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ANALYZING POWER MEASUREMENTS FOR $(\vec{p},n)$ REACTIONS

R. Madey, B.D. Anderson, J.W. Watson, A. Fazely, A.M. Kalenda, A.R. Baldwin, R.J. McCarthy, and P.C. Tandy
Kent State University, Kent, Ohio 44242

W. Bertozzi, T. Buti, M. Finn, M. Kovash, and B. Pugh
Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

C.C. Foster
Indiana University Cyclotron Facility, Bloomington, Indiana 47405

The first measurements of neutron analyzing powers were performed in November 1980 with 135 MeV polarized protons incident on a $^{9}Be^{16}O$ target. These measurements are part of a planned series of experiments to study analyzing powers from the $(\vec{p},n)$ reaction at intermediate energies. The neutron detectors in the 0°, 24°, and 45° stations each consisted of two neutron counters with combined frontal areas of 0.5, 1.0, and 1.5 m^2, respectively. Intermediate angles and angles out to 69° were obtained by deflecting the incident proton beam at the target with the beam-swinger facility. The neutron flight-paths were 90.9, 90.8, and 74.4 m, respectively. The energy resolution for 115 MeV neutrons was about 320 keV for the detectors in the 0° and 24° stations and about 415 keV for the detector in the 45° station.

On-line (preliminary) results for the $^{16}O(\vec{p},n)^{16}F$ (4^-;6.37 MeV) reaction are presented in Fig. 1. This (T = 1)4^- state is the analog of the known[1] 4^- state at E_x = 18.98 MeV in ^{16}O. The final state is a so-called "stretched" state believed[2] to be dominated by the simple one-particle, one-hole configuration ($\pi d_{5/2}$, $\nu d^{-1}_{3/2}$). The analyzing power

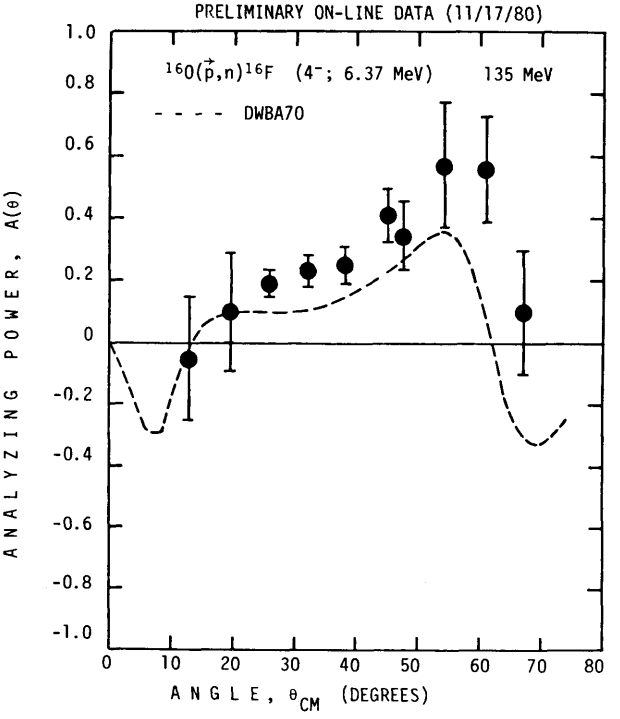

Figure 1. Angular distribution of the analyzing power for the $^{16}O(\vec{p},n)^{16}F$ (4^-; 6.37 MeV) reaction at 135 MeV. The dashed line is a DWBA70 calculation with the effective interaction of Love (1980).

for such an unnatural-parity, stretched-state transition is sensitive to the interference between three terms in the nucleon-nucleon effective interaction, viz., the isovector tensor term, the isovector

spin-orbit term, and the isovector central term. The shape of the angular distribution of the analyzing power for this transition is similar to that seen for the $^{28}Si(\vec{p},p')^{28}Si$ (6^-; T = 1; 14.35 MeV) reaction reported by Bacher et al.[3] Our preliminary results are compared in Fig. 1 to a DWIA calculation with the effective interaction of Love[4] at 140 MeV and optical model parameters from Comfort and Karp[5] for 135 MeV protons on ^{12}C. The comparison between the experimental results and the calculations are similar also to the comparison reported by Bacher et al.[3] for the transition to the 6^-, T = 1, stretched state in ^{28}Si; namely, the general shape of the angular distribution is reproduced, but the calculated analyzing powers are too small and cross through zero (near 60°) at too small an angle. This consistent discrepancy between measured analyzing powers and the predictions may indicate some problem with the strengths or phases of the interfering terms in the effective interaction, or with the distortion effects in the DWIA calculations for these transitions.

We are proceeding with the analysis of the analyzing power for the complete set of data for transitions to the 4^- state and to other states in ^{16}F and for the $^{9}Be(\vec{p},n)^{9}B$ reaction.

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$^{14}C(p,n)^{14}N$ AND THE QUESTION OF MISSING GAMOW-TELLER STRENGTH

C.D. Goodman and C.C. Foster
Indiana University Cyclotron Facility, Bloomington, Indiana 47405

D.E. Bainum
Emporia State University, Physical Science Department, Emporia, Kansas 66801

C. Gaarde and J. Larsen
Niels Bohr Institute, Copenhagen

C.A. Goulding
University of Texas, Physics Department, Austin, Texas 78712

D.J. Horen
Oak Ridge National Laboratory, Oak Ridge Tennessee 37830

T. Masterson
University of Colorado, Nuclear Physics Lab, Boulder, Colorado 80309

J. Rapaport and T.N. Taddeucci
Ohio University, Department of Physics, Athens, Ohio 43701

E. Sugarbaker
Ohio State University, Physics Department, Columbus, Ohio 43212

In previously reported work from the (p,n) program it was shown that the prominent peaks in 0° neutron spectra are interpretable as transitions to states of the final nucleus which are structurally related to the