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**Efficiency Calibration for Measuring the $^{12}$C(n, 2n)$^{11}$C Cross Section**[1] THOMAS ECKERT, AUGUST GULA, LAUREL VINCETT, MARK YULY, Houghton College, STEPHEN PADALINO, MEGAN RUSS, MOLLIE BIENSTOCK, ANGELA SIMONE, DREW ELLISON, HOLLY DESMITT, SUNY Geneseo, CRAIG SANGSTER, SEAN REGAN, Laboratory for Laser Energetics, RYAN FITZGERALD, National Institute of Standards and Technology — One possible inertial confinement fusion diagnostic involves tertiary neutron activation via the $^{12}$C(n, 2n)$^{11}$C reaction. A recent experiment to measure this reaction cross-section involved coincidence counting the annihilation gamma rays produced by the positron decay of $^{11}$C. This requires an accurate value for the full-peak coincidence efficiency of the NaI detector system. The GEANT 4 toolkit was used to develop a Monte Carlo simulation of the detector system which can be used to calculate the required efficiencies. For validation, simulation predictions have been compared with the results of two experiments. In the first, full-peak coincidence positron annihilation efficiencies were measured for $^{22}$Na decay positrons that annihilate in a small plastic scintillator. In the second, a NIST-calibrated $^{68}$Ge source was used. A comparison of calculated with measured efficiencies, as well as $^{12}$C(n, 2n)$^{11}$C cross sections are presented.

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