

HAW09-2009-000932

Abstract for an Invited Paper
for the HAW09 Meeting of
the American Physical Society

Neutron Sources in Stellar Carbon Burning

JOACHIM GOERRES, University of Notre Dame

The possibility of a high temperature s-process during the carbon burning phase in late stellar evolution depends critically on possible neutron sources. In this context the following alpha capture reactions are being discussed, $^{17}\text{O}(\alpha, n)$, $^{18}\text{O}(\alpha, n)$, $^{22}\text{Ne}(\alpha, n)$, $^{25}\text{Mg}(\alpha, n)$, and $^{26}\text{Mg}(\alpha, n)$. Their effective contribution to the neutron production depends on the abundance of the various seed nuclei, which in turn depend critically on the alpha or proton production in the $^{12}\text{C}+^{12}\text{C}$ fusion process; it also depends on the reaction cross sections or rates of these processes at carbon burning temperatures. We have studied the reaction cross sections at low energies at the Notre Dame KN accelerator using a new ^3He neutron detector array. The results will be shown and discussed in the context of late stellar evolution. In collaboration with Andreas Best, University of Notre Dame; Sascha Falahat, University of Mainz, Germany; Marco Pignatari, Keele University, UK; and Michael Wiescher, University of Notre Dame.