

EXCITATION OF GIANT SPIN-ISOSPIN MULTIPOLE VIBRATIONS IN  $^{54,56}\text{Fe}$  AND  $^{58,60}\text{Ni}$

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The selectivity and the surprising simplicity of the (p,n) reaction at intermediate energies has been used to study the spin-isospin correlations in nuclei (see Ref. 1 and other references within). The zero degree spectra have been used to obtain the  $\Delta L = 0$  response function of nuclei while the measured<sup>2</sup> energy dependence of the effective nucleon-nucleus interaction resulting from the spin-isospin terms in the nucleon-nucleon force has been employed to identify the spin-isospin or Gamow-Teller strength. Other multipoles observed at higher excitation energies indicate a maximum differential cross section at slightly higher angles and have been interpreted as ( $\Delta L = 1$ ,  $\Delta S = 1$ ) and ( $\Delta L = 2$ ,  $\Delta S = 1$ ) excitations.<sup>1</sup>

We have obtained 160 MeV (p,n) data on  $^{54,56}\text{Fe}$  and  $^{58,60}\text{Ni}$  and 120 MeV data for the  $^{58}\text{Ni}(p,n)^{58}\text{Cu}$  reaction in order to study the response function of  $^{58,60}\text{Ni}$  targets to spin-isospin transitions characterized with  $\Delta L = 0$ ,  $\Delta L = 1$  and  $\Delta L = 2$  transfers and to study the

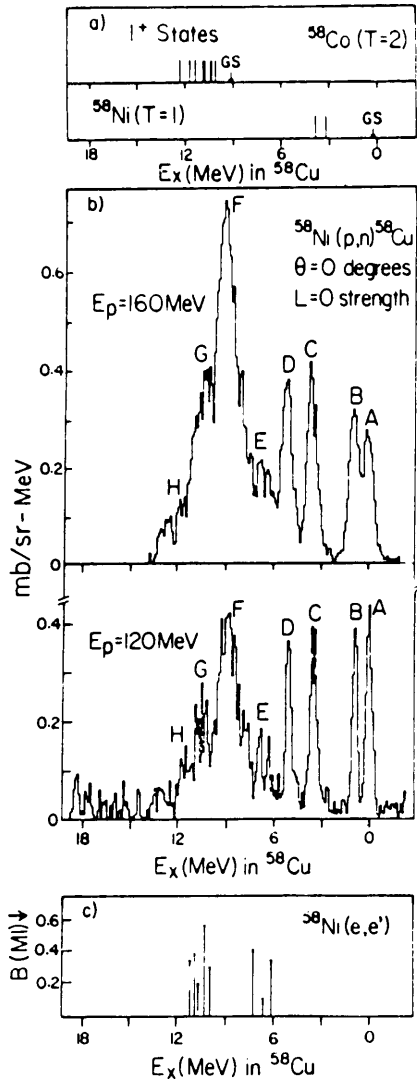
response function for spin-isospin transitions with  $\Delta L=0$  transfers for  $^{54,56}\text{Fe}$  targets. In the case of the Ni isotopes, a comparison may be made with the MI spectra obtained from electro-excitation.<sup>3,4</sup>

The experimental results and analysis for the  $^{58}\text{Ni}(p,n)^{58}\text{Cu}$  reaction have been published<sup>3</sup>; the analysis for the other isotopes is in progress.

The double differential cross section of  $L = 0$  strength observed at  $\theta_L = 0^\circ$  for the  $^{58}\text{Ni}(p,n)^{58}\text{Cu}$  reaction is presented in Fig. 1b and is compared in Fig. 1c with the  $B(M1)_+$  strength reported<sup>4</sup> for the  $^{58}\text{Ni}(e,e')$  reaction. The locations of known  $1^+$  excited states in  $A = 58$  nuclei are shown in Fig. 1a.

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- 1) C. Gaarde et al., Nucl. Phys. A369, 258 (1981).
- 2) T.N. Taddeucci et al., Phys. Rev. C 25, 1094 (1981).
- 3) J. Rapaport et al., Phys. Lett. 119B, 61 (1982).
- 4) R.A. Lindgren et al., Phys. Rev. C 14, 1789 (1976).



**Figure 1.** a) Locations of  $1^+$  states in  $A = 58$  nuclei.  
 b) Double differential cross section of  $L=0$  strength observed at  $\theta_L = 0^\circ$  for the  $^{58}\text{Ni}(p,n)^{58}\text{Cu}$  reaction at  $E_p = 120$  MeV and  $E_p = 160$  MeV. The abscissa represents excitation energy in  $^{58}\text{Cu}$ .  
 c)  $B(M1) \downarrow$  strength reported in Ref. 4 for the  $^{58}\text{Ni}(e,e')$  reaction.