EXCITATION OF NEUTRON, PROTON AND NEUTRON-HOLE STATES IN THE (p,p') REACTION AT 160 MEV AND 96 MEV

Alan Scott*, F. Todd Baker*, W.P. Jones, J. D. Wiggins, Jr. and R. C. Styles*

1. The ^{92}Zr(p,p') reaction at 160 MeV

Data have been acquired over the angular range from 10° to 58°, in steps of 2 degrees, for the 2^+ and 4^+ $(d_{5/2})^2$ neutron states at 0.93 MeV and 1.49 MeV, for higher 2^+ states at 1.85 MeV and 2.07 MeV, and for the 3^- state at 2.34 MeV and the 5^- state at 2.48 MeV. With a 25.4 mg/cm^2 self-supported target[1] of ^{92}Zr enriched to 95.13 percent, and with the QDDM spectrograph system[2], we obtained an overall resolution of 120 keV in the first run but in September 1977 we obtained a resolution of 80 keV overall.

The cross section for the L=4 transition to the $(d_{5/2})^2$ neutron state at 1.49 MeV has already been shown in Figure 7 of the previous section, and compared with the L=4 transition to the $(g_{9/2})^2$ proton state in ^{90}Zr. Peak stripping and data analysis are in progress.

2. The ^{89}Y(p,p') reaction at 160 MeV

Data have been accumulated over the angular range from 10° to 56° for proton states up to about 3 MeV. A 25.8 mg/cm^2 self-supported target was used which had been rolled in argon, after the metal had been vacuum-distilled[2], in order to exclude oxygen and nitrogen contaminants which were expected to cause difficulties at an important part of the angular distribution for the most interesting transition to the single proton state at 0.908 MeV. These contaminants had been major difficulties in an earlier experiment[3] at 61 MeV.

Peak stripping and data analysis is in progress. For this experiment performed in September 1977, the overall resolution was 80 keV with dispersion matching.

3. The ^{207}Pb(p,p') reaction at 96 MeV

Data have been acquired over the angular range from 8° to 70° in angular steps of 2 degrees out to 64°. A self-supported 18.2 mg/cm^2 target was used[4] with ^{207}Pb enriched to 99.8 percent. With the QDDM spectrograph and helical-wire and scintillation detector system, an overall resolution of 50 keV was obtained with dispersion matching.

Our primary interests here are the first four neutron-hole states and the doublet at 2.64 MeV, so that we may determine the energy dependence of reaction mechanisms by comparison with other experiments on ^{207}Pb and ^{208}Pb at other projectile energies[5),6),7]. Data analysis is in progress.

*University of Georgia, Athens

1) Metal purchased from the Isotope Research material Laboratory, Oak Ridge National Laboratory; target rolled by W.R. Lozowski, IUCF.

2) Fabrication by the Isotope Target Laboratory, Oak Ridge National Laboratory.

3) A. Scott, M.L. Whiten and W.G. Love, Nucl.Phys.

A137, 445 (1969); M.L. Whiten, A. Scott and G.R. Satchler, Nucl. Phys. A181, 417 (1972).

4) Metal purchased from the Isotope Research Materials Laboratory, Oak Ridge National Laboratory; target rolled by W.R. Lozowski, IUCF.

5) Alan Scott, M. Owais and W.G. Love, Nucl. Phys. A289, 123 (1977), and references therein; this report, p. 94, neutron-hole states for 135 MeV protons.

6) W.G. Love, Alan Scott, F. Todd Baker, W.P. Jones and J.D. Wiggins, Jr., Phys. Letters 73B, 277 (1978), and this report, p. the 2.64 MeV doublet in ^{207}Pb.

7) Alan Scott, N.P. Mathur and F. Petrovich, Nucl. Phys. A285, 222 (1977), and references therein on ^{208}Pb.