

- and C.C. Foster, Phys. Rev. C **34**, 422 (1986).
3. J.W. Watson, P.J. Pella, B.D. Anderson, A.R. Baldwin, T. Chittrakarn, B.S. Flanders, R. Madey, C.C. Foster and I.J. van Heerden, Phys. Lett. **B181**, 47 (1986).
  4. J.W. Watson, B.D. Anderson and R. Madey, Can. J. Phys. **65**, 566 (1987).
  5. J.W. Watson, Marco R. Plumley, P.J. Pella, B.D. Anderson, A.R. Baldwin, and R. Madey. submitted to Nucl. Instrum. Meth.
  6. J.W. Watson, B.D. Anderson, A.R. Baldwin, T. Chittrakarn, B.S. Flanders, R. Madey, P.J. Pella, C.C. Foster, and I.J. van Heerden, in Nucleon and Anti-Nucleon Scattering from Nuclei, ed. G.E. Walker, C.D. Goodman, and C. Olmer (Plenum, New York, 1985) p. 371.
  7. R.A. Arndt, computer code SAID (unpublished).
  8. T.N. Taddeucci, Can. J. Phys. **65**, 557 (1987).
  9. C. Glashausser, K. Jones, F.T. Baker, L. Bimbot, H. Esbensen, R.W. Ferguson, A. Green, S. Nanda, and R.D. Smith, Phys. Rev. Lett. **58**, 2404 (1987).
  10. P.M. Boucher, B. Castel, Y. Okuhara, I.P. Johnstone, J. Wambach, and T. Suzuki, Phys. Rev. C **37**, 906 (1988).

THE  $^{52,54}\text{Cr}(p,n)^{52,54}\text{Mn}$  AND  $^{57,58}\text{Fe}(p,n)^{57,58}\text{Co}$  REACTIONS AT  $E_p = 120$  MeV

D. Wang and J. Rapaport  
Ohio University, Athens, Ohio 45701

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

B.A. Brown  
Michigan State University, East Lansing, Michigan 48824

C. Gaarde  
Niels Bohr Institute, Copenhagen, Denmark

C.D. Goodman  
Indiana University, Bloomington, Indiana 47405

E. Sugarbaker  
Ohio State University, Columbus, Ohio 43215

T.N. Taddeucci  
Los Alamos National Laboratory, Los Alamos, New Mexico 87545

Differential cross sections for the (p,n) reaction on  $^{52,54}\text{Cr}$  and  $^{57,58}\text{Fe}$  have been measured for angles up to  $\theta_{lab} = 10.5^\circ$  and  $14.6^\circ$ , respectively, using 120 MeV protons. The observed angular distributions has been used to evaluate the location and strength of Gamow-Teller resonances. A shell-model calculation of this strength distribution has

been studied and compared with the experimental results. The M1 strength for  $^{52}\text{Cr}$  has been calculated and compared with available results for (e,e') and (p,p') experiments. A comparison has been made with other  $1f_{7/2}$  nuclei. This work is reported in Ref. 1.

1. D. Wang, et. al., The  $^{52,54}\text{Cr}(p,n)^{52,54}\text{Mn}$  and  $^{57,58}\text{Fe}(p,n)^{57,58}\text{Co}$  Reactions AT  $E_p = 120$  MeV, Nucl. Phys. A **480**, 285 (1988).

## GAMOW-TELLER MATRIX ELEMENTS AND THE (p,n) REACTION

T.N. Taddeucci, R.C. Byrd, T.A. Carey, J.B. McClelland, and L.J. Rybarczyk  
*Los Alamos National Laboratory, Los Alamos, New Mexico 87545*

C.A. Gaarde  
*Niels Bohr Institute, DK-2100 Copenhagen, Denmark*

C.D. Goodman, W. Huang  
*Indiana University Cyclotron Facility, Bloomington, Indiana 47405*

D.J. Horen  
*Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831*

J. Rapaport  
*Ohio University, Athens, Ohio 45701*

E.R. Sugarbaker  
*Ohio State University, Columbus, Ohio 43210*

Nucleon charge exchange reactions, especially (p,n), have provided much information to enhance our understanding of nuclear structure and nuclear reactions. However, in spite of improved understanding, several features of existing data remain poorly understood. Two problems stand out in this respect – the missing Gamow-Teller strength, and fluctuation in the specific Gamow-Teller (GT) and Fermi (F) cross sections, that is, the cross sections per unit GT or F strength.

These problems, in a sense, represent only fine details, generally at the 20% discrepancy level and perhaps as bad as the 50% level in a few special cases. In fact, the (p,n) reaction has provided us with a very good overview of GT strength functions, clearly establishing the giant GT resonance as a general feature of nuclear structure. Furthermore, the (p,n) reaction is the only method presently known to provide quantitative, empirical information on transition matrix elements needed to estimate neutrino absorption cross sections for solar neutrino detectors.

The problem of specific cross sections is displayed in a recent published summary of our work<sup>1</sup>. Our present effort is aimed at attempting to understand the (p,n) cross sections with greater precision and to determine the limits to which the apparent proportionality