

A Study of the $^{13}\text{C}(\alpha,n)$ Reaction Rate Through the ANC Technique

The $^{13}\text{C}(\alpha,n)$ reaction is the main source of neutrons for the s-process. Currently the adopted rate has an uncertainty of $\sim 300\%$ [Angu] at the relevant stellar temperatures ($\sim 10^8$ K). This leads to a large uncertainty in the modeling of AGB stars, which is where the s-process occurs. Recently, we measured the ANC of the $\frac{1}{2}^+$, 6.356 MeV, near threshold state in ^{17}O . This was done via the α -transfer reaction $^{13}\text{C}({}^6\text{Li},d){}^{17}\text{O}(\frac{1}{2}^+, 6.356)$ at sub-Coulomb energies. Using this information we were able to calculate the contribution of the $\frac{1}{2}^+$ state to the astrophysical S-factor. From our S-factor curve we calculated that the $^{13}\text{C}(\alpha,n)$ reaction rate is reduced by a factor of 3, also the associated uncertainty is improved to $\sim 15\%$ [John].