

Abstract Submitted  
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**The  $^{76}\text{Ge}(\text{n,p})^{76}\text{Ga}$  reaction and its relevance to searches for the neutrino-less double-beta decay of  $^{76}\text{Ge}$** <sup>1</sup> W. TORNOW, MEGHA BHIKE, B. FALLIN, FNU KRISHICHAYAN, Department of Physics/TUNL, Duke University — The  $^{76}\text{Ge}(\text{n,p})^{76}\text{Ga}$  reaction and the subsequent  $\beta$  decay of  $^{76}\text{Ga}$  to  $^{76}\text{Ge}$  has been used to excite the 3951.9 keV state of  $^{76}\text{Ge}$ , which decays by emission of a 2040.7 keV  $\gamma$  ray. Using HPGe detectors, the associated pulse-height signal may be undistinguishable from the potential signal produced in neutrino-less double-beta decay of  $^{76}\text{Ge}$  with its Q-value of 2039.0 keV. In the neutron energy range between 10 and 20 MeV the production cross section of the 2040.7 keV  $\gamma$  ray is approximately 0.1 mb. In the same experiment  $\gamma$  rays of energy 2037.9 keV resulting from the  $^{76}\text{Ge}(\text{n},\gamma)^{77}\text{Ge}$  reaction were clearly observed. Adding the  $^{76}\text{Ge}(\text{n},\text{n}'\gamma)^{76}\text{Ge}$  reaction, which also produces the 2040.7 keV  $\gamma$  ray with a cross section value of the order of 0.1 mb clearly shows that great care has to be taken to eliminate neutron-induced backgrounds in searches for neutrino-less double-beta decay of  $^{76}\text{Ge}$ .

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Werner Tornow  
Department of Physics/TUNL, Duke University

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