Abstract Submitted
for the DNP10 Meeting of
The American Physical Society

Determination of the stellar reaction rates of \(^{17}\text{O}(\alpha, n)^{20}\text{Ne}\) and \(^{17}\text{O}(\alpha, \gamma)^{21}\text{Ne}\) ANDREAS BEST, SASCHA FALAHAT, JOACHIM GOERRES, MICHAEL WIESCHER, University of Notre Dame — The reaction \(^{16}\text{O}(n, \gamma)^{17}\text{O}\) acts a neutron poison in the weak s-process by reducing the number of available neutrons in the stellar burning environment. The captured neutrons can be re-emitted into the stellar environment via the reaction \(^{17}\text{O}(n, n)^{20}\text{Ne}\), weakening the poisoning effect of \(^{16}\text{O}\). This channel competes with the reaction \(^{17}\text{O}(\alpha, \gamma)^{21}\text{Ne}\), so that in order to determine the strength of \(^{16}\text{O}\) as a neutron poison it is important to know the reaction of both channels. Only limited information is available on the \(^{16}\text{O}(\alpha, n)^{20}\text{Ne}\) and especially on the \(^{16}\text{O}(\alpha, \gamma)^{21}\text{Ne}\) reaction, which leads to large uncertainties in the determination of the abundance production of the weak s-process. The (\(\alpha, n\)) channel has been measured in the energy range from 900 keV to 2300 keV using a high efficiency 4\(\pi\) neutron detector. To improve the efficiency determination of the detector the (\(\alpha, n_1\)) channel has been measured separately via gamma-ray spectroscopy and the detector response to the resulting neutron energy distribution has been modeled in a Geant4 simulation. An initial measurement of the (\(\alpha, \gamma\)) channel has been successfully completed and a second experiment using the new 5 HPGe detector array GEORGINA is in planning. Results of the finished experiments and the planned experiment will be discussed.

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Date submitted: 28 Jun 2010
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