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The breakout of the Hot CNO cycle via ^{18}Ne resonant states S. ALMARAZ-CALDERON, W. TAN, A. APRAHAMIAN, B. BUCHER, J. GORRES, A. ROBERTS, A. VILLANO, M. WIESCHER, University of Notre Dame, C. BRUNE, Z. HEINEN, T. MASSEY, Ohio University, N. OZKAN, R.T. GURAY, Kocaeli University, H. MACH, Uppsala University — The energy generation rate in the HCNO cycle is limited by the β decay of the waiting point nuclei ^{14}O and ^{15}O. However, when the temperatures and densities are high enough (e.g. Novae and X-ray Bursts) it is possible to bypass them by p/α captures resulting in a thermonuclear runaway towards the rp-process. One of the two paths for breakouts from the HCNO cycle is the reaction chain ^{14}O(α,p)^{17}F(p,γ)^{18}Ne(α,p), which proceeds through resonant states on ^{18}Ne, making their reactions rates very sensitive on the partial and total widths, excitation energies and spins of such resonances. We studied the resonant states in ^{18}Ne via ^{16}O(^{3}He,n) reaction. The neutrons were measured with an array of liquid scintillators using Time-of-Flight and pulse-shape discrimination techniques. The charged particles were detected in coincidence with neutrons by an array of silicon detectors, allowing us to measure α, p, p' and 2p decay branching ratios. Tentative spin assignments were made in comparison with zero range DWBA calculations. This new information will be included in reaction network calculations to evaluate its impact on the nuclear energy generation that occurs in these stellar explosive environments.

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