

# Neutron Inelastic Scattering of $^{76}\text{Ge}$ Coincidence Analysis

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In the study of neutrinoless double beta decay of  $^{76}\text{Ge}$ , the potential background events need to be fully understood. One potential background comes from neutrons, specifically neutron inelastic scattering. The de-excitation of the  $^{76}\text{Ge}$  nucleus could produce gamma rays in the double beta decay region of interest at 2039.061 keV. Camp and Foster [1] first measured an excited level in  $^{76}\text{Ge}$  with an energy of 3951 keV, which de-excites with the emission of a 2040.70 keV gamma ray. In a 2015 study by Crider *et al.* [2], they investigated neutron inelastic scattering on  $^{76}\text{Ge}$  with 3.7 MeV neutrons. They did not observe the 2040 keV gamma ray, and instead, they placed a level at 3147 keV and observed a 2038 keV gamma ray emission. We have extended this neutron inelastic scattering measurement to 4.5 MeV incoming neutrons at Triangle Universities Nuclear Laboratory. In our current study, we investigate the production of the 3147 keV level by creating coincidence spectra at 2038 keV - 1108 keV, 2041 keV - 1911 keV, 2583 keV - 562 keV, and 2579 keV - 562 keV.

[1] D. C. Camp, B. P. Foster, Nucl. Phys. A177, 401 (1971)

[2] B. P. Crider *et al.*, EPJ Web of Conferences 93,05001 (2015)