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Exploring the Neutron Channel of Carbon Burning at Stellar Energies¹ TERRI POXON-PEARSON, University of Notre Dame — The ${}^{12}C({}^{12}C,n)^{23}Mg$ fusion reaction could be an important neutron donor to the weak s-process which is the stellar process responsible for forming most of the elements between iron and strontium. Carbon burning in this scenario occurs at low energies, around 3 MeV center-of-mass, where the nuclear reaction cross section is both small and difficult to predict. Recently, an experiment was conducted at University of Notre Dame's Nuclear Science Laboratory using direct neutron detection in order to determine the cross section at the lowest energy ever measured. This June, we used an independent experimental method which involved the detection of β^+ particles from ${}^{23}Mg$ decay in order to validate the results from the previous experiment. Results from this experiment show overall agreement, but indicated that a newly discovered resonance at 3.4 MeV may not have been as strong as originally thought. Along with these results, I will discuss possibilities and limitations for future investigations of ${}^{12}C({}^{12}C,n){}^{23}Mg$ at astrophysically relevant energies.

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