SEARCH FOR HIGH SPIN PARTICLE-HOLE STATES IN ^{20}Ne

M.C. Munro, G.G. Shute, B.M. Spicer, and V.C. Officer
School of Physics, University of Melbourne, Parkville, Vic., Australia 3052

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

W.E. Dollhopf
Physics Department, Wittenberg University, Springfield, Ohio 45601

The identification of 6^- particle-hole states in ^{28}Si and ^{24}Mg was one of the early results to come from inelastic proton scattering studies at IUCF.[1] Subsequently, the relative purity of configuration of the 6^- states of ^{28}Si (T=0 state at 11.58 MeV excitatation and T=1 state at 14.35 MeV) has been used to test various forms of the nucleon-nucleon interaction.[2] These particular states stood out in the spectra of inelastically scattered protons from ^{28}Si and ^{24}Mg.

The purpose of this experiment was to search for the 6^- particle-hole states of ^{20}Ne using 135 MeV proton inelastic scattering. The gas cell containing the target gas (99.9% ^{20}Ne) was on loan from Georgetown University. The ^{20}Ne gas pressue used was 6.1 atm. The energy resolution obtained was approximately 160 keV. Proton spectra, centered at 15 MeV excitation, were taken at 30°, 40° and 50°. The spectra at 30° and 40° are shown in Fig. 1.

By using the angular dependences of the differential cross section and analyzing power found for the 6^- states of ^{28}Si as a guide, we have been able to make a tentative identification of the 6^-;T=0 state of ^{20}Ne at 13.36 ± 0.1 MeV excitation. None of the peaks seen in this "15 MeV excitation" spectrometer bite appear to be candidates for the 6^-;T=1 state.

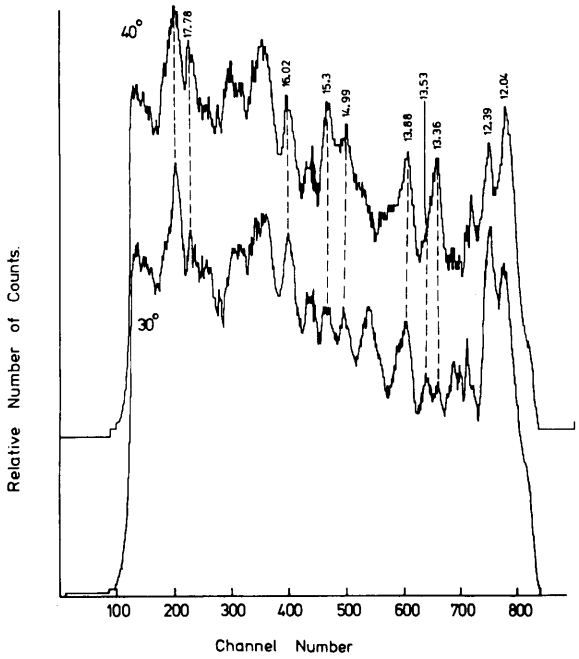

Figure 1. Proton spectra from the ^{20}Ne(p,p') reaction for 135 MeV protons, taken at laboratory angles of 30° and 40°. The numbers give the excitation energies of the final states in MeV.

Further work is needed to confirm the tentative assignment for the 13.36 MeV state, and to extend the search for the 6^-;T=1 state.

1) G.S. Adams, A.D. Bacher, G.T. Emery, W.P. Jones, R.T. Kouzes, D.W. Miller, A. Picklesimer, and G.E. Walker, Phys. Rev. Lett. 38, 1387 (1977).

2) C. Olmer, A.D. Bacher, G.T. Emery, W.P. Jones, D.W. Miller, H. Nann, P. Schwandt, S. Yen, T.E. Drake and R.J. Sobie, Phys. Rev. C 29, 361 (1984).