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APPENDIX 16

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THE SPIN ROTATION PARAMETERS D_{NN} , D_{SL} , D_{SS} , D_{LS} , D_{LL}
AND P FOR $\bar{p}d \rightarrow \bar{p}d$ ELASTIC SCATTERING AT 500 AND 800 MEV*

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The measurement of the spin rotation parameters D_{NN} , D_{SL} , D_{SS} , D_{LS} and D_{LL} for $\bar{p}d \rightarrow \bar{p}d$ elastic scattering can be used to determine the depolarization parameters D_0 , D_x , D_y and D_z .¹ Calculation by the Glauber model shows that the single scattering contributions to D_x and D_z depend only on the double spin flip components of the NN amplitude. The double scattering contributions to D_x and D_z are also sensitive to these amplitudes. So D_x and D_z are of considerable interest for providing selective information about the double spin flip components. Moreover, since the deuteron is the nucleus with the simplest bound state, the effects of the non-eikonal and non-relativistic approximations in the Glauber model can be tested. In this work we plan to use the well known amplitudes at 500 MeV (Ref. 2) to check the Glauber calculation. Then using this model we hope to extract the amplitudes at 800 MeV, which are not so well determined.

Rahbar et al.³ has made the first measurements of D_{NN} , D_{SS} , D_{LS} and P for $\bar{p}d \rightarrow \bar{p}d$ at 500 and 800 MeV. We updated those measurements and have extended them to the final state L component parameters D_{SL} and D_{LL} .

The experiment was performed using the external proton beam (EPB) at LANL. The experimental method used to determine D_{NN} , D_{LS} , D_{SS} and P has been described in Ref. 3. For measuring D_{SL} and D_{LL} , we used a magnet (SCYLLA) to rotate the spin of scattered proton from the L to S direction. The errors in D_{SL} and D_{LL} due to small components of D_{SS} and D_{LS} contributing are less than 0.01. The accuracy of D_{NN} , D_{SS} , D_{LS} and P are 2

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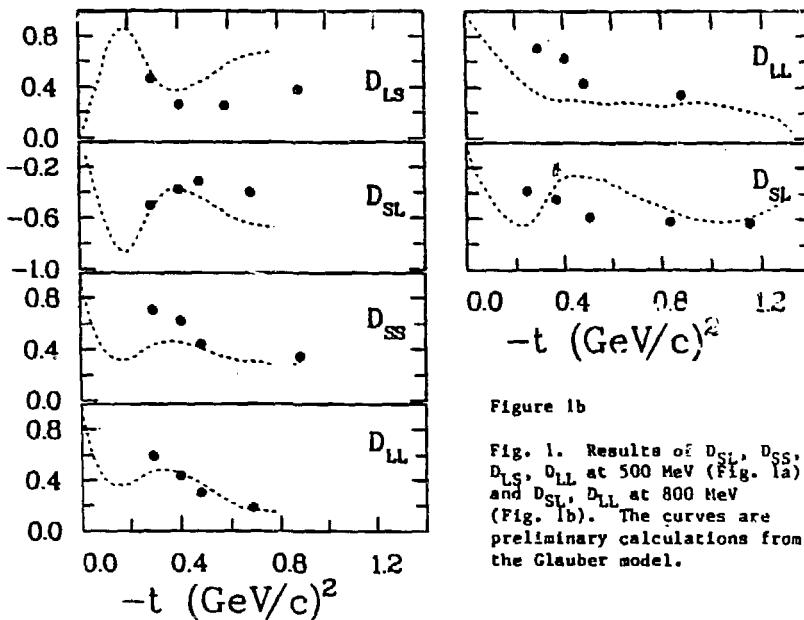


Figure 1a

to 3 times better than the data given in Ref. 3. Our results for D_{LS} , D_{SL} , D_{SS} , D_{LL} at 500 MeV and D_{LL} , D_{SL} at 800 MeV are shown in Fig. 1a and 1b, respectively. It appears that the preliminary predictions¹ from the Glauber model can reproduce the general trend of the data at 500 MeV, but are not in good agreement in detail. For 800 MeV, we used the current Arndt pp and np amplitudes⁴ as input. Further calculations are in progress.

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Figure 1b

Fig. 1. Results of D_{SL} , D_{SS} , D_{LS} , D_{LL} at 500 MeV (Fig. 1a) and D_{SL} , D_{LL} at 800 MeV (Fig. 1b). The curves are preliminary calculations from the Glauber model.