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The Design, Validation, and Future Plans for a New Neutron Detector at Ohio University[1] KRISTYN BRANDENBURG, ZACH MEISEL, CARL BRUNE, GULAKSHAN HAMAD, DOUG SOLTESZ, SHIV SUBEDI, Ohio University — Though (α,n) reaction cross sections play a key role in nuclear astrophysics and applications, many are poorly constrained by nuclear experiments and have significant uncertainties in theoretical predictions. Improving this situation will be done in part using a newly developed neutron long counter, HeBGB, at the Ohio University Edwards Accelerator Lab. The detector was designed using the MCNP6 software to have near constant efficiency in the neutron energy range relevant for core-collapse supernovae and special nuclear materials. Efficiency validation measurements have been performed with HeBGB, which utilize well-characterized reactions with constrained cross sections and known neutron energies. The first measurement conducted with HeBGB is 27Al(α,n) near threshold, which dominates the astrophysical rate, has disagreement between theoretical predictions and has only one prior measurement in this energy regime. In preparation, various aluminum targets have been tested for purity using the Rutherford Backscattering (RBS) and Particle Induced X-ray Emission (PIXE) nuclear reaction analysis techniques. We find that store bought aluminum foils offer higher purity than traditional foil suppliers.

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