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Cross section measurements and R-Matrix analyses of the ^{24}Mg$(\alpha, p\gamma)^{27}$Al and ^{27}Al$(p, \alpha\gamma)^{24}$Mg reactions with HAGRiD[1] S. AGUILAR, T. AHN, A. BOELTZIG, University of Notre Dame, C. R. BRUNE, Ohio University, R. J. DEBOER, University of Notre Dame, K. L. JONES, University of Tennessee, K. T. MACON, University of Notre Dame — Alpha-induced reactions have been identified as playing an important role in various astrophysical phenomena. Sensitivity studies have indicated the ^{24}Mg$(\alpha, p)^{27}$Al reaction is important in understanding the energy generation in Type Ia X-ray bursts; therefore precise cross section measurements are needed. The ^{24}Mg$(\alpha, p)^{27}$Al cross section has not been measured directly, and no data is available for the inelastic channels which may contribute to its reaction rate. Present ^{24}Mg$(\alpha, p)^{27}$Al reaction rates rely exclusively on the inverse ^{27}Al$(p, \alpha)^{24}$Mg cross section. The direct (α, p) and inverse (p, α) reactions have been performed at the University of Notre Dame's Nuclear Science Laboratory using the 5U Sta. ANA accelerator to produce a high-intensity beam with high energy resolution, providing new precision cross section measurements. The $LaBr_3$ Hybrid Array of Gamma Ray Detectors (HAGRiD) was utilized to span seven unique angles to detect the secondary γ rays in the inelastic channels. R-Matrix analyses of the cross sections using secondary γ rays and the inelastic channels effect on reaction rates will be presented.

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