Nuclear Seminar

Cross Section Measurements for $^{34}S(\alpha,\gamma)$

Dr. Patrick O'Malley
Colorado School of Mines

Friday, October 4 ◆ 2 P.M.

Room 124 Nieuwland Science Hall

Particularly massive stars will go through a stage of explosive oxygen burning which commences with conversion of ^{16}O and ^{24}Mg to ^{28}Si. When the ^{24}Mg becomes exhausted, the free α-particle density rises sharply and initiates a network of reactions among nuclides ranging from ^{28}Si to ^{40}Ca. The final abundances of most of the neutron-rich nuclides in this mass region depend in varying amounts on the cross sections of reactions involving ^{34}S and ^{38}Ar, particularly those of alpha capture. Astrophysical reaction rates are primarily dominated by the presence of resonances with the Gamow windows. Often due to a lack of experimental data, statistical modeling is used instead for calculations of reaction rates. However, statistical modeling can provide a poor prediction of the true cross sections in regions where isolated resonances exist. A recent study by Illiadis et. al. show that there is often an order of magnitude discrepancy or more between statistical calculations and experimental determinations of reaction rates. For alpha capture onto ^{34}S, experimental data exist, however there are discrepancies between measurements that have never been resolved. Furthermore, states exist around the gamow window that could also be resonances for alpha capture, but have never been studied. A recent measurement was done using DRAGON at TRIUMF to resolve these discrepancies and to search for new resonances. Experimental data will be shown and VERY preliminary results discussed.

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