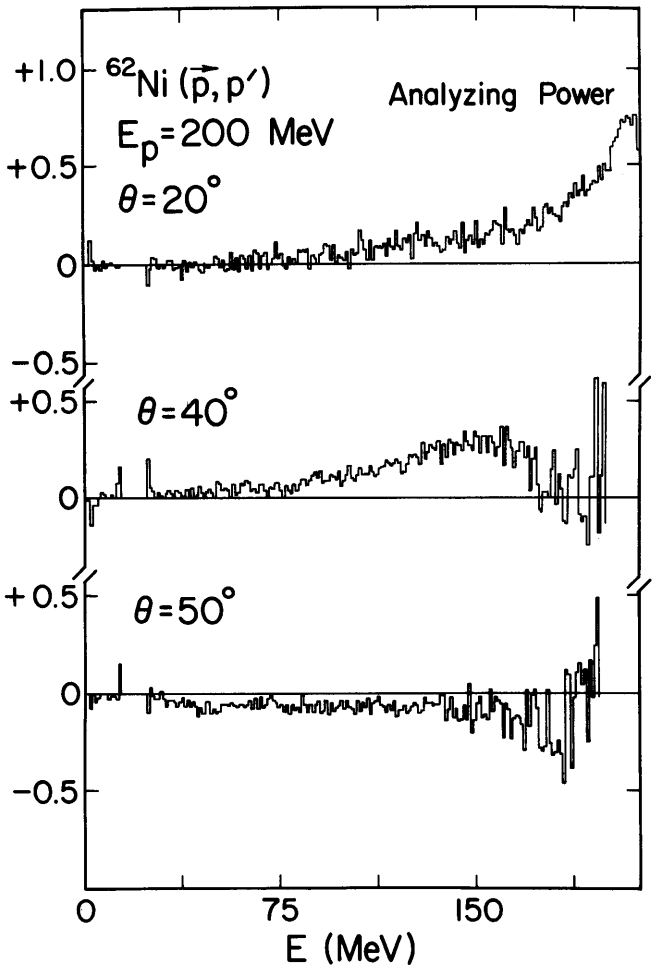

Figure 6. Analyzing powers for the reaction ^{62}Ni(p,p'x) at θ_L=20°, 40° and 50° and E_p = 200 MeV.

picture, although the collective excitation mechanism cannot be ruled out completely, especially for the spectra near the high energy end.

The analyzing powers at backward angles measured in this experiment are vastly different from those obtained at E_p = 65 MeV. At E_p = 65 MeV, the analyzing powers at large angles are large, especially at low excitation. These large analyzing powers at low excitation regions might be due to collective excitations.

Calculations are now being carried out in which the plane wave impulse approximation (PWIA) expression for quasifree nucleon knockout is integrated over the direction of the undetected outgoing nucleon. In the near future, distorted-wave impulse approximation calculations of the quasifree mechanism as well as collective excitation will also be performed.

1) J.R. Wu, C.C. Chang, and H.D. Holmgren, Phys. Rev. C 19, 698 (1979).

2) B.A. Anderson et al., Phys. Rev. Lett. 46, 226 (1981).

THE ROLE OF NUCLEON-NUCLEON INTERACTIONS IN PROTON-INDUCED REACTIONS ON ^{58}Ni AT 200 MEV

C.C. Chang, G. Ciangaru, H.D. Holmgren, A. Nadasen, and P.G. Roos
University of Maryland, College Park, Maryland 20742

A.A. Cowley and S. Mills
Council for Scientific and Industrial Research, South Africa

J.R. Hall, M.K. Saber, and P.P. Singh
Indiana University Cyclotron Facility, Bloomington, Indiana 47405

As part of an effort to study the importance of the quasifree nucleon-nucleon (QFNN) scattering as a dominant process in dissipating the incident proton energy, a series of particle-particle coincidence studies were previously carried out at Maryland using 100 MeV protons on ^{58}Ni.[1] It was found that the major component of the charged-particle coincidence yield is associated with the emission of at least two fast protons. Furthermore, it was observed that the secondary proton energy spectra at various angles, detected in coincidence with primary protons emitted at 15° with energies between 30 and 50 MeV, have the same

shape and angular dependence as the singles proton energy spectra obtained by bombarding ^{54}Fe target with 61 MeV protons. The similarity of the coincidence secondary spectra to the singles (p,p') spectra indicates that the resultant particle (proton) energy spectrum is independent of whether an incident 100 MeV proton transfers 60 MeV to the target nucleus or whether a 60 MeV nucleon is incident on the same target nucleus. One simple way of explaining the similarity is to assume that the incident 100 MeV proton transfers 60 MeV to a target nucleon via a quasifree nucleon-nucleon interaction. The struck nucleon with 60 MeV then proceeds to interact with the remainder of the nucleus in the same manner as a 60 MeV incident proton.

Although the previous results at 100 MeV provide a consistent picture in agreement with the QFNN mechanism, more supportive evidence is needed. With this motive in mind, we have carried out the same experiment at 200 MeV. The advantage of the present experiment over the one at 100 MeV is that coincidence secondary energy spectra corresponding to three energy slices of the primary protons detected at forward angles can be compared with available singles (p,p') spectra at three different incident energies. These comparisons allow us to examine not only the shape and the angular dependence at one energy slice, but also the ratios of yields between different energy slices. If the ratios agree with the ratios of single measurements, we will have stronger support for the interpretation made previously.

With a limited amount of beam time available for this low-yield coincidence experiment, the measurement was carried out with six movable triple-counter telescopes mounted in the equatorial plane of the 64" scattering chamber, using a 200 MeV polarized proton beam. Each telescope consists of a 50 μ or 100 μ surface barrier ΔE_1-detector, a 1 mm silicon surface barrier ΔE_2-detector, and a 3"×3"×5" NaI(Tℓ) E-detector. The three telescopes which were mounted in the forward hemisphere utilized plastic scintillator active collimators.

Fast electronics were used throughout. Coincidence requirements with multiplicity $6 \geq N \geq 2$ among the detectors were made. Events consisting of up to 18 energy signals, 6 TDC's, and 6 or 12 tagging bits were sent to the computer and the event was recorded on tape in the list mode.

Data were taken with two of the six telescopes fixed at 12° and 30°, while the other four telescopes were mounted on a large movable plate. Two angular settings were made for the plate covering the entire angular range from -20° to -160°. Figure 1 shows a typical two-dimensional proton-proton coincidence spectrum. At present, more than 30% of the raw data have been processed. The data replay is continuing.

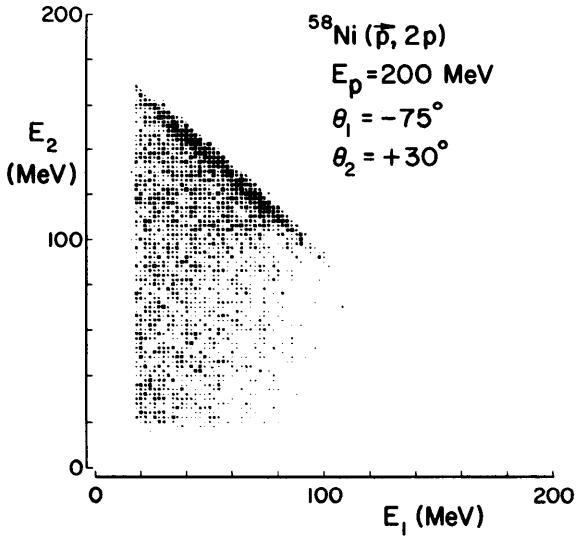

Figure 1. Proton-proton coincidence spectrum for 200 MeV polarized protons on ^{58}Ni.

1) A.A. Cowley et al., Phys. Rev. Lett. 45, 1930 (1980).