High-Energy Nucleon-Nucleon Charge Exchange Scattering in a Weak-Cut Model (*) (**) 

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Summary. — Including a high-lying isoscalar pole trajectory X (closely related to the fixed-pole pomeron) in an absorption model with exchange-degenerate ρ and A₂ poles, we compute differential cross-sections and polarizations at $-t \geq 0.2 \text{GeV/c}^2$ for np and $\bar{p}p$ charge exchange reactions. We take functional forms, trajectories and relative sizes of the ρ residues from previous work by Arnold, Blackmon and Goldstein. The strength of the pomeron and X residue is estimated from high-energy pp elastic scattering data. The sign, magnitude and general shape of the np→pn polarization found are reasonable in light of the available data. The predicted $\bar{p}p→\bar{n}n$ differential cross-section, at least for $-t \geq 0.2 \text{GeV/c}^2$, is in reasonable agreement with experiment when the model is fitted only to pn→np.

1. - Introduction.

Interest in the reaction pn → np in the GeV region was stimulated by CHEW (¹) fourteen years ago, when he suggested that in the forward direction it is dominated by single-pion exchange. Subsequent measurements (²⁴) of the dif-

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ferential cross-section for this reaction indeed revealed a sharp forward peak of width $\Delta t \sim m_\pi^2$, followed by a smoother exponential fall-off, the whole shape being essentially energy independent.

It is well known that the simple Regge-pole model under the assumption of pure parity exchange in the $t$-channel predicts (5) for $\text{pn} \rightarrow \text{np}$ and similar pion-dominated reactions a dip in the differential cross-section at $t = 0$. Conspiracy (6) between the pion and a hypothetical opposite-parity partner was initially invoked to reproduce the forward peak, but objections have been raised against the conspirator pole model for two main reasons: no particle is found to lie on the conspirator trajectory, and it is incompatible with factorization and data on other reactions (7). On the other hand, Regge cuts (8) contain a mixture of both parities exchanged in the $t$-channel (9) (they conspire with the poles) and they are presently considered (10) to offer the most plausible mechanism to resolve the discrepancy between one-pole-exchange predictions and data. Taking into account the fact that very few general properties of cuts are known, one has to employ a specific cut-generating model. The Regge-absorption model (11,12) is the most commonly used, although other phenomenological models (14) could explain the $\text{pn} \rightarrow \text{np}$ forward peak through