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Measurements of the Spin Correlation Parameter A_{LL} in the Coulomb-Nuclear Interference Region

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The spin-correlation parameter A_{LL} was measured between $\sim 4.5^{\circ}$ and 35° c.m. at 650 and 800 MeV incident proton energy. The measurements were made using the longitudinally-polarized proton beam delivered by the Los Alamos Meson Physics Facility (LAMPF). Scattered protons were detected in the High Resolution Spectrometer (HRS). Momentum resolution was used to separate events due to pp elastic scattering from those due to scattering from the heavier target constituents. The longitudinally polarized target comprised a dilution refrigerator[1] (DR) from KEK (Japan) and a superconducting solenoid from Argonne National Laboratory. The DR cryostat was modified to incorporate thin windows in the path of the incident beam and of the scattered protons. This was necessary for reducing the straggling to widths comparable with the HRS momentum resolution. High momentum resolution was substituted for the more usual kinematic overdetermination in order to give adequate peak-to-background ratios even at angles where the recoil proton can not be detected.[2,3] These techniques enabled us to cover an angular range not accessible to previous measurements. Analogous measurements of A_{NN} by this group have already been reported.[3]

The angular range covered by these measurements includes the region of Coulomb-nuclear interference which will permit the real parts of the double-spin-flip amplitudes to be extracted[4] empirically for the first time. Their energy-dependence influences the interpretation of energy-dependent structure[5] in the corresponding imaginary parts. At the present time we depend on the predictions[6] of forward dispersion-relation (FDR) calculations and on those of the phase-shift analyses (PSA's) for this information.[7] These predictions have led to as yet unresolved controversy concerning the association of the above-mentioned structure with dibaryon resonances. Our measurements will constitute a test of the model-dependent assumptions inherent in the FDR's and an important constraint on the PSA's.

Preliminary results of our measurements are shown in Fig. 1, together with the predictions of phase-shift analyses. Phase-shift analyses labeled HOSHIZAKI 85 and ARNDT 85 include the preliminary data shown at 800 MeV but not those at 650 MeV. Previous data at larger angles[8] are also shown for comparison. The two data sets agree within statistics in the region of overlap.

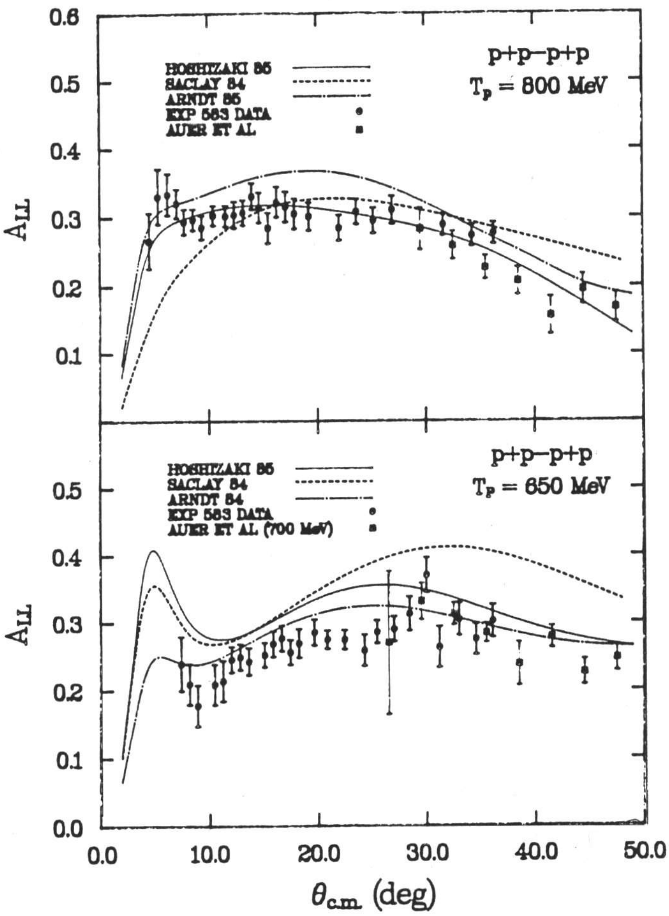

Fig. 1. Preliminary A_{LL} data for $\vec{p}\vec{p}$ elastic scattering at 800 and 650 MeV (solid circles) together with previous data from Argonne (solid squares) at larger angles. The predictions of PSA's (Ref. 7) are also shown.

References

1) Ishitomo, S. et al., NIM 171, 269 (1980).
2) Pauletta, G. et al., Phys. Rev. C27, 282 (1983).
3) Pauletta, G. et al., contribution to the 6th Int. Conf. on High Energy Physics, Marseilles, France (1984).
4) Leclanoine, C., Lehar, F., Perrot, F. and Winternitz, P., Il. Nuovo. Cim. 56A, 201 (1980); Buttimore, N. H., Phys. Rev. D18, 694 (1978).
5) Auer, I. P. et al., Phys. Rev. Lett 41, 354 (1976); Yokosawa, A., Phys. Rev. 64, 47 (1980).
6) Grein, W. and Kroll, P., Nucl. Phys. A377, 505 (1982).
7) Hoshizaki, N., contribution to 7th Int. Seminar on High Energy Physics, Dubna, June 1984; Saclay-Geneva analysis, Bystricky, J. et al., to be published in Phys. Rev.; and Arndt, A. et al., Phys. Rev. D28, 28 (1983).
8) Auer, I. P. et al., Phys. Rev. Lett. 51, 1411 (1983).