# INVESTIGATION OF CHARGE SYMMETRY IN THE $^{6}Li(p,\pi^{+})^{7}Li(0.48)$ AND $^{6}Li(p,\pi^{o})^{7}Be(0.43)$ REACTIONS

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Our understanding of the $(p,\pi)$ reaction near threshold is complicated by several uncertainties, among which are the form of the pion production operator in nuclei, the importance of pion rescattering and other two-step contributions, and the optical potential to be used in computing pion distorted waves. One approach to resolving these ambiguities is the comparison of mirror $(p,\pi)$ reactions. Such a comparison is insensitive to some aspects of the problem, such as the final state configurations, and selectively sensitive to other aspects, such as charge-dependent differences in the intermediate pion wavefunctions in a multistep process or Coulomb distortion of the outgoing pion wavefunctions.

We have made background measurements to determine the feasibility of comparing the $^{6}Li(p,\pi^{+})$ and $^{6}Li(p,\pi^{o})$ reactions to the $1/2^{-}$ first excited states in mass 7 by detecting the deexcitation $\gamma$ rays. An enriched $^{6}Li$ target was bombarded with a pulse-selected 140-MeV proton beam, and $\gamma$ rays were detected in a planar intrinsic-germanium detector situated at an angle of 160°. The $\gamma$-ray resolution at 400 keV was $\lesssim$ 1 keV FWHM. The background rate was minimized by employing a low-mass aluminum target chamber and by timing with respect to the cyclotron RF. The observed background rate corresponds to a cross section of 7 μb in the region of $E_{\gamma} \sim 400$ keV. It is attributed primarily to the scattering of fast neutrons in the germanium crystal and to the Compton scattering of 3.56-MeV $\gamma$ rays produced in the $^{6}Li(p,p')$ reaction. The $^{6}Li(p,\pi)$ cross sections are estimated to be no more than a few hundred nanobarns, which is too small to measure without further improvements.