LIFETIME MEASUREMENT OF THE 6.79 MeV STATE IN ^{15}O

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The ^{14}N(p,γ)^{15}O reaction critically affects globular cluster age estimates, the oldest objects in our galaxy. R-matrix analyses of the ^{14}N(p,γ)^{15}O S factor showed that the main contributor to S(0) is the transition to the 3/2+ subthreshold state of ^{15}O. This state corresponds to the 6.791 MeV state in ^{15}O, which is 506 keV below the 14N+p threshold. Therefore the reaction rate at T$\leq$0.03 GK is dominated by the tail of the 3/2+ subthreshold state and hence is also sensitively dependent on its width, Γ. Since this state decays by γ emission 100% of the time to the ground state one can directly obtain the width by measuring its lifetime.

We measured the lifetime of the 6.791 MeV subthreshold state using Doppler Shift Attenuation Method via the ^{3}He(^{16}O,α)^{15}O reaction. We bombarded a Au foil implanted with ^{3}He atoms with a 50 MeV ^{16}O beam from ISACII to populate the 6.791 MeV state in ^{15}O. For the target and vacuum chamber we used the Doppler Shift Lifetimes facility. The γ rays were be detected by a TIGRESS detector. With this experiment we hope to further constrain the low energy S factor value for the ^{14}N(p,γ)^{15}O reaction.

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