Study of Angular Decay Correlations
for the Process \( \pi + N' \rightarrow \rho + N^{*} \) in the Regge-Pole Model - II.

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In a previous article (1) (hereafter referred to as I) a model was constructed to describe the angular correlations in the decay of the \( \rho \) and \( N^{*} \) which are simultaneously produced in a pion-nucleon collision at sufficiently high energy. The purpose of the present paper is to apply the model to the case where these resonances are produced at a laboratory energy of 8 GeV. The data used are those of the Aachen-Berlin-CERN Collaboration (2). We would like to emphasize that the formulae obtained in I were derived under the assumption that the energy is high enough for the usual Regge prescription to work and, in particular, that the so-called Regge symmetry (see Appendix B of I) holds. An important feature of the model was that the exchanged pion was treated essentially as elementary in the sense that it only contributes to the \( t \)-channel helicity amplitude \( F_{t^{+}t^{0}} \), all other amplitudes being determined by the Reggeized \( A_{s} \) exchange. By these assumptions we were left with a number of five independent \( t \)-channel helicity amplitudes.

In I the angular distribution of the decay products of the \( \rho \) and \( N^{*} \) was given as a linear combination of 20 known angular functions, its coefficients \( B_{t} \) (\( t = 1, ..., 20 \)) being expressible in terms of these five independent amplitudes.

Let us introduce the following notation for these amplitudes:

\[
\begin{align*}
\sqrt{N'}F_{t^{+}t^{0}} &= a, \\
\sqrt{N'}F_{t^{+}t^{0}} &= b, \\
\sqrt{N'}F_{t^{-}t^{0}} &= c, \\
\sqrt{N'}F_{t^{-}t^{0}} &= d, \\
\sqrt{N'}F_{t^{+}t^{0}} &= e, \\
\end{align*}
\]

(1)

with \( N' = \left[ \sum_{\lambda_{t}} |F_{\lambda_{t}t_{t};\lambda_{0}}|^{2} \right]^{-1} \).

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The 20 coefficients $B_i$ may then be expressed in terms of $a, b, c, d$ and $e$ as follows:

\[
\begin{align*}
B_1 &= |a|^2 \left( 1 + \frac{1 - x}{1 + x} \right) + |d|^2 \left( 1 + \frac{1 + x}{1 - x} \right), \\
B_2 &= -|a|^2 \left( \frac{1 - x}{1 + x} \right) - |d|^2 \left( \frac{1 + x}{1 - x} \right), \\
B_3 &= 2 \text{Re}(ae^*) - \frac{2x}{1-x} \text{Re}(db^*), \\
B_4 &= -\left( \frac{1 + x}{1 - x} + \frac{1 - x}{1 + x} \right) \text{Re}(ac^*) - \frac{2x}{1-x} \text{Re}(db^*), \\
B_5 &= \left( \frac{1 - x}{1 + x} - \frac{1 + x}{1 - x} \right) \text{Re}(ac^*) - \frac{2}{1-x} \text{Re}(db^*), \\
B_6 &= 0, \\
B_7 &= \frac{2}{1-x} \text{Re}(de^*), \\
B_8 &= \frac{2x}{1-x} \text{Re}(de^*), \\
B_9 &= 0, \\
B_{10} &= 0, \\
B_{11} &= \frac{2x}{1+x} \text{Re}(ab^*) - 2 \frac{1 + x^2}{(1-x)^2} \text{Re}(de^*), \\
B_{12} &= 2 \frac{1 + x}{1-x} \text{Re}(de^*) + \frac{2x}{1+x} \text{Re}(ab^*), \\
B_{13} &= \frac{2}{1+x} \text{Re}(ab^*), \\
B_{14} &= \frac{2}{1+x} \text{Re}(ae^*), \\
B_{15} &= \frac{2x}{1+x} \text{Re}(ae^*), \\
B_{16} &= 0, \\
B_{17} &= 2|b|^2 + |c|^2 \left( 1 + \frac{(1 + x)^2}{1 - x} \right), \\
B_{18} &= |b|^2 - |c|^2 \frac{1 + x}{1 - x}, \\
B_{19} &= 0, \\
B_{20} &= |e|^2,
\end{align*}
\]

where $x = \cos \theta_i$. 