

EXPLORATION OF AN ELECTRON LINEAR ACCELERATOR-DRIVEN PHOTONEUTRON SOURCE FOR BNCT

Valentina O'Donnell

Dr. John Gahl, Thesis Supervisor

ABSTRACT

A computational model of a proof-of-concept photoneutron source experiment was created and benchmarked. The neutron output from this system could be used for a number of therapies including Boron Neutron-Capture Therapy, BNCT. This benchmarked code was then modified to improve neutron output. The thermal neutron output of the benchmarked code was 1.33×10^5 neutrons/cm²/sec. The goal was to increase the thermal neutron output to an output similar to a research reactor output: 10^8 or 10^9 neutrons/cm²/sec.

Modifications were made to different parts of the computationally modeled setup, including wall thicknesses, materials modeled, and volumes of liquids used in the experiment. Changes to the settings of the linear accelerator used were also made. These changes resulted in the desired increased neutron output from the system.