Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

The resonant structure of ^{18}Ne and its relevance in the break-out of the Hot CNO cycle S. ALMARAZ-CALDERON, W. TAN, A. APRAHAMIAN, B. BUCHER, J. GORRES, A. ROBERTS, A. VILLANO, M. WIESCHER, ISNAP, University of Notre Dame, USA, C. BRUNE, Z. HEINEN, T. MASSEY, Department of physics and astronomy, Ohio University, USA, H. MACH, ISV, Uppsala University, Sweden, N. GURAY, R.T. GURAY, Department of Physics, Kocaeli University, Turkey — In explosive hydrogen burning environments such as Novae and X-ray bursts, temperatures and densities achieved are sufficiently high to bypass the beta decay of the waiting points of the hot CNO cycle by alpha captures, leading to a thermonuclear runaway via the rp-process. One of the two paths to a breakout from the hot CNO cycle is the route starting from ^{14}O(α,p)^{17}F followed by ^{17}F(p,γ)^{18}Ne and ^{18}Ne(α,p). The ^{14}O(α,p) reaction proceeds through resonant states in ^{18}Ne, making the reaction rate dependent on the excitation energies and spins as well as partial and total widths of these resonances. We used the ^{16}O(^{3}He,n) reaction and charged particle-neutron coincidences to measure the structure details of levels in ^{18}Ne. In particular, the α and proton decay branching ratios via ground state and excited states in ^{17}F were measured. The analysis of the data will allow us to provide crucial information to be included in the reaction network calculations that could have great impact on the nuclear energy generation and nucleosynthesis that occur in these explosive environments.

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Date submitted: 29 Jun 2009 Electronic form version 1.4