Revista Brasileira de Fisica, Vol. 13, nº 4, 1983

Diffractive Dissociation in $pp \to \Delta^{++}\pi^{-}p$. II. Slope-Mass Partial Wave Correlation

A.C.B. ANTUNES

Instituto de Física, Universidade Federal do Rio de Janeiro, Caixa Postal 68528, Rio de Janeiro, 21910, RJ, Brasil

and

A.F.S. SANTORO, M.H.G. SOUZA

Centro Brasileiro de Pesquisas Físicas, Rua Dr. Xavier Sigaud 150, 22290, Rio de Janeiro, RJ, Brasil

Recebido em 17 de fevereiro de 1984

Abstract This paper is a continuation of the "Diffractive Dissociation In $pp \to \Delta^{++}\pi^{-}p$. I - Slope-Mass-Cos$\theta^{G.J.}$ Correlation".[1] We calculate here the partial wave amplitudes and give the results obtained for the slope-mass-partial wave correlation.

Key-words: Diffractive dissociation; Deck-model; Phenomenology.

1. INTRODUCTION

This paper is a continuation of "Diffractive Dissociation in $pp \to \Delta^{++}\pi^{-}p$. I - Slope-Mass-Cos$\theta^{G.J.}$ Correlation", henceforth called [I]'. Here we proceed to the partial wave analysis for the $(\Delta^{++}\pi^{-})$ system using the helicity amplitudes and the formalism of [I]. We avoid reproducing the results of [I], where the required formulae, expressions and notations can be found.

The (TCDM) gives a set of properties of the inelastic diffractive reactions. One of them is the existence of "zeros" as a consequence of the interference among its components. In some cases it was possible to derive an equation for the "zeros", which determines exactly the kinematical region where they are located. But in the present case ($pp \to \Delta^{++}\pi^{-}p$) the complications arising from the spin don't allow to write a simple expression in which we can visualize analytically the "zeros" of the amplitude. These "zeros" corresponds to dips in the cross-sections that are experimentally observed in the kinematical region of energy below the threshold of the resonances.

A consequence of these "zeros" in the t_2-distributions for the particular intervals of mass of the $(\Delta^{++}\pi^{-})$ system and of cos$\theta^{G.J.}$, is a slope(b)-mass($M_{\Delta^{++}\pi^{-}}$)-partial wave correlation.

The enhancement of the net slope of a particular wave, which decreases with increasing energies (s_1) of the dissociated particles, is an evidence of this correlation.

We examine the interferences among the components of (TCDM) and investigate in which partial waves they are stronger. As we could not obtain an equation to determine the position of the "zeros" we made in [1] a numerical analysis of the slope-mass-cos$\theta^{G.J.}$ correlation. In the present paper we also calculate numerically the partial wave distributions and search for slope-mass-partial wave correlation.

In section 2 we give the partial wave analysis (PWA) of the helicity amplitudes obtained in [1] using the results shown in Appendix A.

We can search for interference mechanism directly in the t_2-distributions for particular windows of the parameters. The net slope of each partial wave is a good way of checking whether the interference mechanism given by (TCDM) works or not.

In section 3 the results of the calculations are discussed and some conclusions are presented. In Appendix A, we the partial wave development of the helicity amplitudes of the subreaction ($\mathbb{P}$+a $\rightarrow$ 1+2), Fig.(A1).

Some symbols that appear in this paper are: the diffractive momentum transfer $t_2 = (p_b - p_3)^2$; the Gottfried-Jackson coordinates (θ, ϕ) of the momentum $(\vec{p}_1)$ and the angle (a) of the momentum $(\vec{p}_3)$ relative to the incident beam direction $(\vec{p}_a)$, in the R12 system; the squared energy of the dissociated subsystem, $s_1 = (p_1 + p_2)^2$; in the R12 system, $s_1 = (M_{\Delta^{++}\pi^-})$.

2. PARTIAL WAVES FOR $pp \rightarrow \Delta^{++}\pi^- p$ REACTION

We formulate in this section the (PWA) for our reaction, using the helicity amplitudes obtained in paper [1]. For our purposes, these amplitudes (defined in section 4 of [1] formulae (55), (56), (57), (58)) are suitably rewritten here.

$$A_{(\pm 3/2, \pm 1/2)}(\theta,\phi) = e^{\mp i\phi}\{A^{(1)}_{(\pm 3/2,\pm 1/2)} + A^{(2)}_{(\pm 3/2,\pm 1/2)}\cos\phi + A^{(3)}_{(\pm 3/2,\pm 1/2)}\sin\phi\} \tag{1}$$

$$A_{(\mp 3/2,\pm 1/2)}(\theta,\phi) = e^{\pm 2i\phi}\{A^{(1)}_{(\mp 3/2,\pm 1/2)} + A^{(2)}_{(\mp 3/2,\pm 1/2)}\cos\phi + A^{(3)}_{(\mp 3/2,\pm 1/2)}\sin\phi\} \tag{2}$$

$$A_{(\pm 1/2,\pm 1/2)}(\theta,\phi) = \{A^{(1)}_{(\pm 1/2,\pm 1/2)} + A^{(2)}_{(\pm 1/2,\pm 1/2)}\cos\phi + A^{(3)}_{(\pm 1/2,\pm 1/2)}\sin\phi\} \tag{3}$$

$$A_{(\mp 1/2,\pm 1/2)}(\theta,\phi) = e^{\pm i\phi}\{A^{(1)}_{(\mp 1/2,\pm 1/2)} + A^{(2)}_{(\mp 1/2,\pm 1/2)}\cos\phi + A^{(3)}_{(\mp 1/2,\, \pm 1/2)}\sin\phi\} \tag{4}$$

where

$$A^{(1)}_{(\pm 3/2,\pm 1/2)} = \pm\frac{i}{\sqrt{2}}\{\mathrm{Im}_1 + a_2\mathrm{Im}_2 + a_3\mathrm{Im}_3\} \tag{1a}$$

$$A^{(1)}_{(\mp 3/2,\pm 1/2)} = \frac{i}{\sqrt{2}}\{\mathrm{Im}_5 + a_2\mathrm{Im}_6 + a_3\mathrm{Im}_7\} \tag{2a}$$

$$A^{(1)}_{(\pm 1/2,\pm 1/2)} = i\,\{\mathrm{Im}_9 + a_2\mathrm{Im}_{10} + a_3\mathrm{Im}_{11}\} \tag{3a}$$

$$A^{(1)}_{(\mp 1/2,\pm 1/2)} = \mp\, i\,\{\mathrm{Im}_{13} + a_2\mathrm{Im}_{14} + a_3\mathrm{Im}_{15}\} \tag{4a}$$

$$A^{(2)}_{(\pm 3/2,\pm 1/2)} = \pm\frac{i}{\sqrt{2}}(b_2\mathrm{Im}_2 + b_3\mathrm{Im}_3 + \mathrm{Im}_4) \tag{1b}$$

$$A^{(2)}_{(\mp 3/2,\pm 1/2)} = \frac{i}{\sqrt{2}}(b_2\mathrm{Im}_6 + b_3\mathrm{Im}_7 + \mathrm{Im}_8) \tag{2b}$$

$$A^{(2)}_{(\pm 1/2,\pm 1/2)} = i(b_2\mathrm{Im}_{10} + b_3\mathrm{Im}_{11} + \mathrm{Im}_{12}) \tag{3b}$$

$$A^{(2)}_{(\mp 1/2,\pm 1/2)} = \mp\, i(b_2\mathrm{Im}_{14} + b_3\mathrm{Im}_{15} + \mathrm{Im}_{16}) \tag{4b}$$

$$A^{(3)}_{(\pm 3/2,\pm 1/2)} = -\frac{1}{\sqrt{2}}\mathrm{Re}'(\pm 3/2,\pm 1/2) \tag{1c}$$

$$A^{(3)}_{(\mp 3/2,\pm 1/2)} = \pm\frac{1}{\sqrt{2}}\mathrm{Re}'(\mp 3/2,\pm 1/2) \tag{2c}$$

$$A^{(3)}_{(\pm 1/2,\pm 1/2)} = \pm \text{Re}'_{(\pm 1/2,\pm 1/2)} \tag{3c}$$

$$A^{(3)}_{(\mp 1/2,\pm 1/2)} = - \text{Re}'_{(\mp 1/2,\pm 1/2)} \tag{4c}$$

$$\text{Re}'_{(\pm 3/2,\pm 1/2)} = \frac{1}{\sin\phi}\text{Re}_{(\pm 3/2,\pm 1/2)} \tag{1c-1}$$

$$\text{Re}'_{(\mp 3/2,\pm 1/2)} = \frac{1}{\sin\phi}\text{Re}_{(\mp 3/2,\pm 1/2)} \tag{2c-1}$$

$$\text{Re}'_{(\pm 1/2,\pm 1/2)} = \frac{1}{\sin\phi}\text{Re}_{(\pm 1/2,\pm 1/2)} \tag{3c-1}$$

$$\text{Re}'_{(\mp 1/2,\pm 1/2)} = \frac{1}{\sin\phi}\text{Re}_{(\mp 1/2,\pm 1/2)} \tag{4c-1}$$

$$a_2 = m_2^2 + m_3^2 + \frac{1}{2s_1}\Big[(s_1+m_2^2-m_1^2)(s-s_1-m_3^2)$$

$$+ \lambda^{1/2}(s_1,m_1^2,m_2^2)\ \lambda^{1/2}(s,s_1,m_3^2)\cos\alpha\cos\theta\Big]$$

$$b_2 = -\frac{1}{2s_1}\ \lambda^{1/2}(s_1,m_1^2,m_2^2)\lambda^{1/2}(s,s_1,m_3^2)\sin\alpha\sin\theta$$

$$a_3 = s - s_1 + m_1^2 + m_2^2 + m_3^2 - a_2$$

$$b_3 = - b_2$$

The expressions Im_k $(k = 1,\ldots,16)$ and $\text{Re}_{(\lambda_1,\lambda_a)}$, with $\lambda_1 = \pm 3/2, \pm 1/2$ and $\lambda_a = \pm 1/2$ given in [l].

Let us make some comnents on these formulae. We have separated all helicity amplitudes in three parts, one of which has no dependence on ϕ, one multiplied by $\cos\phi$ and another one multiplied by $\sin\phi$. This separation for (PWA) make the integration on ϕ easier to perform as we can see below.

We wishto makesome remarks for each of the coefficients $A^{(i)}_{\lambda_1\lambda_a}$, $i = 1,2,3$. In order to make the observations below easier to be understood, the components of (TCDM) which are present in each coefficient are shown in Table (2.1).

Table 2-1 - Components of (TCDM) present in each of the coefficients $A^{(i)}_{\lambda_i\lambda_a}$ $(i = 1,2,3)$.

$A^{(i)}_{\lambda_1\lambda_a}$		Components present in $A^{(i)}_{\lambda_1\lambda_a}$			
$\lambda_a = \pm 1/2$ $A^{(i)}$	λ_1	U	TU	SU	STU
$A^{(1)}$	$\pm 3/2$	no	yes	no	no
	$\mp 3/2$	no	yes	no	no
	$\pm 1/2$	no	no	no	yes
	$\mp 1/2$	no	no	no	yes
$A^{(2)}$	$\pm 3/2$	no	yes	no	no
	$\mp 3/2$	no	yes	no	no
	$\pm 1/2$	no	no	no	yes
	$\mp 1/2$	no	no	no	yes
$A^{(3)}$	$\pm 3/2$	yes	no	no	no
	$\mp 3/2$	yes	no	no	no
	$\pm 1/2$	no	no	yes	no
	$\mp 1/2$	no	no	yes	no

(i) The coefficients $A^{(1)}_{(\pm1/2,\pm1/2)}$, $A^{(2)}_{(\pm1/2,\pm1/2)}$, $A^{(1)}_{(\mp1/2,\pm1/2)}$ and $A^{(2)}_{(\mp1/2,\pm1/2)}$ contain the three components of (TCDM). Consequently, if there exist strong interferences of TCDM type, they are expected to occur in these coefficients.

(ii) The coefficients $A^{(1)}_{(\pm3/2,\pm1/2)}$, $A^{(2)}_{(\pm3/2,\pm1/2)}$, $A^{(1)}_{(\mp3/2,\pm1/2)}$ and $A^{(2)}_{(\mp3/2,\pm1/2)}$ contain only T and U components. Then, we cannot expect strong interferences of (TCDM) type.

(iii) The coefficients $A^{(3)}_{(\pm3/2,\pm1/2)}$ and $A^{(3)}_{(\mp3/2,\pm1/2)}$ contain only U components, so we do not expect interferences at all.

(iv) Finally the coefficients $A^{(3)}_{(\pm 1/2,\pm 1/2)}$ and $A^{(3)}_{(\mp 1/2,\pm 1/2)}$ contain U and S components. Then the possible interferences are notexpected to be strong.

Now we wrlte the amplitudes given by eqs. (1), (2), (3) and (4) in a general way

$$A_{\lambda_1\lambda_a}(\theta,\phi) = e^{-i(\lambda_1-\lambda_a)\phi}\,\tilde{A}_{\lambda_1\lambda_a}(\theta,\phi) \tag{5}$$

where

$$\tilde{A}_{\lambda_1\lambda_a}(\theta,\phi) = A^{(1)}_{\lambda_1\lambda_a}(\theta) + A^{(2)}_{\lambda_1\lambda_a}(\theta)\cos\phi + A^{(3)}_{\lambda_1\lambda_a}(\theta)\sin\phi \tag{6}$$

The integration on ϕ which appears in eq. (A-27) can be done

$$\int_{-\pi}^{\pi} d\phi\; e^{-i(M-\lambda_a)\phi}\,\tilde{A}_{\lambda_1\lambda_a}(\theta,\phi) = 2\pi\, A^{(1)}_{\lambda\,\lambda_a}(\theta)\;\delta_{M\lambda_a}$$

$$+\;\pi\left[A^{(2)}_{\lambda_1\lambda_a}(\theta) + i\,A^{(3)}_{\lambda_1\lambda_a}(\theta)\right]\delta_{M,\lambda_a-1} + \pi\left[A^{(2)}_{\lambda_1\lambda_a}(\theta) - i\,A^{(3)}_{\lambda_1\lambda_a}(\theta)\right]\delta_{M,\lambda_a-1} \tag{7}$$

Thus we may obtain partial wave amplitudes for each value of M, as it is usually done in the experimental analysis. As we want to show that there may happen interferences in the (PWA), we choose (for simplicity) only the value M = λ_a, because this choice automatically selects the amplitudes in which they are likely to occur.

From eqs. (7) and (A-27), weobtain the partial wave amplitudes for well defined total angular momentum J and its projection on the incident beam momentum M = λ_a

$$A^{J,M=\lambda_a,\pm}_{\lambda_1\lambda_a} = \sqrt{\pi(J+1/2)}\int_0^{\pi}\sin\theta\; d\theta\;\{d^J_{\lambda_a\lambda_1}(\theta)\;A^{(1)}_{\lambda_1\lambda_a}(\theta)$$

$$\pm\; d^J_{\lambda_a,-\lambda_1}(\theta)\;A^{(1)}_{-\lambda_1,\lambda_a}(\theta)\;\} \tag{8}$$

which satisfy the relations

$$A^{J,-\lambda_a,\pm}_{-\lambda_1,-\lambda_a} = A^{J,\lambda_a,\pm}_{\lambda_1,\lambda_a} \tag{9}$$

$$A^{J,\lambda_a,\pm}_{-\lambda_1,\lambda_a} = \pm A^{J,\lambda_a,\pm}_{\lambda_1,\lambda_a} \tag{10}$$

For well defined orbital angular momentum L the amplitudes are given by eq.(A.30)

$$A^{J,M,\pm}_{(L)\lambda_a} = \sqrt{\frac{2L+1}{2J+1}}\left[1 \pm N_{12}(-1)^{J-L-s_1}\right] \sum_{|\lambda_1|} C^{L,s_1,J}_{0,|\lambda_1|,|\lambda_1|} A^{J,M,\pm}_{|\lambda_1|,\lambda_a}$$

where $A^{J,M,\pm}_{|\lambda_1|,\lambda_a}$ is given by eq.(8), satisfying the relation (A.31). If $M=\lambda_a$,

$$A^{J,-\lambda_a,\pm}_{(L),-\lambda_a} = \pm A^{J,\lambda_a,\pm}_{(L),\lambda_a} \tag{11}$$

These amplitudes have parity given by $P = \pm(-1)^{J-1/2}$. As our model must be applied only to a restrict range of the effective mass of the subsystem $(\Delta^{++}\pi^-)$, located below the first resonance threshold $(m_\Delta + m_\pi \lesssim \sqrt{s_1} \lesssim m_{N^*})$, we expect that in this region only the first few partial waves contribute significantly to the subreaction $\mathbb{P} + p \to \Delta^{++} + \pi^-$. For convenience we denote the amplitudes used in our calculations by

$$A(L^P_J)_{1/2} = A^{J,1/2,\pm}_{(L)1/2} \tag{12}$$

Now using eq. (A-40) we have one partial wave amplitude for S-wave, three for P-wave and four amplitudes for D-wave, as given below.

$$A(S^-_{3/2})_{1/2} = A^{3/2,1/2,+}_{3/2,1/2} + A^{3/2,1/2,+}_{1/2,1/2} \tag{13}$$

$$A(P^+_{1/2})_{1/2} = -\sqrt{2}\, A^{1/2,1/2,+}_{1/2,1/2} \tag{14a}$$

$$A(P^{+}_{3/2})_{1/2} = -\frac{1}{\sqrt{5}}\left(3A^{3/2,1/2,-}_{3/2,1/2} + A^{3/2,1/2,-}_{1/2,1/2}\right) \tag{14b}$$

$$A(P^{+}_{5/2})_{1/2} = \frac{1}{\sqrt{5}}\left(2A^{5/2,1/2,+}_{3/2,1/2} + \sqrt{6}\,A^{5/2,1/2,+}_{1/2,1/2}\right) \tag{14c}$$

$$A(D^{-}_{1/2})_{1/2} = \sqrt{2}\;A^{1/2,1/2,-}_{1/2,1/2} \tag{15a}$$

$$A(D^{-}_{3/2})_{1/2} = A^{3/2,1/2,+}_{3/2,1/2} - A^{3/2,1/2,+}_{1/2,1/2} \tag{15b}$$

$$A(D^{-}_{5/2})_{1/2} = -\sqrt{2/7}\left(\sqrt{6}\,A^{5/2,1/2,-}_{3/2,1/2} + A^{5/2,1/2,-}_{1/2,1/2}\right) \tag{15c}$$

$$A(D^{-}_{7/2})_{1/2} = \frac{1}{\sqrt{7}}\left(\sqrt{5}\;A^{7/2,1/2,+}_{3/2,1/2} + 3A^{7/2,1/2,-}_{1/2,1/2}\right) \tag{15d}$$

Based only on the expressions above we cannot predict exactly the behaviour of these amplitudes with respect to the interferences. We know that in all amplitudes (13) to (15) the terms which give the strong interferences are present. However there are other terms not trivially added that can give rise to complicated concelations so that we cannot extract any clear conclusion. Thus we made some numerical calculations whlch we comment in the next section.

The cross-section calculated from the amplitudes (13) to (15), for each partial wave (L) with $|M|=1/2$, is given by (according to eq. (A-47) of |1|):

$$\frac{d\sigma^{L}_{|M|=1/2}}{dt_2} = c\int_{(M_{\Delta^{++}\pi^-})^2}^{(M'_{\Delta^{++}\pi^-})^2} ds_1\;\frac{\lambda^{1/2}(s_1,m_1^2,m_2^2)}{s_1}\sum_J |A(L^P_J)_{1/2}|^2 \tag{16}$$

3. RESULTS AND CONCLUSIONS

The partial wave distributions $d\sigma/dt_2$ for the $pp\to\Delta^{++}\pi^{-}p$ reaction have been calculated in this work. This allows us to look for the existence of a slope-mass-partial wave correlation, as observed in other cases (e.g. KN [3]).

Our results are shown in figures (1) to (6). The set of parameters used in the calculations is the same as that of paper [1] : $\sigma^{\pi N}_{Tot} = 25$ (mb), $\sigma^{NN}_{Tot} = 50.$ (mb), $\sigma^{N\Delta}_{Tot} = 80$ (mb), $B_{\pi N} = 10(\mathrm{GeV}^{-2})$, $B_{NN}=9.$ (GeV^{-2}) and $B_{N\Delta} = 8.(\mathrm{GeV}^{-2})$. Two effective mass $(M_{\Delta^{++}\pi^-})$ intervals were considered: $1.37 \leq M_{\Delta^{++}\pi^-} \leq 1.40$ (GeV) and $1.40 \leq M_{\Delta^{++}\pi} \leq 1.45$ (GeV).

For the partial wave amplitudes $A^{JM,\pm}_{(L)\lambda_a}$ with well defined total angular momentum (J) of the subsystem ($\Delta\pi$) and its projection in the direction of the incident beam (M), orbital angular momentum (L) and normality (±), we have restricted the calculations to the values $M=\lambda_a$ (or $|M| = 1/2$).

This restriction has the advantages of simplifying the calculations and making possible to choose the partial wave amplitudes in which strong interferences due to TCDM are expected to occur.

The condition $|M| = 1/2$ is enough to verify a possible slope-mass-partial wave correlation. This assumption was corroborated by the results presented here. We hope that these results will be confirmed experimentally.

Figure 1 shows the three partial wave (S, P and D) distributions, obtained directly by (13), (14) and (15). We can see that there is a strong interference in the S wave, with a dip at $t_2 = -0.3$ (GeV^2). The P wave shows two different behaviors, or two slopes, and the D wave shows only one slope in the considered range of t_2.

An examination of each $A(L^P_J)_{1/2}$ wave distribution allows us to understand specifically which of them have strong interferences.

Figure 3 shows the P wave distributions, i.e., the $A(P^{\pm}_{1/2})_{1/2}$, $A(P^{+}_{3/2})_{1/2}$ and $A(P^{+}_{5/2})_{1/2}$ given by (14a), (14b) and (14c) respectively. Amang the P wave amplitudes, the $A(P^{\pm}_{3/2})_{1/2}$ is the one that has the strongest interference, with a dip at $t_2 \simeq -0.13$ (GeV^2).

The relative normalization in figure 3, shows that the partial wave $A(P^{\pm}_{1/2})_{1/2}$ is two orders of magnitude bigger than $A(P^{\pm}_{3/2})_{1/2}$ where the strongest interference occurs. For this reason the total P wave distribution shown in Fig. 1, does not present the structures of the $A(P^{\pm}_{3/2})_{1/2}$ wave.

In Fig. 5 we have the D wave spectrum for each J, i.e., $A(D^{-}_{1/2})_{1/2}$, $A(D^{-}_{3/2})_{1/2}$, $A(D^{-}_{5/2})_{1/2}$ and $A(D^{-}_{7/2})_{1/2}$ waves given by (15a,b,c and d) equations respectively. We remark that the $A(D^{-}_{1/2})_{1/2}$

Fig. 1

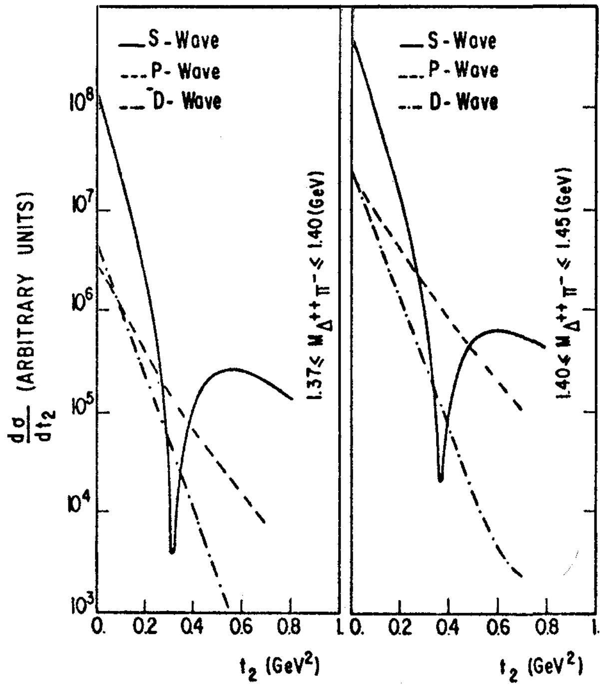


Fig. 2

Fig. 1 - $d\sigma/dt_2$ distributions for S(——), P(----) and D(-·-·-) waves in the effective mass interval $1.37 \leqslant M_{\Delta^{++}\pi^-} \leqslant 1.40$ (GeV).

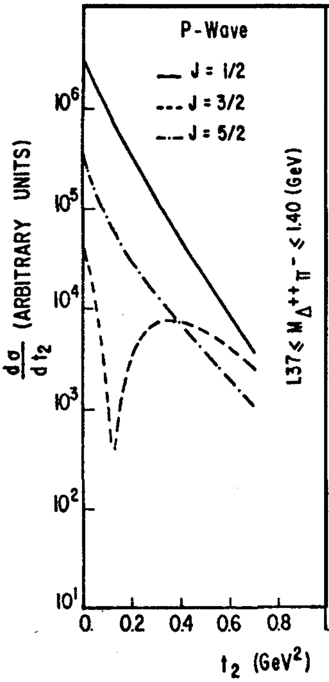
Fig. 2 - $d\sigma/dt_2$ distrlbutions for D(——), P(----) and D(-·-·-) waves in the effective mass interval $1.40 \leqslant M_{\Delta^{++}\pi^-} \leqslant 1.45$ (GeV).

and $A(D^-_{7/2})_{1/2}$ present the dips at $t_2 \simeq -0.6$ (GeV^2) and $t_2 \simeq -0.3$ (GeV^2) respectively, while no dip is seen in the two other.

Figures 2, 4 and 6 show the same behavior that appears in Figs. 1, 3 and 5 respectively, but for a mass range farther from the threshold, $1.40 \leqslant M_{\Delta^{++}\pi^-} \leqslant 1.45$ (GeV).

Summarizing, as we see in Figs. 1 and 2, the P wave does not present dips because all the contributions from the different values of J are added. The dip in $A(P^+_{3/2})_{1/2}$ is masked by large contributions from other J values. The D wave shows a similar pattern for $|t_2| < 0.6$ (GeV^2), but the existence of a dip in $A(D^-_{1/2})_{1/2}$ at $t_2 \simeq -0.6$ (GeV) gives rise to a change in the slope and a possible dip in D wave for $|t_2| > 0.6$ (GeV^2) as seems to appear in Fig. 2.

Fig.3



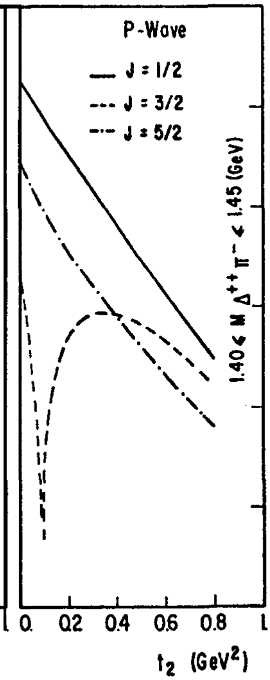


Fig.4

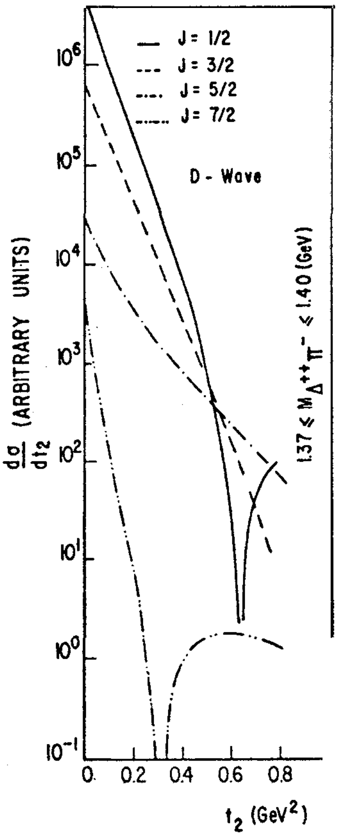
Fig.3 - $d\sigma/dt_2$ distrlbutions for $P_{(J=1/2)}$ (——), $P_{(J=3/2)}$ (----) and $P_{(J=5/2)}$ (-·-·-) waves in the same effective mass interval of the Fig.1.

Fig.4 - $d\sigma/dt_2$ distributions for $P_{(J=1/2)}$ (——), $P_{(J=3/2)}$ (----) and $P(J=5/2)$ (-·-·-) waves in the same effective mass interval of the Fig.2.

It must be emphasized, however, that these structures may not be significant as they occur for large momentum transfer, where the validity of the model is questionable.

We also calculated the net slopes (b) for each wave. Table (3.1) shows the values obtained for the interval $0. \leq t_2 \leq 0.02$ (GeV^2) for two different ranges of invariant mass $M_{\Delta^{++}\pi^-}$. Table (3.2) shows the slopes for each wave with L and J well defined, calculated in the same conditions as those of Table (3.1). In this Table we remark that all waves but the $P_{J=1/2}$ wave present normal mass-slope correlation, that is, the slope decrease with the increasing invariant mass $(M_{\Delta^{++}\pi^-})$. This abnormal behavior of the $P_{J=3/2}$ wave happens because the zero occurs for smaller $|t_2|$ when s_1 increases.

Fig. 5



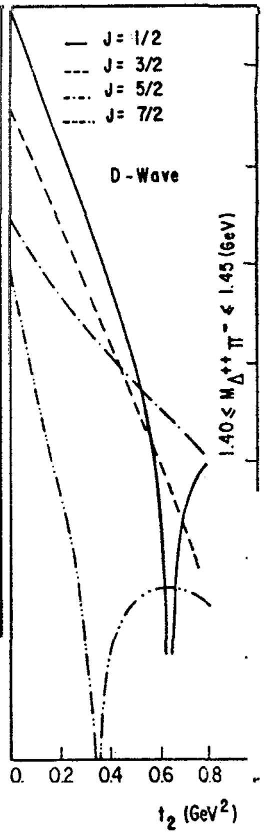


Fig. 6

Fig.5 - $d\sigma/dt_2$ distributions for $D_{(J=1/2)}$ (——), $D_{(J=3/2)}$ (------), $D_{(J=5/2)}$ (-·-·-) and $D_{(J=7/2)}$ (-··-··-) waves in the same effective mass interval of the Fig. 1.

Fig.6 - $d\sigma/dt_2$ distributions for $D_{(J=1/2)}$ (——), $D_{(J=3/2)}$ (-----), $D_{(J=5/2)}$ (-·-·-) and $D_{(J=7/2)}$ (-··-.·-) waves in the same effective mass interval of the Fig. 2.

Finally, this set of results shows that the general interferences predicted by (TCDM) are also maintained in this particular case, and give a new correlation among partial waves.

In this paper we completed the calculations started in [1]. We do not include here a comparison with experirrental results because, as far as we know, they don't exist. But the amplitudes derived here can be employed in a future analysis of the data.

Table 3.1 - Values of the slopes corresponding to the curves of $d\sigma/dt_2$ shown In Fig.1 and 2.

L	$1.37 \leqslant M_{\Delta^{++}\pi^-} \leqslant 1.40$ (GeV)	$1.40 \leqslant M_{\Delta^{++}\pi^-} \leqslant 1.45$ (GeV)
S	b = 19.6 (GeV^{-2})	b = 17.5 (GeV^{-2})
P	b = 11.2 (GeV^{-2})	b = 8.8 (GeV^{-2})
D	b = 16.1 (GeV^{-2})	b = 15.4 (GeV^{-2})

Table 3.2 - Values of the slopes for each wave with (L) and (J) well defined.

L	J	$1.37 \leqslant M_{\Delta^{++}\pi^-} \leqslant 1.40$ (GeV)	$1.40 \leqslant M_{\Delta^{++}\pi^-} \leqslant 1.45$ (GeV)
P	1/2	b = 9.9 (GeV^{-2})	b = 7.5 (GeV^{-2})
	3/2	b = 27.2 (GeV^{-2})	b = 32.3 (GeV^{-2})
	5/2	b = 19.9 (GeV^{-2})	b = 15.9 (GeV^{-2})
D	1/2	b = 16.5 (GeV^{-2})	b = 15.6 (GeV^{-2})
	3/2	b = 13.6 (GeV^{-2})	b = 13.3 (GeV^{-2})
	5/2	b = 16.3 (GeV^{-2})	b = 11.7 (GeV^{-2})
	7/2	b = 43.9 (GeV^{-2})	b = 35.2 (GeV^{-2})

APPENDIX A

Partial Wave Expansion (PWE) of the Subsystem (1+2) of a Generic Reaction $a+b \to (1+2) + 3$

In the Diffractive Dissociation Reaction where we have the Pomeron exchanged between b and 3, the helicity amplitudes decouple in the helicities of the particles b and 3 and the helicities of the dissociation vertex $a \to 1+2$ (Fig.(A1)). This fact, due to Pomeron factorization, enables us to write helicity amplitudes which do notdependon the hellcities of the particles b and 3. These amplitudes are defined by

$$A_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2,\theta,\phi) = \langle p\ \theta\ \phi,\lambda_1\lambda_2;\vec{p}_3|A|\vec{p}_a,\lambda_a,\vec{p}_b\rangle \qquad \text{(A-1)}$$

where $p = |\vec{p}_1| = |\vec{p}_2|$, $\vec{p}_a$, $\vec{p}_b$, $\vec{p}_3$, θ and ϕ are defined in the Gottfried -Jackson system (Appendix A of [1]).

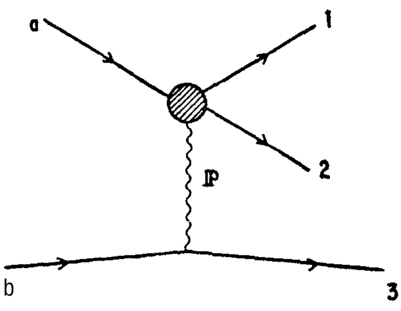


Fig.A1 - $a+b\to(1+2)+3$ DDR factorized by the Pomeron exchangeinto the elastic vertex (bP3) and the dissociative sub-reaction a + P → 1 + 2.The blob represents the three components: π exchange, Δ^{++} exchange and p direct pole.

Our purpose in this Appendix is to develop the subsystem (1+2) In partial waves. Thus the states of Interest for our calculations do not suffer any influence of (bP3) vertex, The (PWE) of the subsystem (1+2) can be made through the following steps:

i) first we define the state that has the minimal set of quantum numbers of the subsystem (1+2),

$$|p\ \theta\ \phi,\lambda_1\lambda_2\rangle = \sum_{J,M} \sqrt{\frac{2J+1}{4\pi}}\ \mathcal{D}^{J}_{M\lambda}(\phi,\theta,-\phi)\,|p\ J\ M,\lambda_1\lambda_2\rangle \qquad \text{(A-2)}$$

where $\lambda = \lambda_1-\lambda_2$ Is the balance of helicities of the final particles 1 and 2 and $\mathcal{D}^{J}_{M\lambda}(\phi,\theta,-\phi)$ is the rotation matrix. The reverse formula is

$$|p\ J\ M,\lambda_1\lambda_2\rangle = \sqrt{\frac{2J+1}{4\pi}} \int d\Omega\ \mathcal{D}^{J*}_{M\lambda}(\phi,\theta,-\phi)\ |p\ \theta\ \phi,\lambda_1\lambda_2\rangle \qquad \text{(A-3)}$$

With these expression we now write the amplitudes of total angular momentum (J,M) and helicities,

$$A^{JM}_{\lambda_1\lambda_2,\lambda_a}(s,s_1,t_2) = \langle p\ J\ M,\lambda_1\lambda_2;\vec{p}_3|A|\vec{p}_a,\lambda_a;\vec{p}_b\rangle \qquad \text{(A-4)}$$

ii) The (PWE) of these helicity amplitudes are written as

$$A_{\lambda_1\lambda_2,\lambda_a}(s,s_1,t_2,\theta,\phi) = \sum_{JM}\sqrt{\frac{2J+1}{4}}\ \mathcal{D}^{J}_{M\lambda}(\phi,\theta,-\phi)\ A^{JM}_{\lambda_1\lambda_2;\lambda_a}(s,s_1,t_2) \quad \text{(A-5)}$$

and their reverse expression is given by

$$A^{JM}_{\lambda_1\lambda_2,\lambda_a}(s,s_1,t_2) = \sqrt{\frac{2J+1}{4\pi}}\int d\Omega\ \mathcal{D}^{J*}_{M\lambda}(\phi,\theta,-\phi)A_{\lambda_1\lambda_2,\lambda_a}(s,s_1,t_2,\theta,\phi) \quad \text{(A-6)}$$

To define amplitudes with well defined Parity (P) and normality ($\pm$) we introduce the correspondlng states

$$|p\ J\ M,\lambda_1\lambda_2>_{(\pm)} = \frac{1}{\sqrt{2}}\{|p\ J\ M,\lambda_1\lambda_2> \pm N_{12}|p\ J\ M,-\lambda_1,-\lambda_2>\} \quad \text{(A-7)}$$

where (N_{12}) refers to the normality of the (1+2) system,

$$N_{12} = \eta_1\eta_2(-1)^{s_1+s_2-\nu_{12}} \quad \text{(A-8)}$$

η_1,η_2,s_1 and s_2 are the intrinsic parities and spinsof particles 1 and 2 respectively; $\nu_{12}=0$, for J = integer and $\nu_{12} = 1/2$ for half integer J. The parities of the states defined above are given by

$$P = \pm(-1)^{J-\nu_{12}} \quad \text{(A-9)}$$

Thus the hslicity amplitudes corresponding to these states are

$$A^{JM,\pm}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2) = \frac{1}{\sqrt{2}}\{A^{JM}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2)\pm N_{12}\ A^{JM}_{-\lambda_1,-\lambda_2,\lambda_a}(s,s_1,t_2) \quad \text{(A-10)}$$

From eqs. (A-6) and (A-10), and using

$$\mathcal{D}^{J}_{M\lambda}(\phi,\theta,-\phi) = e^{-i(M-\lambda)\phi}\ d^{J}_{M\lambda}(\theta)$$

we obtain

$$A^{JM\pm}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2) = \sqrt{\frac{2J+1}{8\pi}}\int d\Omega\ \{e^{-i(M-\lambda)\phi}\ d^{J}_{M\lambda}(\theta)\ A_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2,\theta,\phi)$$

$$\pm N_{12}\ e^{-i(M+\lambda)\phi}d^{J}_{M\,-\lambda}(\theta)\ A_{-\lambda_1,-\lambda_2,\lambda_a}(s,s_1,t_2,\theta,\phi)\} \quad \text{(A-11)}$$

iii) The parity invariance in strong interactions allows us to impose restrictloms on the number of independent A-matrix elements. In order to obtain these conditions we construct the 2→3 particles helicity amplitudes in the overall (CMS). Following Ref.4 and 5 we first construct two particle states with well defined J, M values in the (CMS). With $\vec{p}_{12} = p_{12}\,\hat{z}$, and the operator $H(p_{12})$ representing a boost in the z-direction the above the mentioned states are

$$|p_{12};J\,M;\lambda_1\lambda_2> \;=\; H(p_{12})\,|p;J\,M,\lambda_1\lambda_2> \qquad \text{(A-12)}$$

We note that M is the helicity of the subsystem (1,2) because $J_z =$ $= \vec{J}.\vec{p}_{12}/p_{12}$. As the parity operator P and the Lorentz transformation operator $H(p_{12})$ commute, and

$$P|p;J\,M,\lambda_1\lambda_2> = \eta_1\eta_2(-1)^{J-s_1-s_2}\;|p;J\,M,-\lambda_1,-\lambda_2> \qquad \text{(A-13)}$$

we have for the twc particle states (A-12)

$$P|p_{12};J\,M,\lambda_1\lambda_2> = \eta_1\eta_2(-1)^{J-s_1-s_2}|p_{12};J\,M,-\lambda_1,-\lambda_2> \qquad \text{(A-14)}$$

we can therefore construct the states

$$|p_{12};J\,M,\lambda_1\lambda_2>_{(\pm)} = \frac{1}{\sqrt{2}}\,\{|p_{12};J\,M,\lambda_1\lambda_2> \pm N_{12}|p_{12};J\,M,-\lambda_1,-\lambda_2>\} \qquad \text{(A-15)}$$

A convenient frame for our immediate purposes is obtained choosing $\vec{p}_a =$ $= \vec{p}_a(\theta_0,\phi_0)$ and $\vec{p}_{12} = p_{12}\hat{z}$ in the overall (CMS), as shown in Fig. A-2. In this particular frame we can define three-particle helicity states, according to Refs. 4 and 5,

$$|p_{12},00;J\,M(\lambda_1\lambda_2),\lambda_3>_{(\pm)} \equiv |p_{12};J\,M,\lambda_1\lambda_2>_{(\pm)} \otimes |-p_2,\lambda_3> \qquad \text{(A-16)}$$

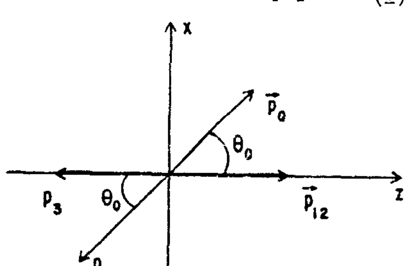


Fig.A-2 - (CMS) for a+b → (1+2) + 3 reaction where $|\vec{p}_a| = |\vec{p}_b|$ and $|\vec{p}_3| = |\vec{p}_{12}| = |\vec{p}_1 + \vec{p}_2|$

We have $\vec{p}_{12}(\theta=0, \phi=0) = -\vec{p}_3$, thus the helicity of these states is $\lambda = M-\lambda_a$.

As discussed in the beginning of this Appendix, the spins of particles (b) and (3) are immaterial for our purposes, which is equivalent to assume $\lambda_b = \lambda_3 = 0$ (due to the high energy conditions).

We can now write the helicity amplitudes in the referenceframe defined by Fig. A2, whose (PWE) is

$$|p_{12},00;J\,M(\lambda_1\lambda_2)\,|A|\,p_a,\theta_0,\phi_0;\lambda_a>_{(\pm)} =$$

$$= \sum_j \left(\frac{2j+1}{4\pi}\right) \mathcal{D}^j_{M\lambda_a}(\phi_0,\theta_0,-\phi_0) <p_{12},J\,M(\lambda_1\lambda_2)\,|A^j|p_a,\lambda_a>_{(\pm)} \tag{A.17}$$

if $\vec{j}$ (total angular momentum) and j_z are conserved quantities.

As the parity is conserved, similarly to the reactions with two particles in the final states, and observing that M is the helicity of the subsystem (1,2), we have

$$<p_{12},J,-M(-\lambda_1,-\lambda_2)\,|A^j|p_a,-\lambda_a>_{(\pm)} = \eta<p_{12},J\,M(\lambda_1,\lambda_2)\,|A^j|p_a,\lambda_a>_{(\pm)} \tag{A-18}$$

where

$$\eta = \eta_a\eta_{12}(-1)^{J-b_a} \tag{A-19}$$

and

$$\eta_{12} = \eta_1\eta_2(-1)^{s_1+s_2-J} \tag{A-20}$$

From eqs. (A-17) and (A-18) we obtain the following symmetry relation

$$<p_{12},00,J,-M(-\lambda_1,-\lambda_2)\,|A|p_a,\theta_0,0,-\lambda_a>_{(\pm)} =$$

$$= \eta(-1)^{M-\lambda_a} <p_{12},00,J\,M(\lambda_1\lambda_2)\,|A|\,p_a,\theta_0,0,\lambda_a>_{(\pm)} \tag{A-21}$$

where the production plane (defined by $\vec{p}_a$, $\vec{p}_b$ and $\vec{p}_3$) was fixed as the xz-plane, i.e., $\phi_0 = 0$. Returning to the Gottfried-Jackson system, the above relation reads, as we intended to obtain

$$A^{J,-M,\pm}_{-\lambda_1,-\lambda_2,-\lambda_a}(s,s_1,t_2) = \eta(-1)^{M-\lambda_a} A^{J\,M,\pm}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2) \qquad \text{(A-22)}$$

and using eqs. (A-11) and (A-22)

$$A_{-\lambda_1,-\lambda_2,-\lambda_a}(s,s_1,t_2;\theta,\phi) = \eta(-1)^{\lambda_1-\lambda_2-\lambda_a} A_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2,\theta,-\phi) \qquad \text{(A-23)}$$

iv) Other relations may be given by the normality of the states (±). From eq. (A-7) we have

$$|p\ J\ M,-\lambda_1,-\lambda_2>_{(\pm)} = \pm N_{12}\ |p\ J\ M,\lambda_1,\lambda_2>_{(\pm)} \qquad \text{(A-24)}$$

which implies the following relations for the amplitudes (A-10),

$$A^{J\,M,\pm}_{-\lambda_1,-\lambda_2,\lambda_a}(s,s_1,t_2) = \pm N_{12}\ A^{J\,M,}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2) \qquad \text{(A-25)}$$

v) From the relations obtalned above we have the helícity amplitudes for (DDR), consequently valld for our model, in the (G.J.S.). Due to Jacob-Wick conventions used here, it has an explicit phase factor

$$A_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2,\theta,\phi) = e^{-i(\lambda-\lambda_a)}\ \tilde{A}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2,\theta,\phi) \qquad \text{(A-26)}$$

where $\lambda = \lambda_1 - \lambda_2$. With this property the amplitudes (A-11) can bewritten as

$$A^{J\,M,\pm}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2) = \sqrt{\frac{2J+1}{8\pi}} \int d\Omega\ e^{-i(M-\lambda_a)\phi}\ \{d^J_{M\lambda}(\theta)\ \tilde{A}_{\lambda_1\lambda_2\lambda_a}(\theta,\phi)$$

$$\pm N_{12}\ d^J_{M,-\lambda}(\theta)\ \tilde{A}_{-\lambda_1,-\lambda_2,\lambda_a}(\theta)\} \qquad \text{(A-27)}$$

vi) Helicity amplitudes for well defined J, L, N and P of the (1+2) system.

$$|J\ M;L,s>_{(\pm)} = \sqrt{\frac{2L+1}{2J+1}} \sum_{\lambda_1\lambda_2} C^{LsJ}_{0\lambda\lambda}\ C^{s_1s_2s}_{\lambda_1,-\lambda_2\lambda}|J\ M;\lambda_1\lambda_2>_{(\pm)} \qquad \text{(A-28)}$$

we define the corresponding amplitudes

$$A^{J\,M,\pm}_{(Ls)\lambda_a}(s,s_1,t_2) = \sqrt{\frac{2L+1}{2J+1}} \sum_{\lambda_1\lambda_2} C^{LsJ}_{0\lambda\lambda}\, C^{s_1 s_2 s}_{\lambda_1,-\lambda_2\lambda}\, A^{J\,M,\pm}_{\lambda_1\lambda_2\lambda a}(s,s_1,t_2) \qquad \text{(A-29)}$$

Henceforth we consider only the case $s_2 = 0$. In such a case, $s = s_1$, $\lambda_2 = 0$ and $\lambda = \lambda_1$. Using $C^{s_1 0 s_1}_{\lambda_1 0 \lambda_1} = 1$, and the relation

$$C^{L\,s_1 J}_{0-\lambda_1,-\lambda_1} = (-1)^{J-L-s_1}\, C^{L\,s_1\,J}_{0\lambda_1\lambda_1}$$

and eq. (A-25) we obtain from eq. (A-29)

$$A^{J\,M,\pm}_{(L)\lambda_a} = \sqrt{\frac{2L+1}{2J+1}} \left[1 \pm N_{12}(-1)^{J-L-s_1}\right] \sum_{|\lambda_1|} C_{0|\lambda_1||\lambda_1|}\, A^{J\,M,\pm}_{|\lambda_1|,\lambda_a} \qquad \text{(A-30)}$$

Expressions (A-22) to (A-30) give the relation

$$A^{J,-M,\pm}_{(L),-\lambda_a} = \pm N_{12}\,\eta(-1)^{M-\lambda_a}\, A^{J,M,\pm}_{(L)\lambda_a} \qquad \text{(A-31)}$$

vii) Partial wave cross-sections

Relations (A-11) and (A-29) may be inverted to give

$$A_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2;\theta,\phi) = \sum_{JM} \sqrt{\frac{2J+1}{8\pi}}\, \mathcal{D}^{J*}_{M\lambda}(\phi,\theta,-\phi)\, \{A^{JM}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2)$$

$$+ A^{JM-}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2)\} \qquad \text{(A-32)}$$

and

$$A^{J\,M\,\pm}_{\lambda_1\lambda_2\lambda_a}(s,s_1,t_2) = \sum_{L,s} \sqrt{\frac{2L+1}{2J+1}}\, C^{L\,s\,J}_{0\lambda\lambda}\, C^{s_1 s_2 s}_{\lambda_1-\lambda_2\lambda}\, A^{JM\pm}_{(Ls)\lambda_a}(s,s_1,t_2) \qquad \text{(A-33)}$$

From ortogonality relation for rotation matrices,

$$\int d\Omega\, \mathcal{D}^{J'*}_{M'\lambda}(\phi,\theta,-\phi)\mathcal{D}^{J}_{M\lambda}(\phi,\theta,-\phi) = \frac{4\pi}{2J+1}\, \delta_{JJ'}\, \delta_{MM'} \qquad \text{(A-34)}$$

we obtain

$$\int d\Omega\ |A_{\lambda_1\lambda_2\lambda_a}(\theta,\phi)|^2 = \frac{1}{2}\sum_{JM}|A^{JM+}_{\lambda_1\lambda_2\lambda_a} + A^{JM-}_{\lambda_1\lambda_2\lambda_a}|^2 \qquad \text{(A-35)}$$

Using now the cornpleteness relation for Clebsh-Gordan coefficients

$$\sqrt{\frac{2L'+1}{2J+1}}\sqrt{\frac{2L+1}{2J+1}}\sum_{\lambda_1\lambda_2} C^{L's'J}_{0\lambda\ \lambda}\ C^{s_1s_2s'}_{\lambda_1,-\lambda_2,\lambda}\ C^{L\ s\ J}_{0\lambda\lambda}\ C^{s_1s_2s}_{\lambda_1,-\lambda_2\lambda} = \delta_{LL'}\ \delta_{ss'}$$

(A-36)

we have

$$\sum_{\lambda_1\lambda_2}|A^{JM+}_{\lambda_1\lambda_2\lambda_a} + A^{JM-}_{\lambda_1\lambda_2\lambda_a}|^2 = \sum_{L,s}|A^{JM+}_{(Ls)\lambda_a} - A^{JM-}_{(Ls)\lambda_a}|^2 \qquad \text{(A-37)}$$

From *eqs. (A-35) and (A-37) we obtain*

$$\sum_{\lambda_1\lambda_2}\int d\Omega\ |A_{\lambda_1\lambda_2\lambda_a}(\theta,\phi)|^2 = \frac{1}{2}\sum_{JM}\sum_{Ls}|A^{JM+}_{(Ls)\lambda_a} + A^{JM-}_{(Ls)\lambda_a}|^2$$

The corresponding cross-sections are

$$\frac{da}{dt_2} = \int ds_1 \frac{\lambda^{1/2}(s_1 m_1^2, m_2^2)}{1} \frac{}{(2s_a+1)} \sum_{\lambda_a} \frac{1}{2}\sum_{JM}\sum_{Ls} |A^{JM}_{(Ls)\lambda_a} + A^{JM-}_{(Ls)\lambda_a}|$$

(A-38)

In *the particular reaction* $pp \to (\Delta^{++}\pi^-)p$ *we have* $s_1 = 3/2$, $s_2 = 0$, $s_a = 1/2$, $\eta_1 = +1$, $\eta_2 = -1$, $\eta_a = +1$, $\nu_{12} = 1/2$, *and consequently* $N_{12} = +1$ *and* $\eta = +1$.

Eq. (A-30) gives

$$A^{JM-}_{(L=J-3/2)\lambda_a} = A^{JM+}_{(L=J-1/2)\lambda_a} = A^{JM-}_{(L=J+1/2)\lambda_a} = A^{JM+}_{(L=J+3/2)\lambda_a} = 0 \qquad \text{(A-39)}$$

and

$$A^{JM+}_{(L=J-3/2)\lambda_a} = \frac{1}{2}\left\{\sqrt{\frac{2L+3}{J}}\ A^{JM+}_{3/2\ \lambda_a} \pm \sqrt{\frac{3(2J-1)}{J}}\ A^{JM+}_{1/2\ \lambda_a}\right\}$$

(A-40a)

$$A^{JM-}_{(L=J-1/2)\lambda_a} = -\frac{1}{2}\left\{\sqrt{\frac{3(2J+3)}{J+1}}\, A^{JM-}_{3/2\ \lambda_a} + \sqrt{\frac{2J-1}{J+1}}\, A^{JM-}_{1/2\ \lambda_a}\right\} \qquad \text{(A-40b)}$$

$$A^{JM+}_{(L=J+1/2)\lambda_a} = \frac{1}{2}\left\{\sqrt{\frac{3(2J-1)}{J}}\, A^{JM+}_{3/2\ \lambda_a} - \sqrt{\frac{2J+3}{J}}\, A^{JM+}_{1/2\ \lambda_a}\right\} \qquad \text{(A-40c)}$$

$$A^{JM-}_{(L=J+3/2)\lambda_a} = \frac{1}{2}\left\{\sqrt{\frac{2J-1}{J+1}}\, A^{JM-}_{3/2\ \lambda_a} + \sqrt{\frac{3(2J+3)}{J+1}}\, A^{JM-}_{1/2\ \lambda_a}\right\} \qquad \text{(A-40d)}$$

REFERENCES

1. A.C.B. Antunes, A.F.S.Santoro and M.H.G.Souza - "Diffraction Dissociation in $pp \to \Delta^{++}\pi^- p$. I.- Slope-Mass-Cos$\theta^{G.J.}$ Correlation", Rev. Bras. Fís. 13, nº 3, 415 (1983).

2. a) G.Cohen-Tannoudji, A.F.S.Santoro and M.H.G.Souza, Nucl.Phys.B*125*, 445 (1977); b) A.M.Endler, M.A.R. Monteiro, A.F.S.Santoro and M.H.G. Souza, Zeit. für Phys. C7. 137 (1981).

3. a) G.Otter et *al.*, Nucl. Phys. B*106*, 77 (1976); b) R.K.Carnegie et *al.* Phys. Lett. *63*B, 235 (1976).

4. G.C.Wick, Ann. of Phys. (NY) 18, 65 (1962).

5. A.D.Martin, T.D.Spearman, *Elementary Particle Theory*, North-Holland Publishing Co. (1970).

Resumo

Este artigo é uma continuação de "Diffractive Dissociation in $pp \to \Delta^{++}\pi^- p$. I - Slope-Mass-Cos$\theta^{G.J.}$".[1] Calculamos as amplitudes em ondas parciais, e apresentamos os resultados obtidos para a correlação. inclinação difrativa - massa efetiva - ondas parciais.