8104	28.8394	.0425
1/8	5.1857	15.6014-	11.9842	5.0776	.6509	31.0312	.0381
1/4	.8389	3.6739-	4.5956	.7342	.3997	39.1711	.0314
1/2	.0799	.2915-	2.4050	.0088	.0606	272.2057	.0239
1	.0538	1.6415	1.0959	.6147	.7489-	1.3352-	.0231
2	.1412	7.8561	23.8964-	.6456-	.1643	2.4664	.0728

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-P:LPIO

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	81.4948	184.3926-	104.4744	81.3523	.8824	7.3981	.0160
1/8	18.1105	46.2403-	29.7372	17.9755	.7774	7.4899	.0120
1/4	3.6393	11.6746-	9.7428	3.4973	.5991	7.7604	.0112
1/2	.5974	2.6839-	4.0132	.4487	.3343	8.9432	.0120
1	.1160	.0357	2.2548	.0001	.0079-	126.1264-	.0153
2	.1202	2.3196	.0422-	31.8234-	27.4383	.1909	.0152

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-PINKO

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	52.3478	122.2173-	71.3043	52.3708	.8570	11.8088	.6113
1/8	12.9894	34.8640-	23.8066	12.7643	.7322	12.1004	.0092
1/4	2.8148	9.7362-	9.1600	2.5871	.5314	12.5356	.0063
1/2	.6110	2.8735-	5.3638	.3848	.2678	13.9368	.0072
1	.2211	.4619-	6.6687	.0080	.0346	28.8688	.0060
2	.2222	4.2222	24.0000	.1856	.0879-	.0000	.0267

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-P:LET

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	69.3600	155.9200-	87.5800	69.3965	.8901	6.4347	3.6454
1/8	16.4849	41.4338-	26.1513	16.4118	.7921	6.4469	.1630
1/4	3.9006	12.1380-	9.6388	3.8213	.6296	6.3624	.1622
1/2	.9191	4.1586-	5.1778	.8350	.4015	6.2009	.1699
1	.2602	1.8761-	5.5862	.1575	.1679	5.9551	.1854
2.	[illegible]	.9548-	18.8555	.0120	.0253	6.2844	.2063

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-P:S+PI-

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	46.9191	108.6540-	63.1095	46.7667	.8608	10.9967	.0761
1/8	10.3415	22.5367-	18.6153	10.1834	.7396	11.1662	.0690
1/4	2.0381	6.9230-	6.4030	1.8713	.5406	11.7077	.0577
1/2	.3730	1.5042-	2.8680	.1972	.2622	14.5408	.0432
1	.1542	.2566	1.8266	.0090	.0702-	14.2342-	.0325
2	.1944	1.9940	.6690	1.4857-	1.4901-	.0000	.0420

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-P:XI-K+

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	63.7397	141.3013-	78.4657	63.6139	.9004	5.3582	.1537
1/8	17.2421	42.3423-	26.1138	17.1640	.8107	5.3580	.0458
1/4	3.6542	10.9679-	8.4008	3.5798	.6527	5.5068	.0459
1/2	.6393	2.7732-	3.3955	.5662	.4083	5.9964	.0461
1	.0767	.3778-	1.9766	.0180	.0955	10.4637	.0477
2	.0322	1.1566	.9551	.3501	.6055-	.0000	.0496

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-P±S-PI+

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	84.0988	186.0444-	103.0666	83.9566	.9025	5.1582	.1687
1/8	21.0852	51.6993-	31.7699	21.0326	.8136	5.2059	.0289
1/4	4.4076	13.2374-	10.0664	4.3518	.6575	5.3506	.0266
1/2	.7386	3.2900-	3.9592	.6834	.4154	5.7928	.0249
1	.0716	.5030-	2.2677	.0279	.1109	9.0152	.0228
2	.0249	.9330	1.9575	.1111	.2383-	.0000	.0229

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-P:XIURO

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	8.1818	19.6363-	11.9090	-8.0943	.8244	21.9563	.3476
1/8	1.4749	4.4185-	3.2949	1.4812	.6704	24.4824	.0515
1/4	.1193	.7220-	.9704	.1342	.3720	52.2117	.0488
1/2	.0420-	.1099	.3257	.0092	.1687-	35.1331	.0491
1	.0057	.3270	.1163	.2299	1.4061-	.7111-	.0504
2	.0611	.5712	.1032-	.7903-	2.7670	.6011	.0546

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-N!LPI-

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	506.0000	1107.2500-	605.9166	93.2482	.9136	4.2379	.4904
1/8	118.6962	284.2504-	170.5700	118.4240	.8332	4.3037	.0145
1/4	25.5758	73.1181-	52.8859	25.2726	.6912	4.3790	.0048
1/2	4.8406	19.3949-	20.7273	4.5370	.4678	4.5684	.0047
1	.7091	4.5469-	12.2416	.4222	.1857	5.3846	.0048
2	.1665	2.0320	13.2415	.0779	.0767-	.0000	.0053

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K-N:S-P10

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	61.0391	136.0452-	76.1020	60.8009	.8938	6.0240	.0112
1/8	12.0524	30.1034-	19.1366	11.8387	.7865	6.8272	.0083
1/4	1.5970	5.1523-	4.6372	1.4312	.5555	10.4981	.0062
1/2	.0720-	.2327	.9170	.0147	.1269-	62.0839	.0050
1	.0012-	1.1145	.0361-	8.5826-	15.4005	.0649	.0053
2	.2347	1.0530	.2133-	1.2996-	2.4682	.6365	.0282

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
K+N:PKO

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	60.2193	141.7653-	83.7551	59.9885	.8463	14.4391	.0289
1/8	12.6049	35.4346-	24.9246	12.5940	.7108	15.3409	.0253
1/4	2.2118	8.3320-	8.6249	2.0[illegible]22	.4830	18.3708	.0248
1/2	.2213	1.0929-	3.8189	.0782	.1431	48.8337	.0249
1	.0467	1.9553	1.4543	.6572	.6722-	1.4875-	.0254
2	.1581	9.7165	31.6613-	.7454-	.1534	2.5528	.0231

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
PI-P:NPIO

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	26.1976	62.5116-	37.5232	26.0352	.8329	18.6172	.0130
1/8	5.7591	16.1984-	11.7285	5.5929	.6905	19.3372	.0121
1/4	1.2121	4.4668-	4.7639	1.0470	.4688	20.7002	.0117
1/2	.2773	1.1849-	3.0381	.1155	.1950	26.2973	.0108
1	.1437	.1998	4.2596	.0023	.0234-	42.6209-	.0099
2	.3333	3.8333	11.8333	.3104	.1619-	.0000	.4889

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
PI-P:NET

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	11.7222	28.8194-	17.9027	11.5982	.8048	32.2282	.0310
1/8	2.2551	6.8550-	5.4087	2.1720	.6337	38.4523	.0000
1/4	.2859	1.2861-	1.8768	.2203	.3426	72 5636	.0000
1/2	.0030	.2491	.7472	.0207	.1667-	35.9726	.0000
1	.0355	1.2613	.5761-	.6903-	1.0947	.9134	.0000
2	.0666	5.9333	37.3333-	.2357-	.0794	3.5474	.0287

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
PI-PILKO

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	36.5000	82.7150-	47.0600	36.3460	.8788	7.8988	.0755
1/8	7.9535	20.3599-	13.2765	7.8056	.7667	8.3696	.0757
1/4	1.4245	4.5553-	4.0397	1.2842	.5638	9.8951	.0748
1/2	.1739	.6039-	1.4104	.0646	.2140	21.8177	.0744
1	.0513	.5884	.4299	.2013	.68[illegible]3-	1.4611-	.0742
2	.1146	1.8562	2.0972-	.4107-	.[illegible]25	1.5032	.0745

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
PI-P:S-K+

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	60.0769	136.4615-	76.3076	59.4505	.8713	9.0612	12.2376
1/8	5.9963	15.9052-	10.5541	5.9923	.7535	9.6228	.0348
1/4	.7561	3.0527-	2.9541	.7886	.5166	14.0317	.0266
1/2	.1280-	.0030-	.8173	.0000	.0018	287591.7799	.0266
1	.1327-	.8361	.0288-	6.0516-	14.4752	.0690	.0267
2	.0270-	1.7707	2.2556-	.3475-	.3925	1.5961	.0262

PARAMETERS OF LEAST SQUARES FIT.
SUMMARY TABLE
PI+P:S+K+

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	29.6000	69.0000-	41.2000	28.8895	.8373	17.1099	2.5073
1/8	4.5844	13.2813-	9.6623	4.5639	.6872	20.0886	.0354
1/4	.3704	2.0685-	2.7074	.3950	.3820	46.9598	.0313
1/2	.1736-	.5097	.7201	.0901	.3538-	7.9850	.0313
1	.0537-	1.3052	.1992-	2.1373-	3.2750	.3053	.0317
2	.1000	2.7045	3.6433-	.5018-	.3711	1.6414	.0346

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
PI+N:PET

N	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
1/16	210.5714	461.9523-	253.0476	210.8298	.9127	4.3068	18.6100
1/8	49.8594	119.2823-	71.6678	49.6327	.8321	4.3473	.0828
1/4	11.4845	32.4866-	23.4399	11 2562	.6929	4.3363	.0798
1/2	2.5060	9.4261-	9.8153	2.2635	.4802	4.3353	.0724
1	.5962	2.9310-	6.5039	.3302	.2253	4.4379	.0626
2	.2893	.4345-	9.3888	.0050	.0231	6.5737	.0540

TABLE 5.2.

PARAMETERS OF LEAST SQUARES FIT

SUMMARY II

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
N=1/16

EXP	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
K-P:NKO	25.2115	61.9470-	38.2155	25.1039	.8104	28.8394	.0425
K-P:LPIO	81.4948	184.3826-	104.4744	81.3523	.8824	7.3981	.0160
K-P:NKO	52.3478	122.2173-	71.3043	52.37[illegible]	.8570	11.8088	.6113
K-P:LFT	69.3600	155.9200-	87.5800	6[illegible].3966	.8901	6.4347	3.6454
K-P:S+PI-	46.9191	108.6540-	63.1095	46.7667	.8608	10.9967	.0761
K-P:S-PI+	84.0888	186.0444-	103.0666	83.9556	.9025	5.1582	.1687
K-P:XI-K+	63.7397	141.3013-	78.4657	63.6139	.9004	5.3562	.1537
K-P:XIDKO	8.1818	19.6363-	11.9090	8.0943	.8244	21.9563	.3476
K-N:LPI-	506.0000	1107.2500-	605.9166	93.2482	.9136	4.2379	.4904
K-N:S-PIO	61.0391	136.0452-	76.1020	60.8009	.8938	6.0240	.0112
K-N:SOPI-	41.2720	94.8788-	54.6818	41.1562	.8675	9.7110	.0421
K+N:PKO	60.2193	141.7653-	83.7551	59.9885	.8463	14.4391	.0269
PI-P:NPIO	26.1976	62.5116-	37.5232	26.0352	.8329	18.6172	.0130
PI-P:NET	11.7222	28.8194-	17.9027	11.5982	.8048	32.2282	.0310
PI-P:LKO	36.5000	82.7150-	47.0600	36.3460	.8788	7.8988	.0755
PI-P:S-K+	60.0769	136.4615-	78.3076	59.4505	.8713	9.0612	12.2376
PI+P:S+K+	29.6000	69.0000-	41.2000	28.8895	.8373	17.1099	2.5073
PI+N:PET	210.5714	461.9523-	253.0476	210.[illegible]	.9127	4.3068	16.6100

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
N=1/8

EXP	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
K-P:NKO	5.1857	15.6014-	11.9842	5.0776	.6509	31.0312	.0381
K-P:LPIO	18.1105	46.2403-	29.7372	17.9755	.7774	7.4899	.0120
K-P:NKO	12.9894	34.8640-	23.8066	12.7643	.7322	12.100	.0092
K-P:LFT	16.4849	41.4338-	26.1513	16.4118	.7921	6.4469	.1630
K-P:S+PT-	10.3415	27.5367=	18.6153	10.1834	.7396	11.1662	.0690
K-P:S-PI+	21.0852	51.6993-	31.7699	21.0326	.8136	5.2059	.0289
K-P:XI-K+	17.2421	42.3423-	26.1138	17.1640	.8107	5.3580	.0458
K-P:/IOKO	1.4749	4.4185-	3.2949	1.4812	.6704	24.4824	.0515
K-N:LPI-	118.6962	284.2504-	170.5700	118.4240	.8332	4.3037	.0145
K-N:S-PIO	12.0524	30.1034-	19.1366	11.8387	.7865	6.8272	.0083
K-N:SOPI-	7.2742	19.7321-	13.5359	7.1911	.7288	12.5531	.0398
K+N:PKO	12.8049	35.4346-	24.9246	12.5940	.7108	15.3409	.0253
PI-P:NPIO	5.7591	16.1984-	11.7285	5.5929	.6905	19.3372	.0121
PI-P:NET	2.2551	6.6550-	5.4087	2.1720	.6337	38.4523	.0000
PI-P:LKO	7.9535	20.3599-	13.2765	7.6056	.7667	8.3696	.0757
PI-P:S-K+	5.9963	15.9052-	10.5541	5.9923	.7535	9.6728	.0348
PI+P:S+K+	4.5844	13.2813-	9.6623	4.5639	.6872	20.0886	.0354
PI+N:PET	49.8594	119.2823-	71.6678	49.6327	.8321	4.3473	.0828

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
N=1/4

EXP	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
K-P:NKO	.8389	3.6739-	4.5956	.7342	.3997	39.1711	.0314
K-P:LPIO	3.6393	11.6746-	9.7428	3.4973	.5991	7.7604	.0112
K-P:NKO	2.8148	9.7362-	9.1600	2.5871	.5314	12.5356	.0083
K-P:LET	3.9006	12.1360-	9.6388	3.8213	.6296	6.3624	.1622
K-P:S+PI-	2.0381	6.9230-	6.4030	1.8713	.5406	11.7077	.0577
K-P:S-PI+	4.4076	13.2374-	10.0664	4.3518	.6575	5.3506	.0266
K-P:XI-K+	3.6542	10.9679-	8.4008	3.5798	.6527	5.5068	.0459
K-P:XIOKO	.1193	.7220-	.9704	.1342	.3720	52.2117	.0488
K-N:LPI-	25.5758	73.1181-	52.8859	25.2726	.6912	4.3790	.0048
K-N:S-PIO	1.5970	5.1523-	4.6372	1.4312	.5555	10.4981	.0062
K-N:SOPI-	.5199	2.6199-	3.1742	.5406	.4126	34.4747	.0369
K+N:PKO	2.2118	8.3320-	8.6249	2.0122	.4830	18.3708	.0248
PI-P:NPIO	1.2121	4.4668-	4.7639	1.0470	.4688	20.7002	.0117
PI-P:NET	.2858	1.2861-	1.8768	.2203	.3426	72.5636	.0000
PI-P:LKO	1.4245	4.5553-	4.0397	1.2842	.5638	9.8951	.0748
PI-P:S-K+	.7561	3.0527-	2.9541	.7886	.5166	14.0317	.0266
PI+P:S+K+	.3704	2.0605-	2.7074	.3950	.3820	46.9598	.0313
PI+N:PET	11.4845	32.4866-	23.4399	1..2562	.6929	4..363	.0798

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
N=1/2

EXP	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
K-P:NKO	.0799	.2915-	2.4050	.0088	.0606	272.2057	.0239
K-P:LP10	.5974	2.6839-	4.0132	.4487	.3343	8.9432	.0120
K-P:NKO	.6110	2.8735-	5.3638	.3848	.2678	13.9368	.0072
K-P:LFT	.9191	4.1586-	5.1778	.8350	.4015	6.2009	.1699
K-P:S+PI-	.3730	1.5042-	2.8680	.1972	.2622	14.5408	.0432
K-P:S-PI+	.7386	3.2900-	3.9592	.6834	.4154	5.7928	.0249
K-P:XI-K+	.6393	2.7732-	3.3955	.5662	.4083	5.9964	.0461
K-P:AIOKO	.0420-	.1099	.3257	.0092	.1687-	35.1331	.0491
K-N:LPI-	4.8406	19.3949-	20.7273	4.5370	.4678	4.5684	.0047
K-N:S-PIO	.0720-	.2327	.9170	.0147	.1269-	62.0839	.0050
K-N:SOPI-	.2748-	.7837	.5602	.2741	.6994-	2.0437	.0353
K+N:PPO	.2213	1.0929-	3.8189	.0782	.1431	48.8337	.0249
PI-P:NPIO	.2773	1.1849-	3.0381	.1155	.1950	26.2973	.0108
PI-P:NET	.0038	.2491	.7472	.0207	.1667-	35.9726	.0000
PI-P:LKO	.1738	.6039-	1.4104	.0646	.2140	21.8177	.0744
PI-P:S-K+	.1240-	.0030-	.8173	.0000	.0018	287591.7799	.0266
PI+P:S+K+	.1736-	.5057	.7201	.0901	.3538-	7.9650	.0313
PI+N:PET	2.5061	9.4261-	9.8133	2.2635	.4802	4.3353	.0724

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
N=1

EXP	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
K-P:NKO	.0538	1.6415	1.0959	.6147	.7489-	1.3352-	.0231
K-P:LPIO	.1160	.0357	2.2548	.0001	.0079-	126.1264-	.0153
K-P:NKO	.2211	.4619-	6.6687	.1080	.0346	-28.8688	.0060
K-P:LET	.2502	1.8761-	5.5832	.1575	.1679	5.9551	.1854
K-P:S+PI-	.1542	.2566	1.8266	.0090	.0702-	14.2342-	.0325
K-P:S-PI+	.0716	.5030-	2.2677	.0279	.1109	9.0152	.0228
K-P:XI-K+	.0767	.3778-	1.9766	.0180	.0955	10.4637	.0477
K-P:KLOKO	.0057	.3270	.1163	.2299	1.4061-	.7111-	.0504
K-N:LPI-	.7091	4.5469-	12.2416	.4722	.1857	5.3846	.0048
K-N:S-PIO	.0012-	1.1145	.0361-	8.5826-	15.4005	.0649	.0053
K-N:SOPI-	.0277-	1.1870	.0954-	3.6911-	6.2189	.1607	.0468
K+N:PKO	.0487	1.9553	1.4543	.6572	.6722-	1.4875	.0254
PI-P:NPIO	.1437	.1998	4.2596	.0023	.0234-	42.6209-	.0099
PI-P:NET	.0355	1.2613	.5761-	.6903-	1.0947	.9134	.0000
PI-P:LKO	.0513	.5884	.4299	.2013	.6843-	1.4611-	.0742
PI-P:S-K+	.1327-	.8361	.0268-	6.0516-	14.4752	.0690	.0267
PI+P:S+K+	.0537-	1.3052	.1992-	2.1373-	3.2750	.3053	.0317
PI+N:P.T	.5962	2.9310-	6.5039	.3302	.2253	4.4379	.0626

PARAMETERS OF LEAST SQUARES FIT
SUMMARY TABLE
N=2

EXP	A	B	C	(B**2/4C)	(-B/2C)	((-B/2C)**(-1/N))	CHI-SQUARE
K-P:NKO	.1412	7.8561	23.8964-	.6456-	.1643	2.4664	.0728
K-P:LPIO	.1202	2.3196	.0422-	31.8234-	27.4383	.1909	.0152
K-P:NKO	.2222	4.2222	24.0000	.1856	.0879-	.0000	.0267
K-P:LFT	.1173	.9548-	18.8555	.0120	.0253	6.2844	.2063
K-P:S+PI-	.1946	1.9940	.6690	1.4857	1.4901-	.0000	.0420
K-P:S-PI+	.0249	.9330	1.9575	.1111	.2383-	.0000	.0229
K-P:XI-K+	.0322	1.1566	.9551	.3501	.6055-	.0000	.0496
K-P:XIOKO	.0611	.5712	.1032-	.7903-	2.7670	.6011	.0546
K-N:LPI-	.1685	2.0320	13.2415	.0779	.0767-	.0000	.0053
K-N:S-PIO	.2347	1.0530	.2133-	1.2996-	2.4682	.6365	.0282
K-N:SOPI-	.2231	1.0416	.2118-	1.2803-	2.4582	.6378	.1156
K+N:PKO	.1561	9.7165	31.6613-	.7454-	.1534	2.5528	.0231
PI-P:NPIO	.3333	3.8333	11.8333	.3104	.1619-	.0000	.4889
PI-P:NET	.0606	5.9333	37.3333-	.2357-	.0794	3.5474	.0287
PI-P:LKO	.1146	1.8562	2.0972-	.4107-	.4425	1.5032	.0745
PI-P:S-K+	.0270-	1.7707	2.2556-	.3475-	.3925	1.5961	.0262
PI+P:S+K+	.1000	2.7045	3.6433-	.5018-	.3711	1.6414	.0346
PI+N:PET	.2893	.4345-	9.3888	.0050	.0231	6.5737	.0540

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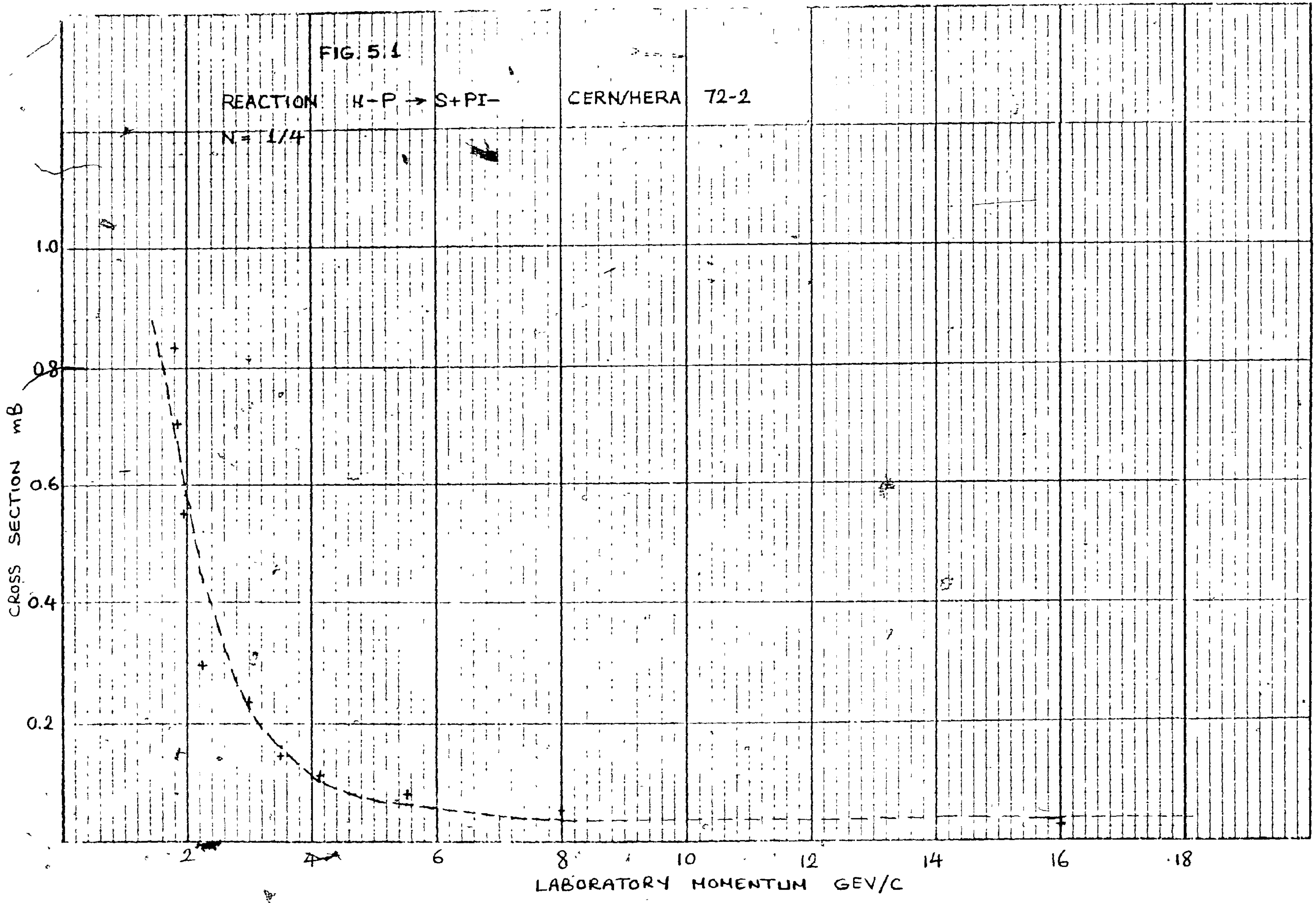
FIG. 5.1
REACTION K-P → S+PI-
CERN/HERA 72-2
N= 1/4
1.0
0.8
0.6
0.4
0.2
CROSS SECTION mB
2
4
6
8
10
12
14
16
18
LABORATORY MOMENTUM GEV/C

APPENDIX "A"

NOTATION

APPENDIX "A"

NOTATION

BASIS VECTORS

A baryon state basis vector array is denoted by m. The vector resulting from the action of a meson operator M_{op} on a basis vector m is represented by basis vectors

$$\begin{matrix} d_1, d_3, d_5 & b & c_1, c_3, c_5 \\ & m & \\ d_2, d_4, d_6 & a & c_2, c_4, c_6 \end{matrix}$$

This is read as the b-plet basis vector generated by M_{op} acting on an a-plet basis vector m, the $m_{c_1c_2}$, $m_{c_3c_4}$ and $m_{c_5c_6}$ parameters of m being replaced by $m_{c_1c_2} - 1$, $m_{c_3c_4} - 1$, $m_{c_5c_6} - 1$ respectively, and the $m_{d_1d_2}$, $m_{d_3d_4}$, $m_{d_5d_6}$ parameters of m being replaced by $m_{d_1d_2} + 1$, $m_{d_3d_4} + 1$, $m_{d_5d_6} + 1$ respectively. For example a basis vector

$$\begin{matrix} 2, 1 & 10 & 1, 1, 2 \\ & m & \\ 2, 3 & 8 & 1, 2, 3 \end{matrix}$$

is the decuplet basis vector resulting from the octet basis vector m with the m_{11}, m_{12}, m_{23}, elements replaced by $m_{11} - 1$, $m_{12} - 1$, $m_{23} - 1$ and the m_{22}, m_{13} elements replaced by $m_{22} + 1$, $m_{13} + 1$ respectively.

VECTOR COEFFICIENTS

A coefficient $\alpha^{c_1, c_3, c_5}_{c_2, c_4, c_6}$ is the product of the coefficients $a^{c_1}_{c_2}$, $a^{c_3}_{c_4}$, $a^{c_5}_{c_6}$ defined in [6] , divided by the terms in $a^{c_3}_{c_4}$ and $a^{c_5}_{c_6}$ which include the parameter $m_{c_1c_2}$, the terms $a^{c_1}_{c_2}$ and $a^{c_3}_{c_4}$ which include the parameter $m_{c_5c_6}$ and the terms in $a^{c_1}_{c_2}$ and $a^{c_5}_{c_6}$ which include the parameter $m_{c_3c_4}$. The product being multiplied by $\sqrt{(-1)^{S+1}}$ where S in the number of coefficients a in the product.

A coefficients $\beta^{d_1, d_3, d_5}_{d_2, d_4, d_6}$ is similarily defined with the b coefficients defined in [7] replacing the a coefficients.

However, while the α coefficients are computed using the values of the initial array parameters, the β coefficients are computed using these values modified by replacing the $m_{c_1c_2}$, $m_{c_3c_4}$ and $m_{c_5c_6}$ parameters by $m_{c_1c_2} - 1$, $m_{c_3c_4} - 1$ and $m_{c_5c_6} - 1$ respectively.

The α and β coefficients are listed in Tables A.1. and A.2. respectively.

TABLE A.1.

$$\alpha_{3}^{1} = \left[\frac{-(m_{14}-m_{13}+1)(m_{24}-m_{13})(m_{34}-m_{13}-1)(m_{44}-m_{13}-2)(m_{12}-m_{13})(m_{22}-m_{13}-1)}{(m_{23}-m_{13})(m_{33}-m_{13}-1)(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)} \right]^{\frac{1}{2}}$$

$$\alpha_{2}^{2} = \left[\frac{-(m_{14}-m_{23}+2)(m_{24}-m_{23}+1)(m_{34}-m_{23})(m_{44}-m_{23}-1)(m_{12}-m_{23}+1)(m_{22}-m_{23})}{(m_{13}-m_{23}+2)(m_{33}-m_{23})(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)} \right]^{\frac{1}{2}}$$

$$\alpha_{3}^{3} = \left[\frac{-(m_{14}-m_{33}+3)(m_{24}-m_{33}+2)(m_{34}-m_{33}+1)(m_{44}-m_{33})(m_{12}-m_{33}+2)(m_{22}-m_{33}+1)}{(m_{13}-m_{33}+3)(m_{23}-m_{33}+2)(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)} \right]^{\frac{1}{2}}$$

$$\alpha_{2}^{1} = \left[\frac{-(m_{13}-m_{12}+1)(m_{23}-m_{12})(m_{33}-m_{12}-1)(m_{11}-m_{12})}{(m_{22}-m_{12})(m_{22}-m_{12}-1)} \right]^{\frac{1}{2}}$$

$$\alpha_{2}^{2} = \left[\frac{-(m_{13}-m_{22}+2)(m_{23}-m_{22}+1)(m_{33}-m_{22})(m_{11}-m_{22}+1)}{(m_{12}-m_{22}+2)(m_{12}-m_{22}+1)} \right]^{\frac{1}{2}}$$

$$\alpha_{1}^{1} = \left[-(m_{12}-m_{11}+1)(m_{22}-m_{11}) \right]^{\frac{1}{2}}$$

$$\alpha_{1,2,3}^{1,1,1} = \left[\frac{-(m_{14}-m_{13}+1)(m_{24}-m_{13})(m_{34}-m_{13}-1)(m_{44}-m_{13}-2)(m_{22}-m_{13}-1)(m_{23}-m_{12})(m_{33}-m_{12}-1)(m_{22}-m_{11})}{(m_{23}-m_{13})(m_{33}-m_{13}-1)(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{22}-m_{12})(m_{22}-m_{12}-1)} \right]^{\frac{1}{2}}$$

$$\alpha_{1,2,3}^{1,1,2} = \left[\frac{-(m_{14}-m_{23}+2)(m_{24}-m_{23}+1)(m_{34}-m_{23})(m_{44}-m_{23}-1)(m_{22}-m_{23})(m_{13}-m_{12}+1)(m_{33}-m_{12}-1)(m_{22}-m_{11})}{(m_{13}-m_{23}+2)(m_{33}-m_{23})(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{22}-m_{12})(m_{22}-m_{12}-1)} \right]^{\frac{1}{2}}$$

$$\alpha_{1,2,3}^{1,1,3} = \left[\frac{-(m_{14}-m_{33}+3)(m_{24}-m_{33}+2)(m_{34}-m_{33}+1)(m_{44}-m_{33})(m_{22}-m_{33}+1)(m_{13}-m_{12}+1)(m_{23}-m_{12})(m_{22}-m_{11})}{(m_{13}-m_{33}+3)(m_{23}-m_{33}+2)(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{22}-m_{12})(m_{22}-m_{12}-1)} \right]^{\frac{1}{2}}$$

$$\alpha^{1,2,1}_{1,2,2} = \left[\frac{-(m_{14}-m_{13}+1)(m_{24}-m_{13})(m_{34}-m_{13}-1)(m_{44}-m_{13}-2)(m_{12}-m_{13})(m_{23}-m_{22}+1)(m_{33}-m_{22})(m_{12}-m_{11}+1)}{(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{23}-m_{13}-2)(m_{33}-m_{13}-3)(m_{12}-m_{22}+1)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

$$\alpha^{1,2,2}_{1,2,3} = \left[\frac{-(m_{14}-m_{23}+2)(m_{24}-m_{23}+1)(m_{34}-m_{23})(m_{44}-m_{23}-1)(m_{12}-m_{23}+1)(m_{13}-m_{22}+2)(m_{33}-m_{22})(m_{12}-m_{11}+1)}{(m_{13}-m_{23}+2)(m_{33}-m_{23})(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{12}-m_{22}+2)(m_{12}-m_{22}+1)}\right]^{\frac{1}{2}}$$

$$\alpha^{1,2,3}_{1,2,3} = \left[\frac{-(m_{14}-m_{33}+3)(m_{24}-m_{33}+2)(m_{34}-m_{33}+1)(m_{44}-m_{33})(m_{12}-m_{33}+2)(m_{13}-m_{22}+2)(m_{23}-m_{22}+1)(m_{12}-m_{11}+1)}{(m_{13}-m_{33}+3)(m_{23}-m_{33}+2)(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{12}-m_{22}+2)(m_{12}-m_{23}+1)}\right]^{\frac{1}{2}}$$

$$\alpha^{1,1}_{2,3} = \left[\frac{-(m_{14}-m_{13}+1)(m_{24}-m_{13})(m_{34}-m_{13}-1)(m_{44}-m_{13}-2)(m_{22}-m_{13}-1)(m_{23}-m_{12})(m_{33}-m_{12}-1)(m_{11}-m_{12})}{(m_{23}-m_{13})(m_{33}-m_{13}-1)(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{22}-m_{12})(m_{22}-m_{12}-1)}\right]^{\frac{1}{2}}$$

$$\alpha^{1,2}_{2,3} = \left[\frac{-(m_{14}-m_{23}+2)(m_{24}-m_{23}+1)(m_{34}-m_{23})(m_{44}-m_{23}-1)(m_{22}-m_{23})(m_{13}-m_{12}+1)(m_{33}-m_{12}-1)(m_{11}-m_{12})}{(m_{13}-m_{23}+2)(m_{33}-m_{23})(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{22}-m_{12})(m_{22}-m_{12}-1)}\right]^{\frac{1}{2}}$$

$$\alpha^{1,3}_{2,3} = \left[\frac{-(m_{14}-m_{33}+3)(m_{24}-m_{33}+2)(m_{34}-m_{33}+1)(m_{44}-m_{33})(m_{22}-m_{33}+1)(m_{13}-m_{12}+1)(m_{23}m_{12})(m_{11}-m_{12})}{(m_{13}-m_{23}+3)(m_{23}-m_{33}+2)(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{22}-m_{12})(m_{22}-m_{12}-1)}\right]^{\frac{1}{2}}$$

$$\alpha^{2,1}_{2,3} = \left[\frac{-(m_{14}-m_{13}+1)(m_{24}-m_{13})(m_{34}-m_{13}-1)(m_{44}-m_{13}-2)(m_{12}-m_{13})(m_{23}-m_{22}+1)(m_{33}-m_{22})(m_{11}-m_{22}+1)}{(m_{23}-m_{13})(m_{33}-m_{13}-1)(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{12}-m_{22}+2)(m_{12}-m_{22}+1)}\right]^{\frac{1}{2}}$$

$$\alpha^{2,2}_{2,3} = \left[\frac{-(m_{14}-m_{23}+2)(m_{24}-m_{23}+1)(m_{34}-m_{23})(m_{44}-m_{23}-1)(m_{12}-m_{23}+1)(m_{13}-m_{22}+2)(m_{33}-m_{22})(m_{11}-m_{22}+1)}{(m_{13}-m_{23}+2)(m_{33}-m_{23})(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{12}-m_{22}+2)(m_{12}-m_{22}+1)}\right]^{\frac{1}{2}}$$

$$\alpha^{2,3}_{2,3} = \left[\frac{-(m_{14}-m_{33}+3)(m_{24}-m_{33}+2)(m_{34}-m_{33}+1)(m_{12}-m_{33})(m_{12}-m_{33}+2)(m_{13}-m_{22}+2)(m_{23}-m_{22}+1)(m_{11}-m_{22}+1)}{(m_{13}-m_{33}+3)(m_{23}-m_{33}+2)(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{12}-m_{22}+2)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

TABLE A.2.

$$\beta^{1}_{3}=\left[\frac{-(m_{14}-m_{13})(m_{24}-m_{13}-1)(m_{34}-m_{13}-2)(m_{44}-m_{13}-3)(m_{12}-m_{13}-1)(m_{22}-m_{13}-2)}{(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{23}-m_{13}-2)(m_{33}-m_{13}-3)}\right]^{\frac{1}{2}}$$

$$\beta^{2}_{3}=\left[\frac{-(m_{14}-m_{23}+1)(m_{24}-m_{23})(m_{34}-m_{23}-1)(m_{44}-m_{23}-2)(m_{12}-m_{23})(m_{22}-m_{23}-1)}{(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{13}-m_{23})(m_{33}-m_{23}-2)}\right]^{\frac{1}{2}}$$

$$\beta^{3}_{3}=\left[\frac{-(m_{14}-m_{33}+2)(m_{23}-m_{33}+1)(m_{34}-m_{33})(m_{44}-m_{33}-1)(m_{12}-m_{33}+1)(m_{22}-m_{33})}{(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{13}-m_{33}+1)(m_{23}-m_{33})}\right]^{\frac{1}{2}}$$

$$\beta^{1}_{2}=\left[\frac{-(m_{13}-m_{12})(m_{23}-m_{12}-1)(m_{33}-m_{12}-2)(m_{11}-m_{12}-1)}{(m_{22}-m_{12}-1)(m_{22}-m_{12}-2)}\right]^{\frac{1}{2}}$$

$$\beta^{2}_{2}=\left[\frac{-(m_{13}-m_{22}+1)(m_{23}-m_{22})(m_{33}-m_{22}-1)(m_{11}-m_{22})}{(m_{12}-m_{22}+1)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

$$\beta^{1}_{1}=\left[-(m_{12}-m_{11})(m_{22}-m_{11}-1)\right]^{\frac{1}{2}}$$

$$\beta^{1,1}_{2,3}=\left[\frac{-(m_{13}-m_{14})(m_{24}-m_{13}-1)(m_{34}-m_{13}-2)(m_{44}-m_{13}-3)(m_{22}-m_{13}-2)(m_{23}-m_{12}-1)(m_{33}-m_{12}-2)(m_{11}-m_{12}-1)}{(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{23}-m_{13}-2)(m_{33}-m_{13}-3)(m_{22}-m_{12}-1)(m_{22}-m_{12}-2)}\right]$$

$$\beta^{1,2}_{2,3}=\left[\frac{-(m_{14}-m_{23}+1)(m_{24}-m_{23})(m_{34}-m_{23}-1)(m_{44}-m_{23}-2)(m_{22}-m_{23}-1)(m_{13}-m_{12})(m_{33}-m_{12}-2)(m_{11}-m_{12}-2)}{(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{13}-m_{23})(m_{33}-m_{23}-2)(m_{22}-m_{12}-1)(m_{22}-m_{12}-2)}\right]^{\frac{1}{2}}$$

$$\beta^{1,3}_{2,3}=\left[\frac{-(m_{14}-m_{33}+2)(m_{24}-m_{33}+1)(m_{34}-m_{33})(m_{44}-m_{33}-1)(m_{22}-m_{33})(m_{13}-m_{12})(m_{23}-m_{12}-1)(m_{11}-m_{12}-1)}{(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{13}-m_{33}+1)(m_{23}-m_{33})(m_{22}-m_{12}-1)(m_{22}-m_{12}-2)}\right]^{\frac{1}{2}}$$

$$\beta^{2,1}_{2,3}=\left[\frac{-(m_{14}-m_{13})(m_{24}-m_{13}-1)(m_{34}-m_{13}-2)(m_{44}-m_{13}-3)(m_{12}-m_{13}-1)(m_{23}-m_{22})(m_{33}-m_{22}-1)(m_{11}-m_{22})}{(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{23}-m_{13}-2)(m_{33}-m_{13}-3)(m_{12}-m_{22}+1)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

$$\beta^{2,2}_{2,3}=\left[\frac{-(m_{14}-m_{23}+1)(m_{24}-m_{23})(m_{34}-m_{23}-1)(m_{44}-m_{23}-2)(m_{12}-m_{23})(m_{13}-m_{22}+1)(m_{33}-m_{22}-1)(m_{11}-m_{22})}{(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{13}-m_{23})(m_{33}-m_{23}-2)(m_{12}-m_{22}+1)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

$$\beta^{2,3}_{2,3}=\left[\frac{-(m_{14}-m_{33}+2)(m_{24}-m_{33}+1)(m_{34}-m_{33})(m_{44}-m_{33}-1)(m_{12}-m_{33}+1)(m_{13}-m_{22}+1)(m_{23}-m_{22})(m_{11}-m_{22})}{(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{13}-m_{33}+1)(m_{23}-m_{33})(m_{12}-m_{22}+1)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

$$\beta^{1,1,1}_{1,2,3}=\left[\frac{-(m_{14}-m_{13})(m_{24}-m_{13}-1)(m_{34}-m_{13}-2)(m_{44}-m_{13}-3)(m_{22}-m_{13}-2)(m_{23}-m_{12}-1)(m_{33}-m_{12}-2)(m_{22}-m_{11}-1)}{(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{23}-m_{13}-2)(m_{33}-m_{13}-3)(m_{22}-m_{12}-1)(m_{22}-m_{12}-2)}\right]$$

$$\beta^{1,1,2}_{1,2,3}=\left[\frac{-(m_{14}-m_{23}+1)(m_{24}-m_{23})(m_{34}-m_{23}-1)(m_{44}-m_{23}-2)(m_{22}-m_{23}-1)(m_{13}-m_{12}-1)(m_{33}-m_{12}-2)(m_{22}-m_{11}-1)}{(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{13}-m_{23})(m_{33}-m_{23}-2)(m_{22}-m_{12}-1)(m_{22}-m_{12}-2)}\right]$$

$$\beta^{1,1,3}_{1,2,3}=\left[\frac{-(m_{14}-m_{33}+2)(m_{24}-m_{33}+1)(m_{34}-m_{33})(m_{44}-m_{33}-1)(m_{22}-m_{33})(m_{13}-m_{12})(m_{23}-m_{12}-1)(m_{22}-m_{11}-1)}{(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{13}-m_{33}+1)(m_{23}-m_{33})(m_{22}-m_{12}-1)(m_{22}-m_{12}-2)}\right]^{\frac{1}{2}}$$

$$\beta^{1,2,1}_{1,2,3}=\left[\frac{-(m_{14}-m_{13})(m_{24}-m_{13}-1)(m_{34}-m_{13}-2)(m_{44}-m_{13}-3)(m_{12}-m_{13}-1)(m_{23}-m_{22})(m_{33}-m_{22}-1)(m_{12}-m_{11})}{(m_{23}-m_{13}-1)(m_{33}-m_{13}-2)(m_{23}-m_{13}-2)(m_{33}-m_{13}-3)(m_{12}-m_{22}+1)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

$$\beta^{1,2,2}_{1,2,3}=\left[\frac{-(m_{14}-m_{23}+1)(m_{24}-m_{23})(m_{34}-m_{23}-1)(m_{44}-m_{23}-2)(m_{12}-m_{23})(m_{13}-m_{22}+1)(m_{33}-m_{22}-1)(m_{12}-m_{11})}{(m_{13}-m_{23}+1)(m_{33}-m_{23}-1)(m_{13}-m_{23})(m_{33}-m_{23}-2)(m_{12}-m_{22}+1)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

$$\beta^{1,2,3}_{1,2,3}=\left[\frac{-(m_{14}-m_{33}+2)(m_{24}-m_{33}+1)(m_{34}-m_{33})(m_{44}-m_{33}-1)(m_{12}-m_{33}+1)(m_{13}-m_{22}+1)(m_{23}-m_{22})(m_{12}-m_{11})}{(m_{13}-m_{33}+2)(m_{23}-m_{33}+1)(m_{13}-m_{33}+1)(m_{23}-m_{33})(m_{12}-m_{22}+1)(m_{12}-m_{22})}\right]^{\frac{1}{2}}$$

APPENDIX "B"

GENERAL FORM OF Mop $|B\rangle$ FOR THE PSEUDOSCALAR MESON OCTET OPERATORS

$$(\pi^{+})\quad I_{14}\, I_{42}^{m} = (\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,1}_{2,3})\begin{matrix}1,1,1 & 8 & 1,1\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,1}_{2,3})\begin{matrix}1,1,2 & 8 & 1,1\\ & m & \\ 1,2,3 & 10 & 2,3\end{matrix} +(\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,1}_{2,3})\begin{matrix}1,1,3 & 8 & 1,1\\ & m & \\ 1,2,3 & 27 & 2,3\end{matrix}$$

$$+(\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,1}_{2,3})\begin{matrix}1,2,1 & 8 & 1,1\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,1}_{2,3})\begin{matrix}1,2,2 & 8 & 1,1\\ & m & \\ 1,2,3 & 10 & 2,3\end{matrix}$$

$$+(\beta^{1,2,3}_{1,2,3})\,(\alpha^{1,2}_{2,3})\begin{matrix}1,2,3 & 8 & 1,1\\ & m & \\ 1,2,3 & 27 & 2,3\end{matrix} +(\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,2}_{2,3})\begin{matrix}1,1,1 & 10 & 1,2\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,2}_{2,3})\begin{matrix}1,1,2 & 8 & 1,2\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,2}_{2,3})\begin{matrix}1,1,3 & 10 & 1,2\\ & m & \\ 1,2,3 & 27 & 2,3\end{matrix}$$

$$+(\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,2}_{2,3})\begin{matrix}1,2,1 & 10 & 1,2\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,2}_{2,3})\begin{matrix}1,2,2 & 8 & 1,2\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,2,3}_{1,2,3})\,(\alpha^{1,2}_{2,3})\begin{matrix}1,2,3 & 10 & 1,2\\ & m & \\ 1,2,3 & 27 & 2,3\end{matrix} +(\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,3}_{2,3})\begin{matrix}1,1,1 & 27 & 1,3\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,3}_{2,3})\begin{matrix}1,1,2 & 27 & 1,3\\ & m & \\ 1,2,3 & 10 & 2,3\end{matrix} +(\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,3}_{2,3})\begin{matrix}1,1,3 & 8 & 1,3\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,3}_{2,3})\begin{matrix}1,2,1 & 27 & 1,3\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,3}_{2,3})\begin{matrix}1,2,2 & 27 & 1,3\\ & m & \\ 1,2,3 & 10 & 2,3\end{matrix}$$

$$+(\beta^{1,2,3}_{1,2,3})\,(\alpha^{1,3}_{2,3})\begin{matrix}1,2,3 & 8 & 1,3\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,1,1}_{1,2,3})\,(\alpha^{2,1}_{2,3})\begin{matrix}1,1,1 & 8 & 2,1\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,1,2}_{1,2,3})\,(\alpha^{2,1}_{2,3})\begin{matrix}1,1,2 & 8 & 2,1\\ & m & \\ 1,2,3 & 10 & 2,3\end{matrix} +(\beta^{1,1,3}_{1,2,3})\,(\alpha^{2,1}_{2,3})\begin{matrix}1,1,3 & 8 & 2,1\\ & m & \\ 1,2,3 & 27 & 2,3\end{matrix}$$

$$+(\beta^{1,2,1}_{1,2,3})\,(\alpha^{2,1}_{2,3})\begin{matrix}1,2,1 & 8 & 2,1\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,2,2}_{1,2,3})\,(\alpha^{2,1}_{2,3})\begin{matrix}1,2,2 & 8 & 2,1\\ & m & \\ 1,2,3 & 10 & 2,3\end{matrix}$$

$$+(\beta^{1,2,3}_{1,2,3})\,(\alpha^{2,1}_{2,3})\begin{matrix}1,2,3 & 8 & 2,1\\ & m & \\ 1,2,3 & 27 & 2,3\end{matrix} +(\beta^{1,1,1}_{1,2,3})\,(\alpha^{2,2}_{2,3})\begin{matrix}1,1,1 & 10 & 2,2\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,1,2}_{1,2,3})\,(\alpha^{2,2}_{2,3})\begin{matrix}1,1,2 & 8 & 2,2\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,1,3}_{1,2,3})\,(\alpha^{2,2}_{2,3})\begin{matrix}1,1,3 & 10 & 2,2\\ & m & \\ 1,2,3 & 27 & 2,3\end{matrix}$$

$$+(\beta^{1,2,1}_{1,2,3})\,(\alpha^{2,2}_{2,3})\begin{matrix}1,2,1 & 10 & 2,2\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,2,2}_{1,2,3})\,(\alpha^{2,2}_{2,3})\begin{matrix}1,2,2 & 8 & 2,2\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,2,3}_{1,2,3})\,(\alpha^{2,2}_{2,3})\begin{matrix}1,2,3 & 10 & 2,2\\ & m & \\ 1,2,3 & 27 & 2,3\end{matrix} +(\beta^{1,1,1}_{1,2,3})\,(\alpha^{2,3}_{2,3})\begin{matrix}1,1,1 & 27 & 2,3\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,1,2}_{1,2,3})\,(\alpha^{2,3}_{2,3})\begin{matrix}1,1,2 & 27 & 2,3\\ & m & \\ 1,2,3 & 10 & 2,3\end{matrix} +(\beta^{1,1,3}_{1,2,3})\,(\alpha^{2,3}_{2,3})\begin{matrix}1,1,3 & 8 & 2,3\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$+(\beta^{1,2,1}_{1,2,3})\,(\alpha^{2,3}_{2,3})\begin{matrix}1,2,1 & 27 & 2,3\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix} +(\beta^{1,2,2}_{1,2,3})\,(\alpha^{2,3}_{2,3})\begin{matrix}1,2,2 & 27 & 2,3\\ & m & \\ 1,2,3 & 10 & 2,3\end{matrix}$$

$$+(\beta^{1,2,3}_{1,2,3})\,(\alpha^{2,3}_{2,3})\begin{matrix}1,2,3 & 8 & 2,3\\ & m & \\ 1,2,3 & 8 & 2,3\end{matrix}$$

$$(\pi^0)\ (I_{14}I_{41} - I_{24}I_{42})\ m = (\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,1,1}_{1,2,3}) \begin{matrix} 1,1,1 & 8 & 1,1,1 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,1,2}_{1,2,3}) \begin{matrix} 1,1,1 & 10 & 1,1,2 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,1,3}_{1,2,3}) \begin{matrix} 1,1,1 & 27 & 1,1,3 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,2,1}_{1,2,3}) \begin{matrix} 1,1,1 & 8 & 1,2,1 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,2,2}_{1,2,3}) \begin{matrix} 1,1,1 & 10 & 1,2,2 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,1,1}_{1,2,3})\,(\alpha^{1,2,3}_{1,2,3}) \begin{matrix} 1,1,1 & 27 & 1,2,3 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,1,1}_{1,2,3}) \begin{matrix} 1,1,2 & 8 & 1,1,1 \\ 1,2,3 & m & 1,2,3 \\ & 10 & \end{matrix} + (\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,1,2}_{1,2,3}) \begin{matrix} 1,1,2 & 8 & 1,1,2 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,1,3}_{1,2,3}) \begin{matrix} 1,1,2 & 27 & 1,1,3 \\ 1,2,3 & m & 1,2,3 \\ & 10 & \end{matrix} + (\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,2,1}_{1,2,3}) \begin{matrix} 1,1,2 & 8 & 1,2,1 \\ 1,2,3 & m & 1,2,3 \\ & 10 & \end{matrix}$$

$$+ (\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,2,2}_{1,2,3}) \begin{matrix} 1,1,2 & 8 & 1,2,2 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,1,2}_{1,2,3})\,(\alpha^{1,2,3}_{1,2,3}) \begin{matrix} 1,1,2 & 27 & 1,2,3 \\ 1,2,3 & m & 1,2,3 \\ & 10 & \end{matrix}$$

$$+ (\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,1,1}_{1,2,3}) \begin{matrix} 1,1,3 & 8 & 1,1,1 \\ 1,2,3 & m & 1,2,3 \\ & 27 & \end{matrix} + (\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,1,2}_{1,2,3}) \begin{matrix} 1,1,3 & 10 & 1,1,2 \\ 1,2,3 & m & 1,2,3 \\ & 27 & \end{matrix}$$

$$+ (\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,1,3}_{1,2,3}) \begin{matrix} 1,1,3 & 8 & 1,1,3 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,2,1}_{1,2,3}) \begin{matrix} 1,1,3 & 8 & 1,2,1 \\ 1,2,3 & m & 1,2,3 \\ & 27 & \end{matrix}$$

$$+ (\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,2,2}_{1,2,3}) \begin{matrix} 1,1,3 & 10 & 1,2,2 \\ 1,2,3 & m & 1,2,3 \\ & 27 & \end{matrix} + (\beta^{1,1,3}_{1,2,3})\,(\alpha^{1,2,3}_{1,2,3}) \begin{matrix} 1,1,3 & 8 & 1,2,3 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,1,1}_{1,2,3}) \begin{matrix} 1,2,1 & 8 & 1,1,1 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,1,2}_{1,2,3}) \begin{matrix} 1,2,1 & 10 & 1,1,3 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,1,3}_{1,2,3}) \begin{matrix} 1,2,1 & 27 & 1,1,3 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,2,1}_{1,2,3}) \begin{matrix} 1,2,1 & 8 & 1,2,1 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,2,2}_{1,2,3}) \begin{matrix} 1,2,1 & 10 & 1,2,2 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,2,1}_{1,2,3})\,(\alpha^{1,2,3}_{1,2,3}) \begin{matrix} 1,2,1 & 27 & 1,2,3 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,1,1}_{1,2,3}) \begin{matrix} 1,2,2 & 8 & 1,1,1 \\ 1,2,3 & m & 1,2,3 \\ & 10 & \end{matrix} + (\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,1,2}_{1,2,3}) \begin{matrix} 1,2,2 & 8 & 1,1,2 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix}$$

$$+ (\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,1,3}_{1,2,3}) \begin{matrix} 1,2,2 & 27 & 1,1,3 \\ 1,2,3 & m & 1,2,3 \\ & 10 & \end{matrix} + (\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,2,1}_{1,2,3}) \begin{matrix} 1,2,2 & 8 & 1,2,1 \\ 1,2,3 & m & 1,2,3 \\ & 10 & \end{matrix}$$

$$+ (\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,2,2}_{1,2,3}) \begin{matrix} 1,2,2 & 8 & 1,2,2 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,2,2}_{1,2,3})\,(\alpha^{1,2,3}_{1,2,3}) \begin{matrix} 1,2,2 & 27 & 1,2,3 \\ 1,2,3 & m & 1,2,3 \\ & 10 & \end{matrix}$$

$$+ (\beta^{1,2,3}_{1,2,3})\,(\alpha^{1,1,1}_{1,2,3}) \begin{matrix} 1,2,3 & 8 & 1,1,1 \\ 1,2,3 & m & 1,2,3 \\ & 27 & \end{matrix} + (\beta^{1,2,3}_{1,2,3})\,(\alpha^{1,1,2}_{1,2,3}) \begin{matrix} 1,2,3 & 10 & 1,1,2 \\ 1,2,3 & m & 1,2,3 \\ & 27 & \end{matrix}$$

$$+ (\beta^{1,2,3}_{1,2,3})\,(\alpha^{1,1,3}_{1,2,3}) \begin{matrix} 1,2,3 & 8 & 1,1,3 \\ 1,2,3 & m & 1,2,3 \\ & 8 & \end{matrix} + (\beta^{1,2,3}_{1,2,3})\,(\alpha^{1,2,1}_{1,2,3}) \begin{matrix} 1,2,3 & 8 & 1,2,1 \\ 1,2,3 & m & 1,2,3 \\ & 27 & \end{matrix}$$

$$+(\beta^{1,2,3}_{1,2,3})(\alpha^{1,2,2}_{1,2,3})\,{}^{1,2,3}_{1,2,3}\,m^{10}_{27}\,{}^{1,2,2}_{1,2,3}\;-(\beta^{1,2,3}_{1,2,3})(\alpha^{1,2,3}_{1,2,3})\,{}^{1,2,3}_{1,2,3}\,m^{8}_{8}\,{}^{1,2,3}_{1,2,3}$$

$$-(\beta^{1,1}_{2,3})(\alpha^{1,1}_{2,3})\,{}^{1,1}_{2,3}\,m^{8}_{8}\,{}^{1,1}_{2,3}\;-(\beta^{1,1}_{2,3})(\alpha^{1,2}_{2,3})\,{}^{1,1}_{2,3}\,m^{10}_{8}\,{}^{1,2}_{2,3}$$

$$-(\beta^{1,1}_{2,3})(\alpha^{1,3}_{2,3})\,{}^{1,1}_{2,3}\,m^{27}_{8}\,{}^{1,3}_{2,3}\;-(\beta^{1,1}_{2,3})(\alpha^{2,1}_{2,3})\,{}^{1,1}_{2,3}\,m^{8}_{8}\,{}^{2,1}_{2,3}$$

$$-(\beta^{1,1}_{2,3})(\alpha^{2,2}_{2,3})\,{}^{1,1}_{2,3}\,m^{10}_{8}\,{}^{2,2}_{2,3}\;-(\beta^{1,1}_{2,3})(\alpha^{2,3}_{2,3})\,{}^{1,1}_{2,3}\,m^{27}_{8}\,{}^{2,3}_{2,3}$$

$$-(\beta^{1,2}_{2,3})(\alpha^{1,1}_{2,3})\,{}^{1,2}_{2,3}\,m^{8}_{10}\,{}^{1,1}_{2,3}\;-(\beta^{1,2}_{2,3})(\alpha^{1,2}_{2,3})\,{}^{1,2}_{2,3}\,m^{8}_{8}\,{}^{1,2}_{2,3}$$

$$-(\beta^{1,2}_{2,3})(\alpha^{1,3}_{2,3})\,{}^{1,2}_{2,3}\,m^{27}_{10}\,{}^{1,3}_{2,3}\;-(\beta^{1,2}_{2,3})(\alpha^{2,1}_{2,3})\,{}^{1,2}_{2,3}\,m^{8}_{10}\,{}^{2,1}_{2,3}$$

$$-(\beta^{1,2}_{2,3})(\alpha^{2,2}_{2,3})\,{}^{1,2}_{2,3}\,m^{8}_{8}\,{}^{2,2}_{2,3}\;-(\beta^{1,2}_{2,3})(\alpha^{2,3}_{2,3})\,{}^{1,2}_{2,3}\,m^{27}_{10}\,{}^{2,3}_{2,3}$$

$$-(\beta^{1,3}_{2,3})(\alpha^{1,1}_{2,3})\,{}^{1,3}_{2,3}\,m^{8}_{27}\,{}^{1,1}_{2,3}\;-(\beta^{1,3}_{2,3})(\alpha^{1,2}_{2,3})\,{}^{1,3}_{2,3}\,m^{10}_{27}\,{}^{1,2}_{2,3}$$

$$-(\beta^{1,3}_{2,3})(\alpha^{1,3}_{2,3})\,{}^{1,3}_{2,3}\,m^{8}_{8}\,{}^{1,3}_{2,3}\;-(\beta^{1,3}_{2,3})(\alpha^{2,1}_{2,3})\,{}^{1,3}_{2,3}\,m^{8}_{27}\,{}^{2,1}_{2,3}$$

$$-(\beta^{1,3}_{2,3})(\alpha^{2,2}_{2,3})\,{}^{1,3}_{2,3}\,m^{10}_{27}\,{}^{2,2}_{2,3}\;-(\beta^{1,3}_{2,3})(\alpha^{2,3}_{2,3})\,{}^{1,3}_{2,3}\,m^{8}_{8}\,{}^{2,3}_{2,3}$$

$$-(\beta^{2,1}_{2,3})(\alpha^{1,1}_{2,3})\,{}^{2,1}_{2,3}\,m^{8}_{8}\,{}^{1,1}_{2,3}\;-(\beta^{2,1}_{2,3})(\alpha^{1,2}_{2,3})\,{}^{2,1}_{2,3}\,m^{10}_{8}\,{}^{1,2}_{2,3}$$

$$-(\beta^{2,1}_{2,3})(\alpha^{1,3}_{2,3})\,{}^{2,1}_{2,3}\,m^{27}_{8}\,{}^{1,3}_{2,3}\;-(\beta^{2,1}_{2,3})(\alpha^{2,1}_{2,3})\,{}^{2,1}_{2,3}\,m^{8}_{8}\,{}^{2,1}_{2,3}$$

$$-(\beta^{2,1}_{2,3})(\alpha^{2,2}_{2,3})\,{}^{2,1}_{2,3}\,m^{10}_{8}\,{}^{2,2}_{2,3}\;-(\beta^{2,1}_{2,3})(\alpha^{2,3}_{2,3})\,{}^{2,1}_{2,3}\,m^{27}_{8}\,{}^{2,3}_{2,3}$$

$$-(\beta^{2,2}_{2,3})(\alpha^{1,1}_{2,3})\,{}^{2,2}_{2,3}\,m^{8}_{10}\,{}^{1,1}_{2,3}\;-(\beta^{2,2}_{2,3})(\alpha^{1,2}_{2,3})\,{}^{2,2}_{2,3}\,m^{8}_{8}\,{}^{1,2}_{2,3}$$

$$-(\beta^{2,2}_{2,3})(\alpha^{1,3}_{2,3})\,{}^{2,2}_{2,3}\,m^{27}_{10}\,{}^{1,3}_{2,3}\;-(\beta^{2,2}_{2,3})(\alpha^{2,1}_{2,3})\,{}^{2,2}_{2,3}\,m^{8}_{10}\,{}^{2,1}_{2,3}$$

$$-(\beta^{2,2}_{2,3})(\alpha^{2,2}_{2,3})\,{}^{2,2}_{2,3}\,m^{8}_{8}\,{}^{2,2}_{2,3}\;-(\beta^{2,2}_{2,3}(\alpha^{2,3}_{2,3}\,{}^{2,2}_{2,3}\,m^{27}_{10}\,{}^{2,3}_{2,3}$$

$$-(\beta^{2,3}_{2,3})(\alpha^{1,1}_{2,3})\,{}^{2,3}_{2,3}\,m^{8}_{27}\,{}^{1,1}_{2,3}\;-(\beta^{2,3}_{2,3})(\alpha^{1,2}_{2,3})\,{}^{2,3}_{2,3}\,m^{10}_{27}\,{}^{1,2}_{2,3}$$

$$-(\beta^{2,3}_{2,3})\;{}^{1,3}_{2,3}\;{}^{2,3}_{2,3}\,m^{8}_{8}\,{}^{1,3}_{2,3}\;-(\beta^{2,3}_{2,3}(\alpha^{2,1}_{2,3})\,{}^{2,3}_{2,3}\,m^{8}_{27}\,{}^{2,1}_{2,3}$$

$$-(\beta_{2,3}^{2,3}) \quad (\alpha_{2,3}^{2,2}) \quad {}^{2,3}_{2,3}\,{}^{10}_{27}m\,{}^{2,2}_{2,3} \qquad -(\beta_{2,3}^{2,3}) \quad (\alpha_{2,3}^{2,3}) \quad {}^{2,3}_{2,3}\,{}^{8}_{8}m\,{}^{2,3}_{2,3}$$

$$(ii)\quad I_{24}I_{41m} = (\beta^{1,1}_{2,3})(\alpha^{1,1,1}_{1,2,3})\begin{smallmatrix}1,1\\2,3\end{smallmatrix}\overset{8}{\underset{8}{m}}\begin{smallmatrix}1,1,1\\1,2,3\end{smallmatrix} + (\beta^{1,1}_{2,3})(\alpha^{1,1,2}_{1,2,3})$$

$$\begin{smallmatrix}1,1\\2,3\end{smallmatrix}\overset{10}{\underset{8}{m}}\begin{smallmatrix}1,1,2\\1,2,3\end{smallmatrix} + (\beta^{1,1}_{2,3})(\alpha^{1,1,3}_{1,2,3})\begin{smallmatrix}1,1\\2,3\end{smallmatrix}\overset{27}{\underset{8}{m}}\begin{smallmatrix}1,1,3\\1,2,3\end{smallmatrix}$$

$$+(\beta^{1,1}_{2,3})(\alpha^{1,2,1}_{1,2,3})\begin{smallmatrix}1,1\\2,3\end{smallmatrix}\overset{8}{\underset{8}{m}}\begin{smallmatrix}1,2,1\\1,2,3\end{smallmatrix} + (\beta^{1,1}_{2,3})(\alpha^{1,2,2}_{1,2,3})$$

$$\begin{smallmatrix}1,1\\2,3\end{smallmatrix}\overset{10}{\underset{8}{m}}\begin{smallmatrix}1,2,2\\1,2,3\end{smallmatrix} + (\beta^{1,1}_{2,3})(\alpha^{1,2,3}_{1,2,3})\begin{smallmatrix}1,1\\2,3\end{smallmatrix}\overset{27}{\underset{8}{m}}\begin{smallmatrix}1,2,3\\1,2,3\end{smallmatrix}$$

$$+(\beta^{1,2}_{2,3})(\alpha^{1,1,1}_{1,2,3})\begin{smallmatrix}1,2\\2,3\end{smallmatrix}\overset{8}{\underset{10}{m}}\begin{smallmatrix}1,1,1\\1,2,3\end{smallmatrix} + (\beta^{1,2}_{2,3})(\alpha^{1,1,2}_{1,2,3})$$

$$\begin{smallmatrix}1,2\\2,3\end{smallmatrix}\overset{8}{\underset{8}{m}}\begin{smallmatrix}1,1,2\\1,2,3\end{smallmatrix} + (\beta^{1,2}_{2,3})(\alpha^{1,1,3}_{1,2,3})\begin{smallmatrix}1,2\\2,3\end{smallmatrix}\overset{27}{\underset{10}{m}}\begin{smallmatrix}1,1,3\\1,2,3\end{smallmatrix}$$

$$+(\beta^{1,2}_{2,3})(\alpha^{1,2,1}_{1,2,3})\begin{smallmatrix}1,2\\2,3\end{smallmatrix}\overset{8}{\underset{10}{m}}\begin{smallmatrix}1,2,1\\1,2,3\end{smallmatrix} + (\beta^{1,2}_{2,3})(\alpha^{1,2,2}_{1,2,3})$$

$$\begin{smallmatrix}1,2\\2,3\end{smallmatrix}\overset{8}{\underset{8}{m}}\begin{smallmatrix}1,2,2\\1,2,3\end{smallmatrix} + (\beta^{1,2}_{2,3})(\alpha^{1,2,3}_{1,2,3})\begin{smallmatrix}1,2\\1,3\end{smallmatrix}\overset{27}{\underset{10}{m}}\begin{smallmatrix}1,2,3\\1,2,3\end{smallmatrix}$$

$$+(\beta^{1,3}_{2,3})(\alpha^{1,1,1}_{1,2,3})\begin{smallmatrix}1,3\\2,3\end{smallmatrix}\overset{8}{\underset{27}{m}}\begin{smallmatrix}1,1,1\\1,2,3\end{smallmatrix} + (\beta^{1,3}_{2,3})(\alpha^{1,1,2}_{1,2,3})$$

$$\begin{smallmatrix}1,3\\2,3\end{smallmatrix}\overset{10}{\underset{27}{m}}\begin{smallmatrix}1,1,2\\1,2,3\end{smallmatrix} + (\beta^{1,3}_{2,3})(\alpha^{1,1,3}_{1,2,3})\begin{smallmatrix}1,3\\2,3\end{smallmatrix}\overset{8}{\underset{8}{m}}\begin{smallmatrix}1,1,3\\1,2,3\end{smallmatrix}$$

$$+(\beta^{1,3}_{2,3})(\alpha^{1,2,1}_{1,2,3})\begin{smallmatrix}1,3\\2,3\end{smallmatrix}\overset{8}{\underset{27}{m}}\begin{smallmatrix}1,2,1\\1,2,3\end{smallmatrix} + (\beta^{1,3}_{2,3})(\alpha^{1,2,2}_{1,2,3})$$

$$\begin{smallmatrix}1,3\\2,3\end{smallmatrix}\overset{10}{\underset{27}{m}}\begin{smallmatrix}1,2,2\\1,2,3\end{smallmatrix}\quad(\beta^{1,3}_{2,3})(\alpha^{1,2,3}_{1,2,3})\begin{smallmatrix}1,3\\2,3\end{smallmatrix}\overset{8}{\underset{8}{m}}\begin{smallmatrix}1,2,3\\1,2,3\end{smallmatrix}$$

$$+(\beta^{2,1}_{2,3})(\alpha^{1,1,1}_{1,2,3})\begin{smallmatrix}2,1\\2,3\end{smallmatrix}\overset{8}{\underset{8}{m}}\begin{smallmatrix}1,1,1\\1,2,3\end{smallmatrix} + (\beta^{2,1}_{2,3})(\alpha^{1,1,2}_{1,2,3})$$

$$\begin{smallmatrix}2,1\\2,3\end{smallmatrix}\overset{10}{\underset{8}{m}}\begin{smallmatrix}1,1,2\\1,2,3\end{smallmatrix} + (\beta^{2,1}_{2,3})(\alpha^{1,1,3}_{1,2,3})\begin{smallmatrix}2,1\\2,3\end{smallmatrix}\overset{27}{\underset{8}{m}}\begin{smallmatrix}1,1,3\\1,2,3\end{smallmatrix}$$

$$+(\beta^{2,1}_{2,3})(\alpha^{1,2,1}_{1,2,3})\begin{smallmatrix}2,1\\2,3\end{smallmatrix}\overset{8}{\underset{8}{m}}\begin{smallmatrix}1,2,1\\1,2,3\end{smallmatrix} + (\beta^{2,1}_{2,3})(\alpha^{1,2,2}_{1,2,3})$$

$$\begin{smallmatrix}2,1\\2,3\end{smallmatrix}\overset{10}{\underset{8}{m}}\begin{smallmatrix}1,2,2\\1,2,3\end{smallmatrix} + (\beta^{2,1}_{2,3})(\alpha^{1,2,3}_{1,2,3})\begin{smallmatrix}2,1\\2,3\end{smallmatrix}\overset{27}{\underset{8}{m}}\begin{smallmatrix}1,2,3\\1,2,3\end{smallmatrix}$$

$$+(\beta^{2,2}_{2,3})(\alpha^{1,1,1}_{1,2,3})\begin{smallmatrix}2,2\\2,3\end{smallmatrix}\overset{8}{\underset{10}{m}}\begin{smallmatrix}1,1,1\\1,2,3\end{smallmatrix} + (\beta^{2,2}_{2,3})(\alpha^{1,1,2}_{1,2,3})$$

$$\begin{matrix}2,2 & 8 & 1,1,2\\ & m & \\ 2,3 & 8 & 1,2,3\end{matrix} + (\beta^{2,2}_{2,3})\,(\alpha^{1,1,3}_{1,2,3}) \begin{matrix}2,2 & 27 & 1,1,3\\ & m & \\ 2,3 & 10 & 1,2,3\end{matrix}$$

$$+ (\beta^{2,2}_{2,3})\,(\alpha^{1,2,1}_{1,2,3}) \begin{matrix}2,2 & 8 & 1,2,1\\ & m & \\ 2,3 & 10 & 1,2,3\end{matrix} + (\beta^{2,2}_{2,3})\,(\alpha^{1,2,2}_{1,2,3})$$

$$\begin{matrix}2,2 & 8 & 1,2,2\\ & m & \\ 2,3 & 8 & 1,2,3\end{matrix} + (\beta^{2,2}_{2,3})\,(\alpha^{1,2,3}_{1,2,3}) \begin{matrix}2,2 & 27 & 1,2,3\\ & m & \\ 2,3 & 10 & 1,2,3\end{matrix}$$

$$+ (\beta^{2,3}_{2,3})\,(\alpha^{1,1,1}_{1,2,3}) \begin{matrix}2,3 & 8 & 1,1,1\\ & m & \\ 2,3 & 27 & 1,2,3\end{matrix} + (\beta^{2,3}_{2,3})\,(\alpha^{1,1,2}_{1,2,3})$$

$$\begin{matrix}2,3 & 10 & 1,1,3\\ & m & \\ 2,3 & 27 & 1,2,3\end{matrix} + (\beta^{2,3}_{2,3})\,(\alpha^{1,1,3}_{1,2,3}) \begin{matrix}2,3 & 8 & 1,1,3\\ & m & \\ 2,3 & 8 & 1,2,3\end{matrix}$$

$$+ (\beta^{2,3}_{2,3})\,(\alpha^{1,2,1}_{1,2,3}) \begin{matrix}2,3 & 8 & 1,2,1\\ & m & \\ 2,3 & 27 & 1,2,3\end{matrix} + (\beta^{2,3}_{2,3})\,(\alpha^{1,2,2}_{1,2,3})$$

$$\begin{matrix}2,3 & 10 & 1,2,2\\ & m & \\ 2,3 & 27 & 1,2,3\end{matrix} + (\beta^{2,3}_{2,3})\,(\alpha^{1,2,3}_{1,2,3}) \begin{matrix}2,3 & 8 & 1,2,3\\ & m & \\ 2,3 & 8 & 1,2,3\end{matrix}$$

$$
\begin{aligned}
(K^{+})_{*}\, I_{14} I_{43}\, m = {} & (\beta^{1,1,1}_{1,2,3})\,(\alpha_3^{1})\,{}^{1,1,1}_{1,2,3}\,{}^{8}_{8}m^{1}_{3} + (\beta^{1,1,1}_{1,2,3})\,(\alpha_3^{2})\,{}^{1,1,1}_{1,2,3}\,{}^{10}_{8}m^{2}_{3} \\
& + (\beta^{1,1,1}_{1,2,3})\,(\alpha_3^{3})\,{}^{1,1,1}_{1,2,3}\,{}^{27}_{8}m^{3}_{3} + (\beta^{1,1,2}_{1,2,3})\,(\alpha_3^{1})\,{}^{1,1,2}_{1,2,3}\,{}^{8}_{10}m^{1}_{3} \\
& + (\beta^{1,1,2}_{1,2,3})\,(\alpha_3^{2})\,{}^{1,1,2}_{1,2,3}\,{}^{8}_{8}m^{2}_{3} + (\beta^{1,1,2}_{1,2,3})\,(\alpha_3^{3})\,{}^{1,1,2}_{1,2,3}\,{}^{27}_{10}m^{3}_{3} \\
& + (\beta^{1,1,3}_{1,2,3})\,(\alpha_3^{1})\,{}^{1,1,3}_{1,2,3}\,{}^{8}_{27}m^{1}_{3} + (\beta^{1,1,3}_{1,2,3})\,(\alpha_3^{2})\,{}^{1,1,3}_{1,2,3}\,{}^{10}_{27}m^{2}_{3} \\
& + (\beta^{1,1,3}_{1,2,3})\,(\alpha_3^{3})\,{}^{1,1,3}_{1,2,3}\,{}^{8}_{8}m^{3}_{3} + (\beta^{1,2,1}_{1,2,3})\,(\alpha_3^{1})\,{}^{1,2,1}_{1,2,3}\,{}^{8}_{8}m^{1}_{3} \\
& + (\beta^{1,2,1}_{1,2,3})\,(\alpha_3^{2})\,{}^{1,2,1}_{1,2,3}\,{}^{10}_{8}m^{2}_{3} + (\beta^{1,2,1}_{1,2,3})\,(\alpha_3^{3})\,{}^{1,2,1}_{1,2,3}\,{}^{27}_{8}m^{3}_{3} \\
& + (\beta^{1,2,2}_{1,2,3})\,(\alpha_3^{1})\,{}^{1,2,2}_{1,2,3}\,{}^{8}_{10}m^{1}_{3} + (\beta^{1,2,2}_{1,2,3})\,(\alpha_3^{2})\,{}^{1,2,2}_{1,2,3}\,{}^{8}_{8}m^{2}_{3} \\
& + (\beta^{1,2,2}_{1,2,3})\,(\alpha_3^{3})\,{}^{1,2,2}_{1,2,3}\,{}^{27}_{10}m^{3}_{3} + (\beta^{1,2,3}_{1,2,3})\,(\alpha_3^{1})\,{}^{1,2,3}_{1,2,3}\,{}^{8}_{27}m^{1}_{3} \\
& + (\beta^{1,2,3}_{1,2,3})\,(\alpha_3^{2})\,{}^{1,2,3}_{1,2,3}\,{}^{10}_{27}m^{2}_{3} + (\beta^{1,2,3}_{1,2,3})\,(\alpha_3^{3})\,{}^{1,2,3}_{1,2,3}\,{}^{8}_{8}m^{3}_{3}
\end{aligned}
$$

$$
\begin{aligned}
(K^0)\ I_{24}I_{43}\,m = {} & (\beta^{1,1}_{2,3})(\alpha_3^{1})\begin{array}{ccc}1,1 & 8 & 1\\ & m & \\ 2,3 & 8 & 3\end{array} + (\beta^{1,1}_{2,3})(\alpha_3^{2})\begin{array}{ccc}1,1 & 10 & 2\\ & m & \\ 2,3 & 8 & 3\end{array} \\
& + (\beta^{1,1}_{2,3})(\alpha_3^{3})\begin{array}{ccc}1,1 & 27 & 3\\ & m & \\ 2,3 & 8 & 3\end{array} + (\beta^{1,2}_{2,3})(\alpha_3^{1})\begin{array}{ccc}1,2 & 8 & 1\\ & m & \\ 2,3 & 10 & 3\end{array} \\
& + (\beta^{1,2}_{2,3})(\alpha_3^{2})\begin{array}{ccc}1,2 & 8 & 2\\ & m & \\ 2,3 & 8 & 3\end{array} + (\beta^{1,2}_{2,3})(\alpha_3^{3})\begin{array}{ccc}1,2 & 27 & 3\\ & m & \\ 2,3 & 10 & 3\end{array} \\
& + (\beta^{1,3}_{2,3})(\alpha_3^{1})\begin{array}{ccc}1,3 & 8 & 1\\ & m & \\ 2,3 & 27 & 3\end{array} + (\beta^{1,3}_{2,3})(\alpha_3^{2})\begin{array}{ccc}1,3 & 10 & 2\\ & m & \\ 2,3 & 27 & 3\end{array} \\
& + (\beta^{1,3}_{2,3})(\alpha_3^{3})\begin{array}{ccc}1,3 & 8 & 3\\ & m & \\ 2,3 & 8 & 3\end{array} + (\beta^{2,1}_{2,3})(\alpha_3^{1})\begin{array}{ccc}2,1 & 8 & 1\\ & m & \\ 2,3 & 8 & 3\end{array} \\
& + (\beta^{2,2}_{2,3})(\alpha_3^{2})\begin{array}{ccc}2,1 & 10 & 2\\ & m & \\ 2,3 & 8 & 3\end{array} + (\beta^{2,1}_{2,3})(\alpha_3^{3})\begin{array}{ccc}2,1 & 27 & 3\\ & m & \\ 2,3 & 8 & 3\end{array} \\
& + (\beta^{2,2}_{2,3})(\alpha_3^{1})\begin{array}{ccc}2,2 & 8 & 1\\ & m & \\ 2,3 & 10 & 3\end{array} + (\beta^{2,2}_{2,3})(\alpha_3^{2})\begin{array}{ccc}2,2 & 8 & 2\\ & m & \\ 2,3 & 8 & 3\end{array} \\
& + (\beta^{2,2}_{2,3})(\alpha_3^{3})\begin{array}{ccc}2,2 & 27 & 3\\ & m & \\ 2,3 & 10 & 3\end{array} + (\beta^{2,3}_{2,3})(\alpha_3^{1})\begin{array}{ccc}2,3 & 8 & 1\\ & m & \\ 2,3 & 27 & 3\end{array} \\
& + (\beta^{2,3}_{2,3})(\alpha_3^{2})\begin{array}{ccc}2,3 & 10 & 2\\ & m & \\ 2,3 & 27 & 3\end{array} + (\beta^{2,3}_{2,3})(\alpha_3^{3})\begin{array}{ccc}2,3 & 8 & 3\\ & m & \\ 2,3 & 8 & 3\end{array}
\end{aligned}
$$

$$
\begin{aligned}
(\bar{K}^{\circ})\; I_{34} I_{42}\, m = \;& (\beta_3^{1})\,(\alpha_{2,3}^{1,1})\;{}^{1}_{3}m^{8\;\,1,1}_{8\;\,2,3} + (\beta_3^{2})\,(\alpha_{2,3}^{1,1})\;{}^{2}_{3}m^{8\;\,1,1}_{10\;\,2,3} \\
& + (\beta_3^{3})\,(\alpha_{2,3}^{1,1})\;{}^{3}_{3}m^{8\;\,1,1}_{27\;\,2,3} + (\beta_3^{1})\,(\alpha_{2,3}^{1,2})\;{}^{1}_{3}m^{10\;\,1,2}_{8\;\,2,3} \\
& + (\beta_3^{2})\,(\alpha_{2,3}^{1,2})\;{}^{2}_{3}m^{8\;\,1,2}_{8\;\,2,3} + (\beta_3^{3})\,(\alpha_{2,3}^{1,2})\;{}^{3}_{3}m^{10\;\,1,2}_{27\;\,2,3} \\
& + (\beta_3^{1})\,(\alpha_{2,3}^{1,3})\;{}^{1}_{3}m^{27\;\,1,3}_{8\;\,2,3} + (\beta_3^{2})\,(\alpha_{2,3}^{1,3})\;{}^{2}_{3}m^{27\;\,1,3}_{10\;\,2,3} \\
& + (\beta_3^{3})\,(\alpha_{2,3}^{1,3})\;{}^{3}_{3}m^{8\;\,1,3}_{8\;\,2,3} + (\beta_3^{1})\,(\alpha_{2,3}^{2,1})\;{}^{1}_{3}m^{8\;\,2,1}_{8\;\,2,3} \\
& + (\beta_3^{2})\,(\alpha_{2,3}^{2,1})\;{}^{2}_{3}m^{8\;\,2,1}_{10\;\,2,3} + (\beta_3^{3})\,(\alpha_{2,3}^{2,1})\;{}^{3}_{3}m^{8\;\,2,1}_{27\;\,2,3} \\
& + (\beta_3^{1})\,(\alpha_{2,3}^{2,2})\;{}^{1}_{3}m^{10\;\,2,2}_{8\;\,2,3} + (\beta_3^{2})\,(\alpha_{2,3}^{2,2})\;{}^{2}_{3}m^{8\;\,2,2}_{8\;\,2,3} \\
& + (\beta_3^{3})\,(\alpha_{2,3}^{2,2})\;{}^{3}_{3}m^{10\;\,2,2}_{27\;\,2,3} + (\beta_3^{1})\,(\alpha_{2,3}^{2,3})\;{}^{1}_{3}m^{27\;\,2,3}_{8\;\,2,3} \\
& + (\beta_3^{2})\,(\alpha_{2,3}^{2,3})\;{}^{2}_{3}m^{27\;\,2,3}_{10\;\,2,3} + (\beta_3^{3})\,(\alpha_{2,3}^{2,3})\;{}^{3}_{3}m^{8\;\,2,3}_{8\;\,2,3}
\end{aligned}
$$

$$(K^-)\quad I_{34}I_{41}\,m = (\beta_3^{1})(\alpha_{1,2,3}^{1,1,1})\,{}^{1}_{3}\,{}^{8}_{8}m^{1,1,1}_{1,2,3}\quad(\beta_3^{2})(\alpha_{1,2,3}^{1,1,1})\,{}^{2}_{3}\,{}^{8}_{10}m^{1,1,1}_{1,2,3}$$

$$+(\beta_3^{3})(\alpha_{1,2,3}^{1,1,1})\,{}^{3}_{3}\,{}^{8}_{27}m^{1,1,1}_{1,2,3}+(\beta_3^{1})(\alpha_{1,2,3}^{1,1,2})\,{}^{1}_{3}\,{}^{10}_{8}m^{1,1,2}_{1,2,3}$$

$$+(\beta_3^{2})(\alpha_{1,2,3}^{1,1,2})\,{}^{2}_{3}\,{}^{8}_{8}m^{1,1,2}_{1,2,3}+(\beta_3^{3})(\alpha_{1,2,3}^{1,1,2})\,{}^{3}_{3}\,{}^{10}_{27}m^{1,1,2}_{1,2,3}$$

$$+(\beta_3^{1})(\alpha_{1,2,3}^{1,1,3})\,{}^{1}_{3}\,{}^{27}_{8}m^{1,1,3}_{1,2,3}+(\beta_3^{2})(\alpha_{1,2,3}^{1,1,3})\,{}^{2}_{3}\,{}^{27}_{10}m^{1,1,3}_{1,2,3}$$

$$+(\beta_3^{3})(\alpha_{1,2,3}^{1,1,3})\,{}^{3}_{3}\,{}^{8}_{8}m^{1,1,3}_{1,2,3}+(\beta_3^{1})(\alpha_{1,2,3}^{1,2,1})\,{}^{1}_{3}\,{}^{8}_{8}m^{1,2,1}_{1,2,3}$$

$$+(\beta_3^{2})(\alpha_{1,2,3}^{1,2,1})\,{}^{2}_{3}\,{}^{8}_{10}m^{1,2,1}_{1,2,3}+(\beta_3^{3})(\alpha_{1,2,3}^{1,2,1})\,{}^{3}_{3}\,{}^{8}_{27}m^{1,2,1}_{1,2,3}$$

$$+(\beta_3^{1})(\alpha_{1,2,3}^{1,2,2})\,{}^{1}_{3}\,{}^{10}_{8}m^{1,2,2}_{1,2,3}+(\beta_3^{2})(\alpha_{1,2,3}^{1,2,2})\,{}^{2}_{3}\,{}^{8}_{8}m^{1,2,2}_{1,2,3}$$

$$+(\beta_3^{3})(\alpha_{1,2,3}^{1,2,2})\,{}^{3}_{3}\,{}^{10}_{27}m^{1,2,2}_{1,2,3}+(\beta_3^{1})(\alpha_{1,2,3}^{1,2,3})\,{}^{1}_{3}\,{}^{27}_{8}m^{1,2,3}_{1,2,3}$$

$$+(\beta_3^{2})(\alpha_{1,2,3}^{1,2,3})\,{}^{2}_{3}\,{}^{27}_{10}m^{1,2,3}_{1,2,3}+(\beta_3^{3})(\alpha_{1,2,3}^{1,2,3})\,{}^{3}_{3}\,{}^{8}_{8}m^{1,2,3}_{1,2,3}$$

APPENDIX "C"

LEAST SQUARES FIT OF SELECTED REACTIONS

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-P:NKU SLAC REP.202 REACTION 996

PLAB GEV/C	SIGMA MB
3.000	.5700
3.070	.4690
3.500	.4000
3.900	.2720
3.950	.2580
4.000	.3000
4.200	.2660
4.250	.2360
4.600	.2120
5.000	.1590
6.000	.1500
7.100	.0990
7.700	.0710
8.000	.0780
8.360	.0720
9.500	.0700
12.300	.0450
12.800	.0360
13.000	.0410
14.300	.0280
24.800	.0110
34.600	.0075

22 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:OK0 SLAC REP.202 REACTION 996

N= 1/16

A= 25.2115 B= 61.9470- C= 38.2155

(B**2/4C)= 25.1039 (-B/2C)= .8104 PLAR(-B/2C)= 28.8394

PLAR**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9336	.7549	.6871	.0678
.9322	.6848	.6745	.0102
.9246	.6324	.6059	.0265
.9184	.5215	.5530	.0314-
.9177	.5079	.5470	.0390-
.9170	.5477	.5411	.0066
.9142	.5157	.5186	.0029-
.9135	.4857	.5133	.0275-
.9090	.4604	.4786	.0181-
.9043	.3987	.4438	.0451-
.8940	.3872	.3744	.0128
.8847	.3146	.3180	.0033-
.8802	.2664	.2934	.0269-
.8781	.2792	.2823	.0031-
.8757	.2683	.2701	.0018-
.8687	.2645	.2372	.0273
.8548	.2121	.1827	.0294
.8527	.1897	.1756	.0140
.8518	.2024	.1730	.0294
.8468	.1673	.1580	.0093
.8181	.1048	.1098	.0049-
.8013	.0866	.1108	.0242-

CHI-SQUARE= .0425 FOR 21 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:OK0 SLAC REP.202 REACTION 996

N= 1/8

A= 5.1657 B= 15.6014- C= 11.9842

(B**2/4C)= 5.0775 (-B/2C)= .6509 PLAB(-B/2C)= 31.0312

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8716	.7549	.6921	.0628
.8691	.6848	.6789	.0058
.8550	.6324	.6074	.0249
.8435	.5215	.5528	.0312-
.8422	.5079	.5466	.0387-
.8408	.5477	.5406	.0071
.8357	.5157	.5176	.0018-
.8345	.4857	.5121	.0263-
.8263	.4604	.4768	.0164-
.8177	.3987	.4416	.0429-
.7993	.3872	.3720	.0152
.7826	.3146	.3161	.0015-
.7747	.2664	.2919	.0255-
.7711	.2792	.2811	.0019-
.7668	.2683	.2692	.0008-
.7547	.2645	.2371	.0273
.7307	.2121	.1844	.0277
.7271	.1897	.1776	.0120
.7256	.2024	.1750	.0273
.7171	.1673	.1605	.0067
.6694	.1048	.1121	.0072-
.6471	.0866	.1089	.0223-

CHI-SQUARE= .0381 FOR 21 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:NKO SLAC REP.202 REACTION 996

N= 1/4

A= .3389 B= 3.6739- C= 4.5956

(B**2/4C)= .7342 (-B/2C)= .3997 PLAB(-B/2C)= 39.1711

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7598	.7549	.7006	.0543
.7554	.6848	.6862	.0014-
.7311	.6324	.6093	.0231
.7115	.5215	.5516	.0301-
.7093	.5079	.5451	.0372-
.7071	.5477	.5388	.0088
.6985	.5157	.5149	.0007
.6964	.4857	.5093	.0235-
.6828	.4604	.4729	.0125-
.6687	.3987	.4372	.0385-
.6399	.3872	.3676	.0196
.6126	.3146	.3129	.0016
.6003	.2664	.2895	.0231-
.5946	.2792	.2791	.0000
.5880	.2683	.2677	.0005
.5695	.2645	.2372	.0272
.5339	.2121	.1874	.0246
.5286	.1897	.1810	.0086
.5266	.2024	.1786	.0237
.5142	.1673	.1649	.0024
.4481	.1048	.1154	.0105-
.4123	.0866	.1053	.0187-

CHI-SQUARE= .0314 FOR 21 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:NK0 SLAC REP.202 REACTION 996

L= 1/2

A= .0199 B= .2915- C= 2.4050

(B**2/4C)= .0088 (-B/2C)= .0606 PLAB(-B/2C)= 272.2057

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5773	.7549	.7133	.0416
.5707	.6848	.6969	.0121-
.5345	.6324	.6112	.0211
.5063	.5215	.5490	.0274-
.5031	.5079	.5421	.0342-
.5000	.5477	.5354	.0122
.4879	.5157	.5103	.0054
.4850	.4857	.5044	.0186-
.4662	.4604	.4668	.0064-
.4472	.3987	.4305	.0318-
.4082	.3872	.3617	.0255
.3752	.3146	.3092	.0053
.3603	.2664	.2872	.0207-
.3535	.2792	.2775	.0017
.3458	.2683	.2668	.0015
.3244	.2645	.2385	.0260
.2851	.2121	.1923	.0197
.2795	.1897	.1863	.0033
.2173	.2024	.1841	.0183
.2644	.1673	.1710	.0037-
.2008	.1048	.1184	.0135-
.1700	.0866	.0999	.0133-

CHI-SQUARE= .0239 FOR 21 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:NK0 SLAC REP.202 REACTION 996

N= 1

A= .0538 B= 1.6415 C= 1.0959

(B**2/4C)= .6147 (-B/2C)= .7489- PLAB(-B/2C)= 1.3352-

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.3333	.7549	.7227	.0321
.3257	.6848	.7048	.0199-
.2857	.6324	.6123	.0201
.2564	.5215	.5468	.0252-
.2531	.5079	.5396	.0317-
.2500	.5477	.5327	.0150
.2380	.5157	.5068	.0089
.2352	.4857	.5007	.0149-
.2173	.4604	.4624	.0020-
.2000	.3987	.4259	.0272-
.1666	.3872	.3578	.0294
.1406	.3146	.3067	.0078
.1298	.2664	.2855	.0190-
.1250	.2792	.2761	.0031
.1196	.2683	.2658	.0024
.1052	.2645	.2387	.0258
.0813	.2121	.1945	.0175
.0781	.1897	.1887	.0009
.0769	.2024	.1865	.0158
.0699	.1673	.1739	.0066-
.0403	.1048	.1218	.0169-
.0289	.0866	.1021	.0155-

CHI-SQUARE= .0231 FOR 21 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:NKO SLAC REP.202 REACTION 996

N= 2

A= .1412 B= 7.8561 C= 23.8964-

(B**2/4C)= .6456- (-B/2C)= .1643 PLAB(-B/2C)= 2.4664

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.1111	.7549	.7191	.0358
.1061	.6848	.7057	.0209-
.0816	.6324	.6233	.0091
.0657	.5215	.5544	.0329-
.0640	.5079	.5465	.0386-
.0625	.5477	.5389	.0088
.0566	.5157	.5098	.0059
.0553	.4857	.5029	.0171-
.0472	.4604	.4591	.0012
.0400	.3987	.4172	.0185-
.0277	.3872	.3410	.0462
.0198	.3146	.2876	.0269
.0168	.2664	.2669	.0004-
.0156	.2792	.2581	.0211
.0143	.2683	.2487	.0195
.0110	.2645	.2253	.0392
.0066	.2121	.1921	.0200
.0061	.1897	.1882	.0014
.0059	.2024	.1868	.0155
.0048	.1673	.1790	.0117-
.0016	.1048	.1539	.0490-
.0008	.0866	.1477	.0611-

CHI-SQUARE= .0728 FOR 21 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-P:NKO CERN/HERA 72-2 REACTION 125

PLAB GEV/C	SIGMA MB
4.100	.2630
5.000	.1510
5.500	.1210
6.000	.1000
7.100	.0990
7.700	.0710
9.500	.0700
12.300	.0450

8 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:NKO CERN/HERA 72-2 REACTION 125

N= 1/16

A= 52.3478 B= 122.2173 C= 71.3043

(B**2/4C)= 52.3708 (-B/2C)= .8570 PLAB(-B/2C)= 11.8088

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9155	.5128	.2215	.2912
.9043	.3885	.1364	.2521
.8989	.3478	.1022	.2456
.8940	.3162	.0747	.2414
.8847	.3146	.0315	.2830
.8802	.2664	.0153	.2511
.8687	.2645	.0132-	.2778
.8548	.2121	.0227-	.2348

CHI-SQUARE= .6113 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:DKO   CERN/HERA 72-2 REACTION 125

U= 1/8

A= 12.9894   B= 34.8640-   C= 23.8066

(B**2/4C)= 12.7643   (-B/2C)= .7322   PLAB(-B/2C)= 12.1004

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8383	.5128	.4929	.0198
.8177	.3885	.3992	.0106-
.9080	.3478	.3620	.0142-
.7993	.3162	.3323	.0160-
.7826	.3146	.2857	.0289
.7747	.2664	.2[illegible]	.0017-
.7547	.2645	.2371	.0274
.7307	.2121	.2251	.0130-

CHI-SQUARE= .0092 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:NK0 CERN/HERA 72-2 REACTION 125

N= 1/4

A=	2.9148	B=	9.7362-	C=	9.1600
(B**2/4C)=	2.5871	(-B/2C)=	.5314	PLAB(-B/2C)=	12.5356

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7027	.5128	.4964	.0163
.6687	.3885	.4003	.0117-
.6529	.3478	.3629	.0151-
.6349	.3162	.3334	.0172-
.6126	.3146	.2879	.0266
.6003	.2664	.2710	.0046-
.5695	.2645	.2409	.0235
.5339	.2121	.2277	.0155-

CHI-SQUARE= .0083 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:OK0 CERN/HERA 72-2 REACTION 125

N= 1/2

A= .6110 B= 2.8735- C= 5.3638

(B**2/4C)= .3848 (-B/2C)= .2678 PLAB(-B/2C)= 13.9368

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.4938	.5128	.5001	.0126
.4472	.3885	.3987	.0101-
.4264	.3478	.3610	.0131-
.4082	.3162	.3319	.0157-
.3752	.3146	.2881	.0265
.3603	.2664	.2721	.0056-
.3244	.2645	.2433	.0211
.2851	.2121	.2278	.0156-

CHI-SQUARE= .0072 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS!
LEAST SQUARES FIT OF LABORATORY MOMENTUM V.S. CROSS-SECTION

K-P:NKO CERN/HERA 72-2 REACTION 125 5

N= 1

A=	.2211	B=	.4619-	C=	6.6687
(B**2/4C)=	.0080	(-B/2C)=	.0346	PLAB(-B/2C)=	28.8688

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2439	.5128	.5051	.0076
.2000	.3885	.3954	.0069-
.1818	.3478	.3576	.0097-
.1666	.3162	.3293	.0131-
.1408	.3146	.2883	.0262
.1298	.2664	.2736	.0071-
.1052	.2645	.2464	.0181
.0813	.2121	.2276	.0155-

CHI-SQUARE= .0060 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:GKO CERN/HERA 72-2 REACTION 125

N= 2

A= .2222 B= 4.2222 C= 24.0000

(B**2/4C)= .1856 (-B/2C)= .0879- PLAB(-B/2C)= .0000

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.0594	.5128	.5583	.0454-
.0400	.3885	.4295	.0409-
.0330	.3478	.3880	.0401-
.0277	.3162	.3580	.0417-
.0198	.3146	.3154	.0007-
.0168	.2664	.3002	.0338-
.0110	.2645	.2719	.0073-
.0066	.2121	.2511	.0390-

CHI-SQUARE= .0267 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-P:LP10   CERN/HERA 72-2 REACTION 196

PLAB GEV/C	SIGMA MB
1.800	.7750
1.843	.5550
1.950	.5300
3.000	.1380
3.500	.1150
6.000	.0240
10.100	.0240

7 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LPIO CERN/HERA 72-2 REACTION 196

N= 1/16

A= 81.4946 B= 184.3826- C= 104.4744

(B**2/4C)= 81.3523 (-B/2C)= .8824 PLAB(-B/2C)= 7.3981

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9639	.8803	.8365	.0437
.9625	.7449	.8125	.0675-
.9591	.7280	.7570	.0290-
.9336	.3714	.4165	.0451-
.9246	.3391	.3291	.0099
.8940	.1549	.1567	.0017-
.8654	.1549	.1727	.0178-

CHI-SQUARE= .0160 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K+P:LP10   CERN/HERA 72-2 REACTION 196

N= 1/8

A= 18.1105 B= 46.2403- C= 29.7372

(B**2/4C)= 17.9755 (-B/2C)= .7774 PLAB(-B/2C)= 7.4899

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9291	.8803	.8191	.0612
.9264	.7449	.7946	.0496-
.9199	.7280	.7382	.0102-
.8716	.3714	.3988	.0274-
.8550	.3391	.3139	.0252
.7993	.1549	.1491	.0057
.7489	.1549	.1591	.0042-

CHI-SQUARE= .0120 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LP10 CERN/HERA 72-2 REACTION 196

N= 1/4

A= 3.6393 B= 11.6746- C= 9.7428

(B**2/4C)= 3.4973 (-B/2C)= .5991 PLAB(-B/2C)= 7.7604

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8633	.8803	.8220	.0583
.8582	.7449	.7961	.0511-
.8462	.7280	.7368	.0088-
.7598	.3714	.3935	.0220-
.7311	.3391	.3116	.0274
.6389	.1549	.1573	.0024-
.5609	.1549	.1561	.0012-

CHI-SQUARE= .0112 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LP10 CERN/HERA 72-2 REACTION 196

N= 1/2

A= .5?74 B= 2.6839 C= 4.0132

(B**2/4C)= .4487 (-B/2C)= .3343 PLAB(-B/2C)= 8.9432

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7453	.8803	.8264	.0538
.7366	.7449	.7979	.0529-
.7161	.7280	.7334	.0054-
.5773	.3714	.3855	.0141-
.5345	.3391	.3094	.0296
.4082	.1549	.1705	.0156-
.3146	.1549	.1502	.0046

CHI-SQUARE= .0120 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LPID CERN/HERA 72-2 REACTION 196

N= 1

A= .1160 B= .0357 C= 2.2548

(B**2/4C)= .0001 (-B/2C)= .0079- PLAB(-B/2C)= 126.1264-

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5555	.8803	.8318	.0484
.5425	.7449	.7993	.0543-
.5128	.7280	.7273	.0006
.3333	.3714	.3785	.0070-
.2857	.3391	.3103	.0287
.1666	.1549	.1846	.0297-
.0990	.1549	.1416	.0132

CHI-SQUARE= .0153 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LPI0 CERN/HERA 72-2 REACTION 196

N= 2

A= .1202 B= 2.3196 C= .0422-

(B**2/4C)= 31.8234- , (-B/2C)= 27.4383 PLAB(-B/2C)= .1909

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.3086	.8803	.8322	.0481
.2944	.7449	.7995	.0545-
.2629	.7280	.7274	.0006
.1111	.3714	.3775	.0060-
.0616	.3391	.3093	.0297
.0277	.1549	.1847	.0297-
.0098	.1549	.1430	.0118

CHI-SQUARE= .0152 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-P:LEI GER.J/HERA 72-2 REACTION 243

PLAB GEV/C	SIGMA MB
3.000	.0590
3.500	.0170
4.100	.0480
5.500	.0020
6.000	.0050
10.100	.0040
16.100	.0380

7 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LFT CERN/HERA 72-2 REACTION 243

N= 1/16

A= 69.3600 B= 155.9200- C= 87.5800

(B**2/4C)= 69.3966 (-B/2C)= .8901 PLAB(-B/2C)= 6.4347

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9336	.2428	.1289	.1139
.9246	.1303	.0677	.0626
.9155	.2190	.0199	.1991
.8989	.0447	.0299-	.0746
.8940	.0707	.0353-	.1060
.8654	.0632	.0168	.0463
.8654	.1949	.0168	.1780

CHI-SQUARE= 3.6454 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LFT   CERN/HERA 72-2 REACTION 243

N= 1/8

A= 16.4849   B= 41.4338-   C= 26.1513

(B**2/4C)= 16.4118   (-B/2C)= .7921   PLAB(-B/2C)= 6.4469

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8716	.2428	.2383	.0045
.8550	.1303	.1764	.0460-
.8383	.2190	.1287	.0903
.8080	.0447	.0797	.0349-
.7993	.0707	.0744	.0037-
.7489	.0632	.1219	.0587-
.7489	.1949	.1219	.0729

CHI-SQUARE= .1630 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LFI   CERN/HERA 72-2 REACTION'243

N= 1/4

A= 3.9006   B= 12.1380-   C= 9.6388

(B**2/4C)= 3.8213   (-B/2C)= .6296   PLAB(-B/2C)= 6.3624

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7598	.2428	.2426	.0002
.7311	.1303	.1785	.0481-
.7027	.2190	.1307	.0882
.6529	.0447	.0845	.0398-
.6389	.0707	.0801	.0093-
.5609	.0632	.1247	.0615-
.5609	.1949	.1247	.0701

CHI-SQUARE= .1622 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LFT CERN/HERA 72-2 REACTION 243

N= 1/2

A=	.9191	B=	4.1586-	C=	5.1778
(B**2/4C)=	.8350	(-B/2C)=	.4015	PLAB(-B/2C)=	6.2009

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5773	.2428	.2440	.0011-
.5345	.1303	.1756	.0452-
.4938	.2190	.1282	.0908
.4269	.0447	.0873	.0425-
.4084	.0707	.0843	.0136-
.3146	.0632	.1232	.0599-
.3146	.1949	.1232	.0717

CHI-SQUARE= .1699 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LFT   CERN/HERA 72-2 REACTION 243

N= 1

A=	.2502	B=	1.6761-	C=	5.5862
(B**2/4C)=	.1575	(-B/2C)=	.1679	PLAB(-B/2C)=	5.9551

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.3333	.2428	.2455	.0026-
.2857	.1303	.1702	.0398-
.2439	.2190	.1250	.0940
.1818	.0447	.0938	.0491-
.1666	.0707	.0927	.0220-
.0990	.0632	.1192	.0560-
.0990	.1949	.1192	.0756

CHI-SQUARE= .1854 FOR 6 DEGREES OF FREEDOM.

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:LFT CERN/HERA 72-2 REACTION 243

N= 2

A=	.1173	B=	.9548-	C=	18.8555
(B**2/4C)=	.0120	(-B/2C)=	.0253	PLAB(-B/2C)=	6.2844

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.1111	.2428	.2440	.0011-
.0816	.1303	.1650	.0347-
.0594	.2190	.1273	.0917
.0330	.0447	.1064	.0617-
.0277	.0707	.1054	.0346-
.0098	.0632	.1098	.0465-
.0098	.1949	.1098	.0851

CHI-SQUARE= .2063 FOR 6 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-P:S+PI- CERN/HERA 72-2 REACTION 348

PLAB GEV/C	SIGMA MB
1.800	.8370
1.843	.7020
1.950	.5500
2.240	.2950
3.000	.2360
3.500	.1400
4.070	.1070
5.470	.0840
8.000	.0551
16.000	.0205

10 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S+PI- CERN/HERA 72-2 REACTION 348

N= 1/10

A= 46.9191 B= 108.6540- C= 63.1095

(B**2/4C)= 46.7657 (-B/2C)= .8608 PLAB(-B/2C)= 10.9967

PLAB**-1	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9639	.9148	.8232	.0916
.9625	.8378	.8048	.0329
.9591	.7416	.7620	.0204-
.9508	.5431	.6637	.1206-
.9336	.4857	.4869	.0011-
.9246	.3741	.4097	.0356-
.9160	.3271	.3445	.0174-
.8992	.2898	.2455	.0442
.8781	.2347	.1713	.0633
.8408	.1431	.1775	.0343-

CHI-SQUARE= .0761 FOR 9 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S+PI- CERN/HERA 72-2 REACTION 348

N= 1/8

A= 10.3415 B= 27.5367- C= 18.6153

(B**2/4C)= 10.1834 (-B/2C)= .7396 PLAB(-B/2C)= 11.1662

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9291	.9148	.8268	.0880
.9264	.8378	.8076	.0302
.9199	.7416	.7631	.0215-
.9041	.5431	.6616	.1185-
.8716	.4857	.4827	.0030
.8550	.3741	.4060	.0319-
.8390	.3271	.3421	.0150-
.8086	.2898	.2467	.0431
.7711	.2347	.1765	.0582
.7071	.1431	.1777	.0345-

CHI-SQUARE= .0690 FOR 9 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S+PT- CERN/HERA 72-2 REACTION 348

N= 1/4

A=	2.0381	B=	6.9230-	C=	6.4030
(B**2/4C)=	1.8713	(-B/2C)=	.5406	PLAB(-B/2C)=	11.7077

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8633	.9148	.8337	.0811
.8582	.8378	.8128	.0249
.8462	.7416	.7649	.0232-
.8174	.5431	.6573	.1142-
.7598	.4857	.4745	.0112
.7311	.3741	.3991	.0250-
.7040	.3271	.3378	.0107-
.6538	.2898	.2489	.0408
.5946	.2347	.1854	.0492
.5000	.1431	.1773	.0341-

CHI-SQUARE= .0577 FOR 9 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S+PI-   CERN/HERA 72-2 REACTION 348

I= 1/2

A= .3730   B= 1.5042-   C= 2.8680

(B**2/4C)= .1972   (-B/2C)= .2622   PLAB(-B/2C)= 14.5408

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7453	.9148	.8451	.0697
.7366	.8378	.8211	.0167
.7161	.7416	.7665	.0249-
.6681	.5431	.6483	.1051-
.5773	.4857	.4605	.0252
.5345	.3741	.3884	.0142-
.4956	.3271	.3320	.0049-
.4275	.2898	.2541	.0356
.3535	.2347	.1996	.0350
.2500	.1431	.1762	.0330-

CHI-SQUARE= .0432 FOR 9 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S+PI- CERN/HERA 72-2 REACTION 348

N= 1

A= .1542 B= .2566 C= 1.8266

(B**2/4C)= .0090 (-B/2C)= .0702- PLAB(-B/2C)= 14.2342-

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5555	.9148	.8605	.0542
.5425	.8378	.8312	.0065
.5128	.7416	.7662	.0246-
.4464	.5431	.6328	.0897-
.3333	.4857	.4427	.0430
.2857	.3741	.3766	.0024-
.2457	.3271	.3275	.0004-
.1828	.2898	.2621	.0276
.1250	.2347	.2148	.0198
.0625	.1431	.1773	.0342-

CHI-SQUARE= .0325 FOR 9 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S+PI- CERN/HERA 72-2 REACTION 348

I= 2

A= .1940 B= 1.4940 C= .6690

(B**2/4C)= 1.4657 (-B/2C)= 1.4901- PLAB(-B/2C)= .0000

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.3086	.9148	.8738	.0409
.2944	.8378	.8397	.0019-
.2629	.7416	.7653	.0237-
.1992	.5431	.6186	.0755-
.1111	.4857	.4245	.0612
.0816	.3741	.3619	.0122
.0603	.3271	.3175	.0095
.0334	.2898	.2620	.0277
.0156	.2347	.2260	.0087
.0039	.1431	.2024	.0593-

CHI-SQUARE= .0420 FOR 9 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-P:S-PI+ CERN/HERA 72-2 REACTION 379

PLAB GEV/C	SIGMA MB
1.800	.2640
1.843	.2140
1.950	.1650
2.240	.0650
3.000	.0400
3.500	.0110
4.070	.0080
5.470	.0020

8 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S-PI+ CERN/HERA 72-2 REACTION 379-

N=.1/16

A= 84.0888 B= 186.0444- C= 103.0666

(B**2/4C)= 83.9566 (-B/2C)= .9025 PLAB(-B/2C)= 5.1582

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9639	.5138	.5205	.0067-
.9625	.4626	.5028	.0402-
.9591	.4062	.4621	.0559-
.9508	.2549	.3726	.1177-
.9336	.2000	.2318	.0318-
.9246	.1048	.1827	.0778-
.9160	.0894	.1509	.0614-
.8992	.0447	.1333	.0886-

CHI-SQUARE= .1687 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S-PI+   CERN/HERA 72-2 REACTION 379

N= 1/8

A=	21.0652	B=	51.8993-	C=	31.7699
(B**2/4C)=	21.0326	(-B/2C)=	.8136	PLAB(-B/2C)=	5.2059

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9291	.5138	.4765	.0372
.9264	.4626	.4566	.0059
.9199	.4062	.4113	.0051-
.9041	.2549	.3125	.0576-
.8716	.2000	.1596	.0403
.8550	.1048	.1070	.0021-
.8490	.0894	.0731	.0162
.8086	.0447	.0534	.0086-

CHI-SQUARE= .0289 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S-PI+ CERN/HERA 72-2 REACTION 379

N= 1/4

A= 4.4076 B= 13.2374- C= 10.0664

(B**2/4C)= 4.3518 (-B/2C)= .6575 PLAB(-B/2C)= 5.3506

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8633	.5138	.4823	.0314
.8582	.4626	.4615	.0010
.8462	.4062	.4143	.0081-
.8174	.2549	.3132	.0582-
.7598	.2000	.1612	.0387
.7311	.1048	.1103	.0054-
.7040	.0894	.0776	.0117
.6538	.0447	.0559	.0112-

CHI-SQUARE= .0266 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S-PI+ CERN/HERA 72-2 REACTION 379

[illegible]= 1/2

A= .7386 B= 3.2900- C= 3.9592

(B**2/4C)= .6834 (-B/2C)= .4154 PLAB(-B/2C)= 5.7928

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7453	.5138	.4859	.0278
.7366	.4626	.4634	.0008-
.7161	.4062	.4129	.0067-
.6681	.2549	.3078	.0529-
.5773	.2000	.1588	.0411
.5345	.1048	.1112	.0063-
.4956	.0894	.0805	.0088
.4275	.0447	.0557	.0109-

CHI-SQUARE= .0249 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S-PI+ CERN/HERA 72-2 REACTION 379

N= 1

A= .0716 B= .5030- C= 2.2677

(B**2/4C)= .0279 (-B/2C)= .1109 PLAB(-B/2C)= 9.0152

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5555	.5138	.4920	.0217
.5425	.4626	.4662	.0036-
.5128	.4062	.4100	.0038-
.4464	.2549	.2989	.0440-
.3333	.2000	.1558	.0441
.2857	.1048	.1130	.0081-
.2457	.0894	.0849	.0045
.1826	.0447	.0554	.0107-

CHI-SQUARE= .0228 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:S-PI+ CERN/HERA 72-2 REACTION 379

N= 2

A= .0249 B= .9330 C= 1.9575

(B**2/4C)= .1111 (-B/2C)= .2383- PLAB(-B/2C)= .0000

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.3086	.5138	.4993	.0144
.2944	.4626	.4693	.0067-
.2629	.4062	.4056	.0005
.1992	.2549	.2886	.0336-
.1111	.2000	.1527	.0472
.0816	.1048	.1141	.0092-
.0603	.0894	.0883	.0010
.0334	.0447	.0582	.0135-

CHI-SQUARE= .0229 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-P?XI-K+ CERN/HERA 72-2 REACTION 543

PLAB GEV/C	SIGMA MB
2.100	.1120
2.240	.0910
2.460	.0500
2.470	.0870
2.640	.0580
2.670	.0400
3.000	.0210
3.500	.0160
4.250	.0154
5.000	.0020
5.500	.0050
6.000	.0077

12 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XI-K+ CERN/HERA 72-2 REACTION 543

N= 1/15

A= 63.7397 B= 141.3013- C= 78.4657

(B**2/4C)= 63.6139 (-B/2C)= .9004 PLAB(-B/2C)= 5.3582

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9546	.3346	.3569	.0223-
.9508	.3016	.3253	.0237-
.9452	.2236	.2838	.0602-
.9450	.2949	.2821	.0127
.9411	.2408	.2559	.0150-
.9404	.2000	.2516	.0516-
.9336	.1449	.2124	.0675-
.9246	.1264	.1720	.0455-
.9135	.1240	.1392	.0151-
.9043	.0447	.1269	.0822-
.8989	.0707	.1259	.0551-
.8940	.0877	.1288	.0411-

CHI-SQUARE= .1537 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XI-K+ CERN/HERA 72-2 REACTION 543

N = 1/8

A=	17.2421	B=	42.3423-	C=	26.1138
(B**2/4C)=	17.1640	(-B/2C)=	.6107	PLAB(-B/2C)=	5.3580

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9114	.3346	.3428	.0082-
.9041	.3016	.3057	.0041-
.8935	.2236	.2573	.0337-
.8931	.2949	.2553	.0395
.8857	.2408	.2249	.0158
.8844	.2000	.2201	.0201-
.8716	.1449	.1751	.0301-
.8550	.1264	.1293	.0028-
.8345	.1240	.0928	.0312
.8177	.0447	.0793	.0346-
.8080	.0707	.0782	.0075-
.7993	.0877	.0814	.0062

CHI-SQUARE= .0458 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XI-K+   CERN/HERA 72-2 REACTION 543

N= 1/4

A= 3.6542   B= 10.9679-   C= 8.4008

(B**2/4C)= 3.5798   (-B/2C)= .6527   PLAB(-B/2C)= 5.5068

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8307	.3346	.3402	.0055-
.8174	.3016	.3020	.0003-
.7984	.2236	.2526	.0290-
.7976	.2949	.2506	.0442
.7845	.2408	.2201	.0207
.7822	.2000	.2152	.0152-
.7598	.1449	.1706	.0257-
.7311	.1264	.1258	.0006
.6964	.1240	.0903	.0337
.6687	.0447	.0764	.0317-
.6529	.0707	.0743	.0036-
.6389	.0877	.0759	.0117

CHI-SQUARE= .0459 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XI*K+ CERN/HERA 72-2 REACTION 543

N= 1/2

A= .6393 B= 2.7732- C= 3.3955

(B**2/4C)= .5662 (-B/2C)= .4083 PLAB(-B/2C)= 5.9964

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.6900	.3346	.3425	.0078-
.6681	.3016	.3022	.0006-
.6375	.2236	.2515	.0279-
.6362	.2949	.2495	.0454
.6154	.2408	.2187	.0220
.6119	.2000	.2139	.0139-
.5773	.1449	.1700	.0251-
.5345	.1264	.1271	.0006-
.4850	.1240	.0930	.0309
.4472	.0447	.0782	.0335-
.4264	.0707	.0742	.0035-
.4082	.0877	.0731	.0146

CHI-SQUARE= .0461 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XI-K+ CERN/HERA 72-2 REACTION 543

N= 1

A= .0767 B= .3778 C= 1.9766

(B**2/4C)= .0180 (-B/2C)= .0955 PLAB(-B/2C)= 10.4637

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.4761	.3346	.3450	.0103-
.4464	.3016	.3020	.0003-
.4065	.2236	.2497	.0261-
.4048	.2949	.2477	.0471
.3787	.2408	.2172	.0236
.3745	.2000	.2124	.0124-
.3333	.1449	.1704	.0255-
.2857	.1264	.1301	.0036-
.2352	.1240	.0972	.0268
.2000	.0447	.0802	.0355-
.1818	.0707	.0733	.0026-
.1666	.0877	.0686	.0190

CHI-SQUARE= .0477 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XI-K+ CERN/HERA 72-2 REACTION 543

N= 2

A= .0322 B= 1.1566 C= .9551

(B**2/4C)= .3501 (-B/2C)= .6055- PLAB(-B/2C)= .0000

PLAB**-N-	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2267	.3346	.3436	.0090-
.1992	.3016	.3007	.0009
.1652	.2236	.2495	.0259-
.1639	.2949	.2475	.0474
.1434	.2408	.2179	.0229
.1402	.2000	.2133	.0133-
.1111	.1449	.1726	.0276-
.0816	.1264	.1330	.0065-
.0553	.1240	.0992	.0248
.0400	.0447	.0800	.0353-
.0330	.0707	.0715	.0008-
.0277	.0877	.0651	.0225

CHI-SQUARE= .0496 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

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THE EQUATION
        SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.
```

K-P:XIOKO CERN/HERA 72-2 REACTION 586

PLAB GEV/C	SIGMA MB
1.800	.0710
1.843	.0360
2.100	.0250
2.470	.0240
2.640	.0150
3.000	.0320
4.250	.0105
4.800	.0030

8 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XIOKO   CERN/HERA 72-2 REACTION 586

N= 1/16 .

A=	8.1818	B=	19.0363-	C=	11.9090
(B**2/4C)=	8.0943	(-B/2C)=	.8244	PLAB(-B/2C)=	21.9563

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9639	.2664	.3192	.0527-
.9625	.1897	.3145	.1247-
.9546	.1581	.2895	.1313-
.9450	.1549	.2607	.1058-
.9411	.1224	.2496	.1271-
.9336	.1788	.2294	.0506-
.9135	.1024	.1820	.0795-
.9066	.0547	.1678	.1131-

CHI-SQUARE= .3476 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XIOKO   CERN/HERA 72-2 REACTION 586

N= 1/8

A= 1.4749   B= 4.4185-   C= 3.2949

(B**2/4C)= 1.4812   (-B/2C)= .6704   PLAB(-B/2C)= 24.4824

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9291	.2664	.2141	.0523
.9264	.1897	.2095	.0197-
.9114	.1581	.1849	.0268-
.8931	.1549	.1570	.0020-
.8857	.1224	.1463	.0238-
.8716	.1788	.1270	.0518
.8345	.1024	.0823	.0201
.8219	.0547	.0692	.0144-

CHI-SQUARE= .0515 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XIOK0 CERN/HERA 72-2 REACTION 586

N= 1/4

A=	.1193	B=	.7220-	C=	.9704
(B**2/4C)=	.1342	(-B/2C)=	.3720	PLAB(-B/2C)=	52.2117

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8633	.2664	.2192	.0471
.8582	.1897	.2144	.0247-
.8307	.1581	.1891	.0310-
.7976	.1549	.1608	.0059-
.7845	.1224	.1501	.0276-
.7598	.1788	.1309	.0479
.6964	.1024	.0871	.0152
.6756	.0547	.0744	.0196-

CHI-SQUARE= .0488 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XIOKO   CERN/HERA 72-2 REACTION 566

N= 1/2

A=	.0420-	B=	.1099	C=	.3257
(B**2/4C)=	.0092	(-B/2C)=	.1687-	PLAB(-B/2C)=	35.1331

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7453	.2664	.2208	.0456
.7366	.1897	.2156	.0258-
.6900	.1581	.1888	.0307-
.6362	.1549	.1597	.0048-
.6154	.1224	.1489	.0264-
.5773	.1788	.1299	.0489
.4850	.1024	.0878	.0145
.4564	.0547	.0759	.0211-

CHI-SQUARE= .0491 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XIOKO   CERN/HERA 72-2 REACTION 566

N= 1

A= .0057   B= .3270   C= .1163

(B**2/4C)= .2299   (-B/2C)= 1.4061-   PLAB(-B/2C)= .7111-

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5555	.2664	.2233	.0431
.5425	.1897	.2174	.0277-
.4761	.1581	.1878	.0297-
.4048	.1549	.1572	.0022-
.3787	.1224	.1463	.0238-
.3333	.1788	.1276	.0512
.2352	.1024	.0891	.0133
.2083	.0547	.0789	.0241-

CHI-SQUARE= .0504 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:XIOKO   CERN/HERA 72-2 REACTION 566

N= 2

A= .0611   B= .5712   C= .1032-

(B**2/4C)= .7903-   (-B/2C)= 2.7670   PLAB(-B/2C)= .6011

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.3036	.2664	.2276	.0388
.2944	.1897	.2203	.0306-
.2267	.1581	.1853	.0272-
.1639	.1549	.1519	.0029
.1434	.1224	.1409	.0185-
.1111	.1788	.1233	.0555
.0553	.1024	.0924	.0100
.0434	.0547	.0857	.0309-

CHI-SQUARE= .0546 FOR 7 DEGREES OF FREEDOM

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        HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
   LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
    SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

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K-N:LPI-      CERN/HERA 72-2 REACTION 671
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PLAB GEV/C	SIGMA MB
2.000	2.1900
2.020	2.1500
2.040	2.1300
2.063	1.7800
2.113	1.7400
3.000	.3100
3.000	.3000
4.500	.0830
4.500	.1020

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9 DATA POINTS READ
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HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:LPI- CERN/HERA 72-2 REACTION 671

N= 1/16

A= 506.0000 B= 1107.2500- C= 605.9166

(B**2/4C)= 93.2482 (-B/2C)= .9136 PLAB(-B/2C)= 4.2379

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9576	1.4798	1.3218	.1580
.9570	1.4662	1.2903	.1759
.9564	1.4594	1.2596	.1998
.9557	1.3341	1.2252	.1089
.9543	1.3190	1.1536	.1654
.9336	.5567	.3947	.1619
.9336	.5477	.3947	.1529
.9102	.2880	.1608	.1272
.9102	.3193	.1608	.1584

CHI-SQUARE= .4904 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:LPI- CERN/HERA 72-2 REACTION 671

N= 178

A= 118.6962 B= 284.2504- C= 170.5700

(B**2/4C)= 118.4240 (-B/2C)= .8332 PLAB(-B/2C)= 4.3037

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9170	1.4798	1.4691	.0107
.9158	1.4662	1.4367	.0295
.9147	1.4594	1.4052	.0542
.9134	1.3341	1.3698	.0357-
.9107	1.3190	1.2964	.0226
.8716	.5567	.5243	.0323
.8716	.5477	.5243	.0233
.8286	.2880	.2758	.0121
.8286	.3193	.2758	.0434

CHI-SQUARE= .0145 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-J:LPI- CERN/HERA 72-2 REACTION 671

J= 1/4

A= 25.5758 B= 73.1181- C= 52.8859

(B**2/4C)= 25.2726 (-B/2C)= .6912 PLAB(-B/2C)= 4.3790

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8408	1.4798	1.4870	.0071-
.8386	1.4662	1.4541	.0121
.8367	1.4594	1.4221	.0372
.8344	1.3341	1.3864	.0522-
.8294	1.3190	1.3123	.0067
.7598	.5567	.5517	.0050
.7598	.5477	.5517	.0039-
.6865	.2880	.3043	.0162-
.6865	.3193	.3043	.0150

CHI-SQUARE= .0048 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:LPI-   CERN/HERA 72-2 REACTION 671

U= 1/2

A= 4.9406   B= 19.3949-   C= 20.7273

(B**2/4C)= 4.5370   (-B/2C)= .4678   PLAB(-B/2C)= 4.5684

PLAB**-A	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7071	1.4798	1.4899	.0100-
.7035	1.4662	1.4553	.0109
.7001	1.4594	1.4218	.0376
.6962	1.3341	1.3844	.0503-
.6879	1.3190	1.3074	.0116
.5773	.5567	.5520	.0047
.5773	.5477	.5520	.0042-
.4714	.2880	.3037	.0156-
.4714	.3193	.3037	.0155

CHI-SQUARE= .0047 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:LPI- CERN/HERA 72-2 REACTION 671

N= 1

A= .7091 B= 4.5469- C= 12.2416

(B**2/4C)= .4222 (-B/2C)= .1857 PLAB(-B/2C)= 5.3846

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5000	1.4798	1.4961	.0162-
.4950	1.4662	1.4583	.0079
.4901	1.4594	1.4218	.0375
.4847	1.3341	1.3814	.0473-
.4732	1.3190	1.2991	.0199
.3333	.5567	.5537	.0030
.3333	.5477	.5537	.0059-
.2222	.2880	.3032	.0151-
.2222	.3193	.3032	.0161

CHI-SQUARE= .0048 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:LPI- CERN/HEPA 72-2 REACTION 671

N= 2

A= .1685 B= 2.0320 C= 13.2415

(B**2/4C)= .0779 (-B/2C)= .0767- PLAB(-B/2C)= .0000

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2500	1.4798	1.5041	.0243-
.2450	1.4662	1.4618	.0044
.2402	1.4594	1.4214	.0380
.2349	1.3341	1.3770	.0429-
.2239	1.3190	1.2879	.0311
.1111	.5567	.5578	.0010-
.1111	.5477	.5578	.0101-
.0493	.2880	.3012	.0131-
.0493	.3193	.3012	.0181

CHI-SQUARE= .0053 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION

SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)

IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-N:S-PIO   CERN/HERA 72-2 REACTION 764

PLAB GEV/C	SIGMA MB
.702	2.3700
.778	1.7900
.837	1.6500
.903	1.3900
.963	1.2200
1.034	1.1100
1.098	.9100
1.173	.9400
3.000	.1300
3.000	.1400
4.940	.0470

11 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:S-PIO   CERN/HERA 72-2 REACTION 704

N= 1/16

A= 61.0391   B= 136.0452-   C= 76.1020

(B**2/4C)= 60.8009   (-B/2C)= .8938   PLAB(-B/2C)= 6.0240

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.0223	1.5394	1.4953	.0440
1.0158	1.3379	1.3705	.0326-
1.0111	1.2845	1.2862	.0017-
1.0063	1.1789	1.2025	.0235-
1.0023	1.1045	1.1345	.0300-
.9979	1.0535	1.0626	.0090-
.9941	.9539	1.0044	.0505-
.9900	.9695	.9431	.0263
.9336	.3605	.3588	.0017
.9336	.3741	.3588	.0153
.9049	.2167	.2477	.0309-

CHI-SQUARE= .0112 FOR 10 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:S-PIO __ CERN/HERA 72-2 REACTION 704

N= 1/8

A= 12.0524 B= 30.1034- C= 19.1366

(B**2/4C)= 11.9387 (-B/2C)= .7865, PLAB(-B/2C)= 6.8272

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.0452	1.5394	1.4942	.0452
1.0318	1.3379	1.3655	.0276-
1.0224	1.2845	1.2791	.0054
1.0128	1.1789	1.1936	.0147-
1.0047	1.1045	1.1246	.0201-
.9958	1.0535	1.0519	.0016
.9883	.9539	.9933	.0393-
.9802	.9695	.9317	.0377
.8716	.3605	.3524	.0081
.8716	.3741	.3524	.0217
.8190	.2167	.2338	.0170-

CHI-SQUARE= .0083 FOR 10 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST-SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:S-PIO   CERN/HERA 72-2 REACTION 704

N= 1/4

A= 1.5970   B= 5.1523-   C= 4.6372

(B**2/4C)= 1.4312   (-B/2C)= .5555   PLAB(-B/2C)= 10.4981

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.0424	1.5394	1.5027	.0366
1.0647	1.3379	1.3683	.0304-
1.0454	1.2845	1.2789	.0055
1.0258	1.1789	1.1914	.0125-
1.0094	1.1045	1.1213	.0168-
.9916	1.0535	1.0479	.0056
.9768	.9539	.9891	.0352-
.9608	.9695	.9277	.0417
.7598	.3605	.3593	.0011
.7598	.3741	.3593	.0147
.6707	.2167	.2274	.0106-

CHI-SQUARE= .0062 FOR 10 DEGREES OF FREEDOM

HIGH ENERGY TWO-BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:S-PIO CERN/HERA 72-2 REACTION 704

N= 1/2

A= .0720- B= .2327 C= .9170

(B**2/4C)= .0147 (-B/2C)= .1269- PLAB(-B/2C)= 62.0839

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.1935	1.5394	1.5120	.0274
1.1337	1.3379	1.3704	.0325-
1.0930	1.2845	1.2779	.0065
1.0523	1.1789	1.1883	.0094-
1.0190	1.1045	1.1173	.0128-
.9834	1.0535	1.0436	.0098
.9543	.9539	.9852	.0312-
.9233	.9695	.9246	.0449
.5773	.3605	.3679	.0074-
.5773	.3741	.3679	.0061
.4499	.2167	.2182	.0014-

CHI-SQUARE= .0050 FOR 10 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:S-PIO CERN/HERA 72-2 REACTION 704

N= 1

A= .0012- B= 1.1145 C= .0361-

(B**2/4C)= 8.5826- (-B/2C)= 15.4005 PLAB(-B/2C)= .0649

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.4245	1.5394	1.5130	.0264
1.2853	1.3379	1.3716	.0336-
1.1947	1.2845	1.2787	.0057
1.1074	1.1789	1.1886	.0097-
1.0384	1.1045	1.1171	.0126-
.9671	1.0535	1.0428	.0107
.9107	.9539	.9838	.0299-
.8525	.9695	.9226	.0468
.3333	.3605	.3662	.0057-
.3333	.3741	.3662	.0079
.2024	.2167	.2228	.0060-

CHI-SQUARE= .0053 FOR 10 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION -

K-N:S-PIO   CERN/HERA 72-2 REACTION 704

N= 2

A= .2347   B= 1.0530   C= .2133-

(B**2/4C)= 1.2996-   (-B/2C)= 2.4682   PLAB(-B/2C)= .6365

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
2.0292	1.5394	1.4932	.0462
1.6521	1.3379	1.3922	.0543-
1.4274	1.2845	1.3032	.0187-
1.2263	1.1789	1.2053	.0263-
1.0783	1.1045	1.1222	.0177-
.9353	1.0535	1.0330	.0204
.8294	.9539	.9614	.0075-
.7267	.9695	.8874	.0821
.1111	.3605	.3490	.0114
.1111	.3741	.3490	.0250
.0409	.2167	.2775	.0607-

CHI-SQUARE= .0282 FOR 10 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K-N:ISOPI- CERN/HERA 72-2 REACTION 741

PLAB GEV/C	SIGMA MB
.702	2.3300
.778	1.7400
.837	1.5500
.903	1.2000
.963	1.1800
1.034	1.0600
1.098	.8900
1.173	1.0000
3.000	.1600
3.000	.1700
4.500	.0320
4.500	.0390

12 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:SOPT- CERN/HERA 72-2 REACTION 741

N= 1/16

A= 41.2720 B= 94.8788- C= 54.6818

(B**2/4C)= 41.1562 (-B/2C)= .8675 PLAB(-B/2C)= 9.7110

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.0223	1.5264	1.4262	.1001
1.0158	1.3190	1.3177	.0013
1.0111	1.2449	1.2438	.0011
1.0063	1.0954	1.1699	.0744-
1.0023	1.0862	1.1094	.0232-
.9979	1.0295	1.0450	.0154-
.9941	.9433	.9924	.0490-
.9900	1.0000	.9366	.0633
.9336	.4000	.3546	.0453
.9336	.4123	.3546	.0577
.9102	.1788	.2155	.0367-
.9102	.1974	.2155	.0181-

CHI-SQUARE= .0421 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:SOPI-   CERN/HERA 72-2 REACTION 741

N= 1/8

A=	7.2742	B=	19.7321-	C=	13.5359
(B**2/4C)=	7.1911	(-B/2C)=	.7288	PLAB(-B/2C)=	12.5531

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.0452	1.5264	1.4375	.0888
1.0318	1.3190	1.3257	.0066-
1.0224	1.2449	1.2499	.0049-
1.0128	1.0954	1.1744	.0790-
1.0047	1.0862	1.1129	.0267-
.9958	1.0295	1.0476	.0180-
.9883	.9433	.9945	.0511-
.9802	1.0000	.9383	.0616
.8716	.4000	.3590	.0409
.8716	.4123	.3590	.0532
.8286	.1788	.2176	.0387-
.8286	.1974	.2176	.0201-

CHI-SQUARE= .0398 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:ISOPI- CERN/HERA 72-2 REACTION 741

N= 1/4

A= .5199 , B= 2.6199 C= 3.1742

(B**2/4C)= .5406, (-B/2C)= .4126 PLAB(-B/2C)= 34.4747

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.0924	1.5264	1.4462	.0801
1.0647	1.3190	1.3290	.0100-
1.0454	1.2449	1.2504	.0054-
1.0256	1.0954	1.1727	.0772-
1.0094	1.0862	1.1098	.0236-
.9916	1.0295	1.0434	.0139-
.9768	.9433	.9898	.0464-
.9608	1.0000	.9333	.0666
.7598	.4000	.3619	.0380
.7598	.4123	.3619	.0504
.6865	.1788	.2175	.0386-
.6865	.1974	.2175	.0200-

CHI-SQUARE= .0369 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N:SOPI- CERN/HERA 72-2 REACTION 741

N= 1/2

A= .2748- B= .7837 C= .5602

(B**2/4C)= .2741 (-B/2C)= .6994- PLAB(-B/2C)= 2.0437

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.1935	1.5264	1.4586	.0678
1.1337	1.3190	1.3337	.0147-
1.0930	1.2449	1.2511	.0061-
1.0523	1.0954	1.1703	.0748-
1.0190	1.0862	1.1055	.0192-
.9834	1.0295	1.0377	.0081-
.9543	.9433	.9833	.0399-
.9233	1.0000	.9263	.0736
.5773	.4000	.3643	.0356
.5773	.4123	.3643	.0479
.4714	.1788	.2191	.0402-
.4714	.1974	.2191	.0216-

CHI-SQUARE= .0353 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-P:SOPI- CERN/HERA 72-2 REACTION 741

N= 1

A= .0277- B= 1.1870 C= .0954-

(B**2/4C)= 3.6911- (-B/2C)= 6.2189 PLAB(-B/2C)= .1607

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
1.4245	1.5264	1.4696	.0568
1.2853	1.3190	1.3404	.0213-
1.1947	1.2449	1.2543	.0093-
1.1074	1.0954	1.1698	.0743-
1.0384	1.0862	1.1020	.0157-
.9671	1.0295	1.0310	.0014-
.9107	.9433	.9742	.0308-
.8525	1.0000	.9149	.0850
.3333	.4000	.3573	.0426
.3333	.4123	.3573	.0549
.2222	.1788	.2313	.0524-
.2222	.1974	.2313	.0338-

CHI-SQUARE= .0468 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K-N ISOPI- CERN/HERA 72-2 REACTION 741

N= 2

A= .2231 B= 1.0416 C= .2118-

(B**2/4C)= 1.2806- (-B/2C)= 2.4582 PLAB(-B/2C)= .6378

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
2.0292	1.5264	1.4645	.0618
1.6521	1.3190	1.3658	.0467-
1.4274	1.2449	1.2784	.0334-
1.2263	1.0954	1.1820	.0865-
1.0783	1.0862	1.1001	.0138-
.9353	1.0295	1.0121	.0174
.8294	.9433	.9414	.0019
.7267	1.0000	.8683	.1316
.1111	.4000	.3363	.0636
.1111	.4123	.3363	.0759
.0493	.1788	.2741	.0952-
.0493	.1974	.2741	.0766-

CHI-SQUARE= .1156 FOR 11 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

K+N:PKO SLAC REP.202. REACTION 997

PLAB GEV/C	SIGMA MB
3.000	.6970
3.800	.5670
4.000	.4030
4.600	.2300
5.500	.1730
6.000	.1880
8.360	.0980
12.000	.0450
12.800	.0500

9 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K+N:PK0 SLAC REP:202 REACTION 997

N= 1/16

A= 60.2193 B= 141.7653- C= 83.7551

(B**2/4C)= 59.9885 (-B/2C)= .8463 PLAB(-B/2C)= 14.4391

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9336	.8348	.8695	.0347-
.9199	.7529	.6849	.0680
.9170	.6348	.6493	.0145-
.9090	.4795	.5602	.0806-
.8989	.4159	.4627	.0468-
.8940	.4335	.4217	.0118
.8757	.3130	.3032	.0098
.8561	.2121	.2389	.0267-
.8527	.2236	.2342	.0106-

CHI-SQUARE= .0289 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K+N:PK0 SLAC REP.202 REACTION 997

N= 1/8

A= 12.8049 B= 35.4346- C= 24.9246

(B**2/4C)= 12.5940 (-B/2C)= .7108 PLAB(-B/2C)= 15.3409

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8716	.8348	.8557	.0208-
.8463	.7529	.6683	.0846
.8408	.6348	.6325	.0023
.8263	.4795	.5433	.0637-
.8080	.4159	.4465	.0306-
.7993	.4335	.4061	.0274
.7668	.3130	.2891	.0238
.7329	.2121	.2231	.0109-
.7271	.2236	.2174	.0061

CHI-SQUARE= .0253 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K+N:PK0 SLAC REP.902 REACTION 997

N= 1/4

A= 2.2118 B= 8.3320- C= 8.6249

(B**2/4C)= 2.0122 (-B/2C)= .4830 PLAB(-B/2C)= 18.3708

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7598	.8348	.8604	.0255-
.7162	.7529	.6686	.0843
.7071	.6348	.6326	.0021
.6826	.4795	.5438	.0642-
.6529	.4159	.4487	.0327-
.6389	.4335	.4092	.0243
.5880	.3130	.2947	.0182
.5372	.2121	.2249	.0128-
.5286	.2236	.2175	.0060

CHI-SQUARE= .0248 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K+N:PK0   SLAC REP.202   REACTION 997

N= 1/2

A=   .2213   B=   1.0929-   C=   3.8189

(B**2/4C)=   .0782   (-B/2C)=   .1431   PLAB(-B/2C)=   48.8337

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5773	.8348	.8633	.0284-
.5129	.7529	.6656	.0873
.5000	.6348	.6296	.0051
.4662	.4795	.5419	.0624-
.4264	.4159	.4496	.0337-
.4082	.4335	.4116	.0219
.3458	.3130	.3001	.0128
.2886	.2121	.2241	.0119-
.2795	.2236	.2142	.0093

CHI-SQUARE=   .0249   FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K+N:PKO SLAC REP.202 REACTION 997

N= 1

A= .0487 B= 1.9553 C= 1.4543

(B**2/4C)= .6572 (-B/2C)= .6722- PLAB(-B/2C)= 1.4875-

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.3333	.8348	.8621	.0273-
.2631	.7529	.6640	.0889
.2500	.6348	.6285	.0062
.2173	.4795	.5425	.0630-
.1818	.4159	.4523	.0364-
.1666	.4335	.4150	.0185
.1196	.3130	.3034	.0095
.0833	.2121	.2218	.0097-
.0781	.2236	.2104	.0131

CHI-SQUARE= .0254 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

K+N:PK0 SLAC REP.202 REACTION 997

N= 2

A= .1581 B= 9.7165 C= 31.6613-

(B**2/4C)= .7454- (-B/2C)= .1534 PLAB(-B/2C)= 2.5528

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.1111	.8348	.8469	.0120-
.0692	.7529	.6792	.0737
.0625	.6348	.6417	.0069-
.0472	.4795	.5466	.0670-
.0330	.4159	.4447	.0288-
.0277	.4335	.4036	.0299
.0143	.3130	.2907	.0223
.0069	.2121	.2241	.0119-
.0061	.2236	.2162	.0073

CHI-SQUARE= .0231 FOR 8 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

PI-P:NPIO   CERN/HERA 72-2 REACTION 147

PLAB GEV/C	SIGMA MB
4.500	.1900
4.800	.1100
4.830	.1290
5.850	.0960
5.900	.0870
9.800	.0480
13.300	.0370
18.200	.0240

8 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NPI0   CERN/HERA 72-2 REACTION 147

N= 1/16

A= 26.1976   B= 62.5116-   C= 37.5232

(B**2/4C)= 26.0352   (-B/2C)= .8329   PLAB(-B/2C)= 18.6172

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9102	.4358	.3867	.0491
.9060	.3316	.3659	.0342-
.9062	.3591	.3640	.0048-
.8954	.3098	.3090	.0007
.8949	.2949	.3068	.0118-
.8670	.2190	.2060	.0130
.8506	.1923	.1742	.0181
.8341	.1549	.1625	.0075-

CHI-SQUARE= .0130 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NPI0   CERN/HERA 72-2 REACTION 147

N= 1/8

A= 5.7591   B= 16.1964-   C= 11.7285

(B**2/4C)= 5.5929   (-B/2C)= .6905   PLAB(-B/2C)= 19.3372

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8286	.4358	.3896	.0461
.8219	.3316	.3686	.0369-
.8213	.3591	.3666	.0075-
.8018	.3098	.3115	.0016-
.8010	.2949	.3092	.0143-
.7517	.2190	.2101	.0089
.7236	.1923	.1790	.0133
.6958	.1549	.1665	.0115-

CHI-SQUARE= .0121 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NPIO CERN/HERA 72-2 REACTION 147

N= 1/4

A= 1.2121 B= 4.4668- C= 4.7639

(B**2/4C)= 1.0470 (-B/2C)= .4688 PLAB(-B/2C)= 20.7002

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.6865	.4358	.3909	.0449
.6756	.3316	.3687	.0371-
.6745	.3591	.3666	.0075-
.6430	.3098	.3095	.0002
.6416	.2949	.3073	.0123-
.5651	.2190	.2093	.0097
.5236	.1923	.1793	.0129
.4841	.1549	.1661	.0112-

CHI-SQUARE= .0117 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NPIO   CERN/HERA 72-2 REACTION 147

N= 1/2

A= .2773   B= 1.1849-   C= 3.0381

(B**2/4C)= .1155   (-B/2C)= .1950   PLAB(-B/2C)= 26.2973

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.4714	.4358	.3938	.0419
.4564	.3316	.3694	.0377-
.4550	.3591	.3671	.0080-
.4134	.3098	.3067	.0030
.4116	.2949	.3044	.0094-
.3194	.2190	.2088	.0102
.2742	.1923	.1808	.0115
.2344	.1549	.1665	.0115-

CHI-SQUARE= .0108 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NPIO CERN/HERA 72-2 REACTION 147

N= 1

A= .1437 B= .1998 C= 4.2596
(B**2/4C)= .0023 (-B/2C)= .0234- PLAB(-B/2C)= 42.6209-

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2222	.4358	.3985	.0373
.2083	.3316	.3702	.0386-
.2070	.3591	.3677	.0085-
.1709	.3098	.3023	.0074
.1594	.2949	.3000	.0050-
.1020	.2190	.2085	.0105
.0751	.1923	.1828	.0094
.0549	.1549	.1676	.0126-

CHI-SQUARE= .0099 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NPIO CERN/HERA 72-2 REACTION 147

N= 2

A= .3333 B= 3.8333 C= 11.8333

(B**2/4C)= .3104 (-B/2C)= .1619- PLAB(-B/2C)= .0000

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.0493	.4358	.5514	.1156-
.0434	.3316	.5220	.1903-
.0428	.3591	.5193	.1602-
.0292	.3098	.4554	.1456-
.0287	.2949	.4532	.1582-
.0104	.2190	.3745	.1554-
.0056	.1923	.3553	.1630-
.0030	.1549	.3450	.1900-

CHI-SQUARE= .4889 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C)+(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

PI-P:NET CERN/HERA 72-2 REACTION 174

PLAB GEV/C	SIGMA MB
3.720	.1110
5.900	.0540
9.800	.0250
13.300	.0166
18.200	.0104

5 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NET CERN/HERA 72-2 REACTION 174

N= 1/16

A= 11.7222 B= 28.8194- C= 17.9027

(B**2/4C)= 11.5982 (-B/2C)= .8048 PLAB(-B/2C)= 32.2282

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9211	.3331	.3661	.0329-
.8949	.2323	.2693	.0370-
.8670	.1581	.1932	.0351-
.8506	.1288	.1615	.0326-
.8341	.1019	.1393	.0373-

CHI-SQUARE= .0310 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NET CERN/HERA 72-2 REACTION 174

N= 1/8

A= 2.2551 B= 6.8550- C= 5.4087

(B**2/4C)= 2.1720 (-B/2C)= .6337 PLAB(-B/2C)= 38.4523

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.3485	.3331	.3328	.0003
.9010	.2323	.2345	.0021-
.7617	.1581	.1585	.0004-
.7236	.1288	.1268	.0019
.6956	.1019	.1040	.0020-

CHI-SQUARE= .0000 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NET   CERN/HERA 72-2 REACTION 174

= 174

A= .2858   B= 1.2861-   C= 1.8766

(B**2/4C)= .2203   (-B/2C)= .3426   PLAB(-B/2C)= 72.5636

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7200	.3331	.3328	.0003
.6416	.2323	.2332	.0008-
.5651	.1581	.1584	.0003-
.5236	.1288	.1269	.0018
.4841	.1019	.1030	.0010-

CHI-SQUARE= .0000 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NET CERN/HERA 72-2 REACTION 174

N= 1/2

A= .0030 B= .2491 C= .7472

(B**2/4C)= .0207 (-B/2C)= .1667- PLAB(-B/2C)= 35.9726

PLAB**-0	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.5184	.3331	.3331	.0000
.4176	.2323	.2323	.0000
.3194	.1581	.1589	.0007-
.2742	.1288	.1275	.0012
.2344	.1019	.1025	.0005-

CHI-SQUARE= .0000 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NET CERN/HERA 72-2 REACTION 174

N= 1

A= .0355 B= 1.2643 C= .5761-

B**2/4C)= .6903- (-B/2C)= 1.0947 PLAB(-B/2C)= .9134

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2688	.3331	.3330	.0001
.1694	.2323	.2328	.0004-
.1020	.1581	.1583	.0001-
.0751	.1288	.1271	.0016
.0549	.1019	.1031	.0011-

CHI-SQUARE= .0000 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:NET   CERN/HERA 72-2 REACTION 174

N= 2

A= .0666   B= 5.9333   C= 37.3333-

(B**2/4C)= .2357- (-B/2C)= .0794 PLAB(-B/2C)= 3.5474

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.0722	.3331	.3004	.0326
.0287	.2323	.2063	.0260
.0104	.1581	.1243	.0337
.0056	.1288	.0990	.0298
.0030	.1019	.0842	.0177

CHI-SQUARE= .0287 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B &C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

PI-P:LKO   CERN/HERA 72-2 REACTION 303

PLAB GEV/C	SIGMA MB
2.050	.1820
2.050	.1790
2.140	.1620
2.150	.1920
2.250	.1720
2.350	.1740
2.494	.1600
2.605	.1060
2.700	.1200
2.750	.0900
2.750	.0900
2.860	.1090
3.000	.0310
3.010	.0840
3.125	.0940
3.210	.0870
3.885	.0670
3.900	.0580
4.160	.0490
6.000	.0235

20 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:LRO CERN/HERA 72-2 REACTION 303

N= 1/10

A= 36.5000 B= 82.7150- C= 47.0600

(B**2/4C)= 36.3460 (-B/2C)= .8788 PLAB(-B/2C)= 7.8988

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9561	.4266	.4352	.0085-
.9561	.4230	.4352	.0121-
.9535	.4024	.4168	.0143-
.9532	.4381	.4149	.0232
.9505	.4147	.3963	.0184
.9479	.4171	.3791	.0379
.9444	.4000	.3568	.0431
.9419	.3255	.3413	.0157-
.9394	.3464	.3290	.0173
.9387	.3000	.3228	.0228-
.9387	.3000	.3228	.0228-
.9364	.3301	.3101	.0199
.9336	.1760	.2954	.1193-
.9334	.2898	.2944	.0045-
.9312	.3065	.2833	.0231
.9297	.2949	.2758	.0191
.9136	.2588	.2287	.0301
.9184	.2408	.2279	.0129
.9147	.2213	.2147	.0065
.8940	.1532	.1649	.0116-

CHI-SQUARE= .0755 FOR 19 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:LKO   CERN/HERA 72-2 REACTION 303

N= 1/9

A= 7.9535   B= 20.3599-   C= 13.2765

(B**2/4C)= 7.8056   (-B/2C)= .7667   PLAB(-B/2C)= 8.3696

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9141	.4266	.4364	.0098-
.9141	.4230	.4364	.0133-
.9092	.4024	.4176	.0151-
.9067	.4381	.4156	.0225
.9036	.4147	.3965	.0181
.8987	.4171	.3790	.0380
.8920	.4000	.3563	.0436
.8872	.3255	.3405	.0149-
.8832	.3464	.3280	.0183
.8812	.3000	.3218	.0218-
.8812	.3000	.3218	.0218-
.8769	.3301	.3090	.0211
.8716	.1760	.2941	.1180-
.8713	.2898	.2931	.0032-
.8672	.3065	.2820	.0245
.8643	.2949	.2743	.0205
.8439	.2588	.2271	.0317
.8435	.2408	.2262	.0145
.8367	.2213	.2130	.0082
.7993	.1532	.1620	.0087-

CHI-SQUARE= .0757 FOR 19 DEGREES OF FREEDOM.

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:LKO   CERN/HERA 72-2 REACTION 303

N= 1/4

A=	1.4245	B=	4.5553-	C=	4.0397
(B**2/4C)=	1.2842	(-B/2C)=	.5638	PLAB(-B/2C)=	9.8951

PLAB**-1	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8357	.4266	.4389	.0123-
.8357	.4230	.4389	.0159-
.8267	.4024	.4197	.0172-
.8258	.4381	.4176	.0205
.8164	.4147	.3982	.0164
.8076	.4171	.3805	.0365
.7957	.4000	.3576	.0423
.7871	.3255	.3417	.0162-
.7801	.3464	.3293	.0170
.7765	.3000	.3231	.0231-
.7765	.3000	.3231	.0231-
.7689	.3301	.3103	.0197
.7598	.1760	.2955	.1194-
.7592	.2898	.2945	.0047-
.7521	.3065	.2835	.0230
.7470	.2949	.2760	.0189
.7122	.2588	.2293	.0294
.7115	.2408	.2285	.0122
.7002	.2213	.2154	.0058
.6389	.1532	.1631	.0098-

CHI-SQUARE= .0748 FOR 19 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:LKO   CERN/HERA 72-2 REACTION 303

N= 1/2

A= .1736   B= .6059-   C= 1.4104

(B**2/4C)= .0646   (-B/2C)= .2140   PLAB(-B/2C)= 21.8177

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.6984	.4266	.4400	.0134-
.6984	.4230	.4400	.0169-
.6635	.4024	.4200	.0175-
.6619	.4381	.4179	.0202
.6456	.4147	.3980	.0166
.6523	.4171	.3800	.0370
.6332	.4000	.3569	.0430
.6195	.3255	.3410	.0154-
.6085	.3464	.3286	.0177
.6030	.3000	.3225	.0225-
.6030	.3000	.3225	.0225-
.5913	.3301	.3096	.0202
.5773	.1760	.2952	.1192-
.5763	.2898	.2942	.0044-
.5656	.3065	.2835	.0230
.5581	.2949	.2761	.0188
.5073	.2588	.2304	.0283
.5063	.2408	.2296	.0111
.4902	.2213	.2167	.0046
.4082	.1532	.1623	.0090-

CHI-SQUARE= .0744 FOR 19 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS

LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:LKO CERN/HERA 72-2 REACTION 303

N= 1

A= .0513 B= .5884 C= .4299

(B**2/4C)= .2013 (-B/2C)= .6843- PLAB(-B/2C)= 1.4611-

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.4678	.4266	.4406	.0140-
.4678	.4230	.4406	.0175-
.4672	.4024	.4201	.0176-
.4651	.4381	.4180	.0201
.4444	.4147	.3977	.0169
.4255	.4171	.3795	.0375
.4004	.4000	.3563	.0436
.3638	.3255	.3405	.0149-
.3703	.3464	.3282	.0181
.3636	.3000	.3221	.0221-
.3636	.3000	.3221	.0221-
.3496	.3301	.3096	.0205
.3333	.1760	.2952	.1191-
.3322	.2898	.2942	.0044-
.3200	.3065	.2836	.0229
.3105	.2949	.2763	.0186
.2574	.2588	.2312	.0275
.2564	.2408	.2304	.0103
.2403	.2213	.2176	.0037
.1666	.1532	.1613	.0080-

CHI-SQUARE= .0742 FOR 19 DEGREES OF FREEDOM.

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS.
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION.

PI-P:LKO   CERN/HERA 72-2 REACTION 303

N= 2

A=	.1146	B=	1.8562	C=	2.0972-
(B**2/4C)=	.4107-	(-B/2C)=	.4425	PLAB(-B/2C)=	1.5032

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2379	.4266	.4376	.0110-
.2379	.4230	.4376	.0145-
.2183	.4024	.4200	.0175-
.2163	.4381	.4181	.0200
.1975	.4147	.3995	.0152
.1810	.4171	.3820	.0350
.1607	.4000	.3589	.0410
.1473	.3255	.3426	.0171-
.1371	.3464	.3298	.0165
.1322	.3000	.3234	.0234-
.1322	.3000	.3234	.0234-
.1222	.3301	.3102	.0198
.1111	.1760	.2950	.1189-
.1103	.2898	.2940	.0041-
.1024	.3065	.2827	.0238
.0970	.2949	.2750	.0198
.0662	.2588	.2284	.0303
.0657	.2408	.2276	.0131
.0577	.2213	.2149	.0064
.0277	.1532	.1646	.0113-

CHI-SQUARE= .0745 FOR 19 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS CROSS-SECTION

THE EQUATION

SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)

IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2

FOR EACH N WE FIND THE COEFFICIENTS A,B & C.

WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.

THE CHI-SQUARE IS COMPUTED AND PRINTED.

PI-P:S-K CERN/HERA 72-2 REACTION 375

PLAB GEV/C	SIGMA MB
2.050	.0870
2.050	.0700
2.140	.0390
2.150	.0650
2.250	.0570
2.350	.0530
2.494	.0510
2.610	.0300
2.700	.0310
2.750	.0320
2.860	.0220
3.000	.0150
3.010	.0220
3.130	.0155
3.210	.0145
3.890	.0085
4.000	.0050
4.160	.0045

18 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:S-K+ CERN/HERA 72-2 REACTION 375

N= 1/16

A= -60.0769 B= 136.4615- C= 78.3076

(B**2/4C)= 59.4505 (-B/2C)= .8713 PLAB(-B/2C)= 9.0612

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9561	.2949	1.1895	.8946-
.9561	.2645	1.1895	.9250-
.9535	.1974	1.1560	.9585-
.9532	.2549	1.1524	.8975-
.9505	.2387	1.1183	.8795-
.9479	.2302	1.0868	.8566-
.9444	.2258	1.0455	.8197-
.9418	.1732	1.0154	.8421-
.9398	.1[illegible]	.9937	.8176-
.9387	.1788	.9872	.8033-
.9364	.1483	.9583	.8100-
.9336	.1224	.9305	.8080-
.9334	.1483	.9286	.7803-
.9311	.1244	.9068	.7823-
.9297	.1204	.8932	.7728-
.9186	.0921	.8014	.7092-
.9170	.0707	.7897	.7190-
.9147	.0670	.7741	.7070-

CHI-SQUARE= 12.2376 FOR 17 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:S-K+ CERN/HERA 72-2 REACTION 375

N= 1/8

A= 5.9963 B= 15.9052- C= 10.5541

(B**2/4C)= 5.9923 (-B/2C)= .7535 PLAB(-B/2C)= 9.6228

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9141	.2949	.2765	.0184
.9141	.2645	.2765	.0119-
.9092	.1974	.2601	.0626-
.9087	.2549	.2584	.0034-
.9036	.2387	.2418	.0030-
.8987	.2302	.2265	.0036
.8920	.2258	.2066	.0192
.8869	.1732	.1921	.0188-
.8832	.1760	.1816	.0056-
.8812	.1788	.1761	.0026
.8769	.1483	.1647	.0164-
.8716	.1224	.1514	.0289-
.8713	.1483	.1505	.0022-
.8670	.1244	.1401	.0156-
.8643	.1204	.1337	.0132-
.8438	.0921	.0901	.0020
.8408	.0707	.0846	.0139-
.8367	.0670	.0772	.0101-

CHI-SQUARE= .0348 FOR 17 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:S-K+ CERN/HERA 72-2 REACTION 375

N= 1/4

A= .7561 B= 3.0527- C= 2.9541

(B**2/4C)= .7886 (-B/2C)= .5166 PLAB(-B/2C)= 14.0317

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8357	.2949	.2682	.0267
.8357	.2645	.2682	.0036-
.8267	.1974	.2516	.0541-
.8258	.2549	.2498	.0050
.8164	.2387	.2330	.0056
.8076	.2302	.2176	.0125
.7957	.2258	.1976	.0282
.7867	.1732	.1830	.0098-
.7801	.1760	.1725	.0035
.7765	.1788	.1670	.0118
.7689	.1483	.1555	.0072-
.7598	.1224	.1422	.0197-
.7592	.1483	.1412	.0070
.7518	.1244	.1308	.0063-
.7470	.1204	.1243	.0039-
.7120	.0921	.0803	.0118
.7071	.0707	.0746	.0039-
.7002	.0670	.0670	.0000

CHI-SQUARE= .0266 FOR 17 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:S-K+ CERN/HERA 72-2 REACTION 375

N= 1/2

A= .1280- B= .0030- C= .8173

(B**2/4C)= .0000 (-B/2C)= .0018 PLAB(-B/2C)=287591.7799

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.6984	.2949	.2684	.0264
.6984	.2645	.2684	.0039-
.6835	.1974	.2517	.0542-
.6819	.2549	.2500	.0049
.6666	.2387	.2331	.0055
.6523	.2302	.2177	.0124
.6332	.2258	.1977	.0281
.6189	.1732	.1831	.0099-
.6085	.1760	.1727	.0032
.6030	.1788	.1672	.0115
.5913	.1483	.1558	.0075-
.5773	.1224	.1426	.0201-
.5763	.1483	.1417	.0066
.5652	.1244	.1313	.0068-
.5581	.1204	.1248	.0044-
.5070	.0921	.0804	.0117
.5000	.0707	.0747	.0040-
.4902	.0670	.0668	.0001

CHI-SQUARE= .0266 FOR 17 DEGREES OF FREEDOM

HIGH ENERGY TWO-BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:S-K+ CERN/HERA 72-2 REACTION 375

N= 1

A= .1327- B= .8361 C= .0288-

(B**2/4C)= 6.0516- (-B/2C)= 14.4752 PLAB(-B/2C)= .0690

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.4878	.2949	.2682	.0267
.4878	.2645	.2682	.0036-
.4672	.1974	.2516	.0541-
.4651	.2549	.2498	.0050
.4444	.2387	.2331	.0055
.4255	.2302	.2178	.0124
.4009	.2258	.1978	.0279
.3831	.1732	.1833	.0101-
.3703	.1760	.1729	.0031
.3636	.1788	.1674	.0114
.3496	.1483	.1560	.0077-
.3333	.1224	.1427	.0202-
.3322	.1483	.1418	.0064
.3194	.1244	.1314	.0069-
.3115	.1204	.1249	.0045-
.2570	.0921	.0802	.0119
.2500	.0707	.0744	.0037-
.2403	.0670	.0665	.0005

CHI-SQUARE= .0267 FOR 17 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI-P:S-K+ CERN/HERA 72-2 REACTION 375

N= 2

A= .0270- B= 1.7707 C= 2.2556-

(B**2/4C)= .3475- (-B/2C)= .3925 PLAB(-B/2C)= 1.5961

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2379	.2949	.2665	.0284
.2379	.2645	.2665	.0019-
.2183	.1974	.2520	.0545-
.2163	.2549	.2504	.0045
.1975	.2387	.2346	.0040
.1810	.2302	.2195	.0106
.1607	.2258	.1992	.0265
.1467	.1732	.1842	.0110-
.1371	.1760	.1733	.0027
.1322	.1788	.1676	.0112
.1222	.1483	.1556	.0073-
.1111	.1224	.1418	.0193-
.1103	.1483	.1408	.0074
.1020	.1244	.1301	.0056-
.0970	.1204	.1235	.0030-
.0660	.0921	.0800	.0121
.0625	.0707	.0747	.0040-
.0577	.0670	.0677	.0006-

CHI-SQUARE= .0262 FOR 17 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION
SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N)).

THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

PI+P:S+K+. CERN 72-2 REACTION 255

PLAB GEV/C	SIGMA MB
2.080	.2900
2.770	.1050
3.230	.1680
4.000	.0590
5.500	.0297

5 DATA POINTS READ.

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+P:S+K+ CERN 72-2 REACTION 255

N= 1/16

A= 23.6000 B= 69.0000- C= 41.2000

(B**2/4C)= 28.8695 (-B/2C)= .8373 PLAB(-B/2C)= 17.1099

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9652	.5385	1.2829	.7444-
.9383	.3240	1.1301	.8060-
.9293	.4098	1.0588	.6489-
.9170	.2428	.9716	.7287-
.8989	.1723	.8665	.6942-

CHI-SQUARE= 2.5073 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS

LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+P:S+K+ CERN 72-2 REACTION 255 5

N= 1X8

A= 4.5844 B= 13.2813- C= 9.6623

(B**2/4C)= 4.5639 (-B/2C)= .6872 PLAB(-B/2C)= 20.0886

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9125	.5385	.5106	.0278
.3404	.3240	.3808	.0568-
.9636	.4098	.3210	.0867
.3408	.2428	.2484	.0055-
.3080	.1723	.1614	.0109

CHI-SQUARE= .0354 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+P:S+K+ CERN 72-2 REACTION 255

N= 1/4

A= .3704 B= 2.0685- C= 2.7074

(B**2/4C)= .3950 (-B/2C)= .3820 PLAB(-B/2C)= 46.9598

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8326	.5385	.5252	1.0132
.7751	.3240	.3937	.0697-
.7459	.4098	.3339	.0759
.7071	.2428	.2614	.0185-
.6529	.1723	.1741	.0018-

CHI-SQUARE= .0313 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+P=S+K+ CERN 72-2 REACTION 255

N= 1/2

A= .1736- B=- .5097 C= .7201

(B**2/4C)= .0901 (-B/2C)= .3538- PLAB(-B/2C)= 7.9850

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.6933	.5385	.5260	.0124
.6098	.3240	.3926	.0686-
.5564	.4098	.3329	.0769
.5000	.2428	.2612	.0183-
.4264	.1723	.1746	.0023-

CHI-SQUARE= .0313 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+P:S+K+ CERN 72-2 REACTION 255

N = 1

A= .0537- B= 1.3052 C= .1992-

(B**2/4C)= 2.1373- (-B/2C)= 3.2750 PLAB(-B/2C)= .3053

PLAB**-1	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.4407	.5365	.5277	.0107
.3610	.3240	.3915	.0674-
.3095	.4098	.3312	.0785
.2500	.2428	.2601	.0172-
.1818	.1723	.1770	.0046-

CHI-SQUARE= .0317 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+P:S+K+ CERN 72-2 REACTION 255

= 2

A= .1000 B= 2.7045 C= 3.6433-

(B**2/4C)= .5018- (-B/2C)= .3711 PLAB(-B/2C)= 1.6414

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2311	.5385	.5305	.0079
.1303	.3240	.3906	.0666-
.0958	.4098	.3258	.0840
.0625	.2428	.2548	.0119-
.0330	.1723	.1854	.0131-

CHI-SQUARE= .0346 FOR 4 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

THE EQUATION

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     SIGMA**1/2 = A + B PLAB**(-N) + C PLAB**(-2N)
IS FITTED FOR N = 1/16,1/8,1/4,1/2,1,2
FOR EACH N WE FIND THE CO-EFFICIENTS A B & C.
WE THEN COMPUTE (B**2/4C),(-B/2C) & ((-B/2C)**(-1/N))
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THE OBSERVED AND ESTIMATED CROSS-SECTIONS ARE PRINTED.
THE CHI-SQUARE IS COMPUTED AND PRINTED.

PI+N>PET   CERN/HERA 72-2 REACTION 316

PLAB GEV/C	SIGMA MB
1.980	.6000
2.100	.5500
2.210	.2900
2.340	.3000
2.460	.1600
2.700	.2100
5.400	.1170
6.000	.0520

8 DATA POINTS READ

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+N:PET CERN/HERA 72-2 REACTION 316

N= 1/16

A= 210.5?1 B= 461.9523 C= 253.0476

(B**2/4C)= 210.8298 (-B/2C)= .9127 PLAB(-B/2C)= 4.3068

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9582	.7745	.2637	.5108
.9546	.7416	.1860	.5556
.9516	.5385	.1238	.4146
.9482	.5477	.0599	.4877
.9452	.4000	.0090	.3909
.9398	.4582	.0735-	.5318
.8999	.3420	.2169-	.5589
.8940	.2280	.1697-	.3978

CHI-SQUARE= 18.6100 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+N:PET CERN/HERA 72-2 REACTION 316

N= 1/8

A= 49.8594 B= 119.2823- C= 71.6678

(B**2/4C)= 49.6327 (-B/2C)= .8321 PLAB(-B/2C)= 4.3473

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.9181	.7745	.7563	.0182
.9114	.7416	.6766	.0649
.9056	.5385	.6132	.0747-
.8991	.5477	.5483	.0006-
.8935	.4000	.4967	.0967-
.8832	.4582	.4134	.0447
.8099	.3420	.2621	.0798
.7903	.2280	.3040	.0759-

CHI-SQUARE= .0828 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO-BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+P:PET CERN/HERA 72-2 REACTION 316

N= 1/4

A= 11.4845 B= 34.4866- C= 23.4399

(B**2/4C)= 11.2562 (-B/2C)= .6929 PLAB(-B/2C)= 4.3363

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.8420	.7745	.7559	.0186
.8307	.7416	.6729	.0686
.8201	.5385	.6075	.0689-
.8085	.5477	.5413	.0064
.7984	.4000	.4892	.0892-
.7801	.4587	.4063	.0519
.6559	.3420	.2603	.0816
.6389	.2280	.2967	.0687-

CHI-SQUARE= .0798 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+P:PET CERN/HERA 72-2 REACTION 316

N= 1/2

A= 2.5060 B= 9.4261- C= 9.8133

(B**2/4C)= 2.2635 (-B/2C)= .4802 PLAB(-B/2C)= 4.3353

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.7106	.7745	.7633	.0112
.6900	.7416	.6743	.0672
.6726	.5385	.6057	.0672-
.6537	.5477	.5376	.0100
.6375	.4000	.4852	.0852-
.6085	.4582	.4040	.0542
.4303	.3420	.2669	.0751
.4092	.2280	.2933	.0653-

CHI-SQUARE= .0724 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+N:PET - CERN/HERA 72-2 REACTION 316

N= 1

A= .5962 B= 2.9310 C= 6.5039

(B**2/4C)= .3302 (-B/2C)= .2253 PLAB(-B/2C)= 4.4379

PLAB**-N	SIGMA**1/2 BESERVED	SIGMA**1/2 ESTIMATED	ERROR
.5050	.7745	.7749	.0003-
.4761	.7416	.6753	.0662
.4524	.5385	.6016	.0631-
.4273	.5477	.5314	.0162
.4065	.4000	.4795	.0795-
.3703	.4582	.4028	.0553
.1651	.3420	.2765	.0655
.1666	.2280	.2884	.0603-

CHI-SQUARE= .0626 FOR 7 DEGREES OF FREEDOM

HIGH ENERGY TWO BODY MESON-BARYON INTERACTIONS
LEAST SQUARES FIT OF LABORATORY MOMENTUM VS. CROSS-SECTION

PI+N:PET.   CERN/HERA 72-2 REACTION 316

N= 2

A= .2893   B= .4345-   C= 9.3888

(B**2/4C)= .0050   (-B/2C)= .0231   PLAB(-B/2C)= 6.5737

PLAB**-N	SIGMA**1/2 OBSERVED	SIGMA**1/2 ESTIMATED	ERROR
.2550	.7745	.7894	.0148-
.2267	.7416	.6736	.0679
.2047	.5385	.5940	.0554-
.1826	.5477	.5231	.0245
.1652	.4000	.4739	.0739-
.1371	.4582	.4064	.0518
.0342	.3420	.2855	.0565
.0277	.2280	.2845	.0565-

CHI-SQUARE= .0540 FOR 7 DEGREES OF FREEDOM