A STUDY OF THE $^7\text{Li}(p,n)^7\text{Be}$ EXCITATION FUNCTION AT INTERMEDIATE ENERGIES USING RESIDUAL ACTIVITY


The objective of this experiment is to measure the excitation function of the $^7\text{Li}(p,n)^7\text{Be}$ reaction in the proton energy range of $E_p = 60$-200 MeV. Such a measurement is needed to determine the total reaction cross section which in the course of other $^7\text{Li}$ studies can be used for calibration purposes.

The total cross sections are determined using standard off-line γ-ray detection techniques to measure the residual $^7\text{Be}(53d)$ activity. This method has been used at lower energies\(^1\)) and at 120 MeV\(^2\)) to calibrate large volume neutron detectors.

Typically at each energy a 10-20 mg/cm\(^2\) enriched $^7\text{Bi}$ target will be irradiated with 20-100 na-hr of protons. After bombardment the irradiated target will be counted in a prescribed counting geometry with known γ-ray efficiency. The $^7\text{Be}$ is identified by its (10%) electron capture branch to the 477.4 keV level in $^7\text{Li}$. The samples will be counted over several months to insure the 477.4 keV γ-ray decays with the $^7\text{Be}$ half-life of 53.3d.

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