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APPENDIX 18

Contribution to the 10th International Conference on Few Body Problems in Physics, Karlsruhe, Germany, August 21-27, 1983.

THE POLARIZATION OBSERVABLES D_{NN} , P AND A FOR $\bar{p}p \rightarrow \bar{p}^+ n$ AT 800 MeV*

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The study of single pion production at intermediate energy has been of increasing interest during the past several years¹. As the dominant inelastic channel in nucleon-nucleon collisions, the $NN \rightarrow NA$ amplitudes are required in coupled channels analyses of the NN scattering matrix². An experimental determination of the sixteen $NN \rightarrow NA$ amplitudes is not feasible at the present time. Probably the best one can do is make selected measurements in the $NN \rightarrow NN\pi$ system and compare with predictions from model calculations. The $NN \rightarrow NA$ amplitudes can then be taken from the model which best describes the experimental results.

In conjunction with a vector polarization transfer measurement³ in the $\bar{p}p \rightarrow \bar{p}^+ n$ reaction, we also obtained data on polarization observables for $\bar{p}p \rightarrow \bar{p}^+ n$ at 800 MeV incident proton energy. Scattered protons were detected in a spectrometer at angles from 5° to 11° , and the normal polarization component was measured with the polarimeter JANUS. Pions were detected in coincidence at angles 80° to 130° . The proton momentum range covered was from 800 to 1300 MeV/c. The prominent peak observed near 1150 MeV/c in the proton spectrum shown in Fig. 19(b) is a reflection of Δ^{++} production at center of mass angles from 0° to 30° . Regions of the spectrum corresponding to Δ^{++} production at backward θ_{cm} angles and to the 1S_0 np final state interaction fall below the momentum acceptance limit for the spectrometer setting used in the present measurements. The events were binned into five proton momentum bins for the determination of the polarization observables D_{NN} , P , and A . These results are shown in Fig. 1(a,c,d). Also shown are predictions for these observables from the unitary model of single pion production of Dubach, Kloet and Silbar,⁴ calculated at $\theta_p = 8.1^\circ$ and $\theta_p = 105^\circ$. The prediction for D_{NN} is remarkably

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FIGURE 1

The analyzing power A (a), proton momentum spectrum (b), depolarization parameter D_{NN} (c) and induced polarization P (d) measured for the exclusive $pp \rightarrow p\pi^+n$ reaction. The proton angles ranged from 5° to 11° and pions were detected at $80^\circ \pm 10^\circ$. No correction has been applied for the spectrometer acceptance. The curves are results from a calculation at $\theta_p = 8.1^\circ$ and $\theta_\pi = 105^\circ$ from the model of Ref. 4.

accurate, while those for P and A do not represent the trend with proton momentum observed in the present measurement. Studies are planned for the near future⁵ to extend the measurements to cover a much broader region of phase space and momentum transfer, and to other polarization directions in the initial and final states.

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