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Development of a Neutron Long Counter for (α,n) Cross Section Measurements at Ohio University

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The astrophysical site of the nucleosynthesis of the elements from roughly zinc to tin (30<Z<50) is still unknown. The α-process within the neutron-rich neutrino driven winds of core collapse supernovae (CCSN) is a proposed mechanism for the creation of these elements. However, a significant source of uncertainty exists in elemental abundance yields from astrophysics model calculations due to the uncertainty for (α,n) reaction rates, as most of the relevant cross sections have yet to be measured. A neutron long counter, HeBGB, is developed and tailored to measure neutrons for (α,n) cross section measurements to be performed at the Ohio University Edwards Accelerator Laboratory. The detector design was optimized to have a relatively constant neutron response in the energy range of 0.01 to 10 MeV using the Monte-Carlo N-Particle transport code (MCNP6).

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