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Reducing the Uncertainty of the ^{23}Na(p,γ)^{24}Mg Reaction Rate JOHN CESARATTO, ART CHAMPAGNE, MATTHEW BUCKNER, THOMAS CLEGG, STEPHEN DAIGLE, CHRISTIAN ILIADIS, BABATUNDE OGINNI, University of North Carolina at Chapel Hill, Triangle Universities Nuclear Laboratory — The ^{23}Na(p,γ)^{24}Mg reaction is the link between the NeNa and MgAl cycles for hydrogen burning in Red Giant Branch (RGB) stars, Asymptotic Giant Branch (AGB) stars, and classical novae. The present uncertainty in the ^{23}Na(p,γ)^{24}Mg reaction rate at temperatures relevant to these environments is due to the expected, but unobserved resonance at E_p^{lab} = 144 keV. An experiment to measurement this reaction was performed at Triangle Universities Nuclear Laboratory's (TUNL) Laboratory for Experimental Nuclear Astrophysics (LENA) using its new, high-intensity ECR ion source and accelerator system. Proton beam currents up to 1.2 mA were incident on target. At E_p = 148 keV, with 55 C proton charge accumulated on target, a signal from this resonance was not observed. However, an upper limit of the resonance strength at E_p^{lab} = 144 keV was determined and corresponds to a factor of 7 reduction from the present value. The new upper limit of resonance strength has reduced the uncertainty of the ^{23}Na(p,γ)^{24}Mg reaction rate for temperatures of interest. Future experiments with higher sensitivity will be performed. Details of the experiment, observations, and results to date will be presented.

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