# MEASUREMENT OF B(GT)/B(F) FOR THE ANOMALOUS $^{35}$Ar $\beta^+$ DECAY VIA THE (p,n) REACTION

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The value of the vector coupling constant $G_v$ deduced from the $3/2^+ \rightarrow 3/2^+$ $^{35}$Ar($\beta^+$)$^{35}$Cl(g.s.) decay is about 3% larger than that inferred from numerous superallowed $0^+ \rightarrow 0^+$ decays.[1] The three other precise measurements of $J \rightarrow J > 0$ transitions involving mixed Fermi (F) and Gamow-Teller (GT) decays lead to values of $G_v$ consistent with the "normal", superallowed values. This anomalously high value of $G_v$ in the $^{35}$Ar decay would, interestingly, imply a vanishing of the Cabbibo angle (0.03 ± 0.09). This result is based on measurements of electron asymmetry in the beta decay of polarized nuclei to determine the ratio of GT to F transition strength in the mixed decay. We recently showed that the transverse spin-flip probability $S_{NN}(0°)$ for the analogous (p,n) reaction at IUCF energies can also be used to extract the fraction of GT strength contributing to such a mixed transition.[3] We therefore wish to address the $^{35}$Ar anomaly in a manner independent of the beta decay results.

The transverse polarization transfer for the $^{35}$Cl(p,n)$^{35}$Ar reaction has been measured for $E_p$ = 160 MeV and $\Theta = 0°$. The neutron flight path to a neutron detector polarimeter[4] was approximately 90 m and the energy resolution achieved was about 800 keV. Using only the known ft value and the "normal" value of $G_v$, we expect a value of B(GT) = 0.050 ± 0.001, while an increase of $G_v$ by 3% would suggest B(GT) = 0.011 ± 0.003. In either case this is a small GT component relative to the B(F) = 1 for this transition. However, a significant enhancement of $\sigma_{GT}$ to $\sigma_F$ is expected in the (p,n) reaction at this bombarding energy.[5] The two values of B(GT) imply, respectively, values of $S_{NN}(0°)$ of 0.196 ± 0.003 and 0.065 ± 0.014 for the $^{35}$Cl(p,n)$^{35}$Ar(g.s.) transition. Based on a preliminary data reduction, our expeirmental value of $S_{NN}(0°)$ may be larger than either of these expected values, possibly suggesting contributions in addition to GT and F strength to the 0° cross section data for this particular transition. To further investigate this issue, we have also measured angular distributions of the differential cross section for this reaction at $E_p$ = 120 MeV. A complete analysis of all the available data is currently in progress.

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