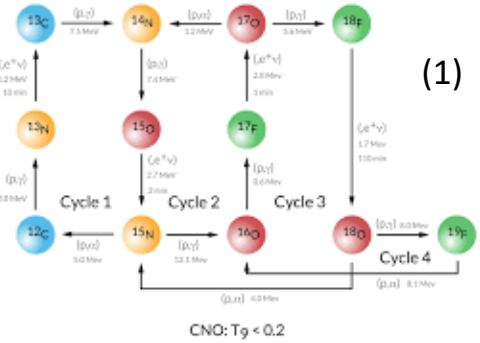
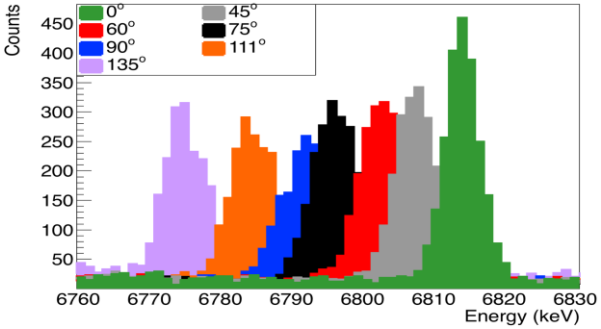
Lifetime measurements of excited states in ^{15}O

In the Sun, the CNO cycle (Fig. 1) accounts for roughly 1% of the total energy production but the neutrinos it produces provide important information about the Sun's core. Recently, the BOREXINO collaboration made the first measurement of the CNO solar neutrino flux. Nuclear physics can cross-validate these results with precise understanding of the CNO reactions.

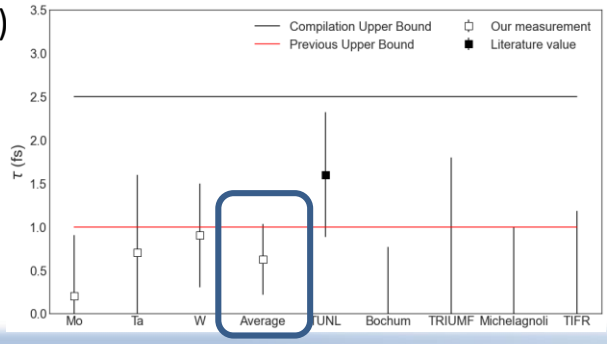
(1)



(2)



(3)



One of the largest uncertainties in the CNO chain of reactions comes from the lifetime of the excited state in ^{15}O at E_x = 6792 keV. A new measurement of this state's lifetime has been performed at the NSL with the Doppler-Shift Attenuation Method (Fig. 2), yielding a lifetime of **τ = 0.6 ± 0.4 fs** which is shown alongside literature measurements in Fig. 3**. This measurement provides the most stringent constraint on the lifetime to date and will be combined with a complete R-matrix analysis to better understand the CNO cycle.**

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