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β-delayed γ decay of ^{20}Mg and the ^{19}Ne(p,γ)^{20}Na breakout reaction in Type I X-ray bursts[1] BRENT GLASSMAN, Michigan State Univ — Certain astrophysical environments such as thermonuclear outbursts on accreting neutron stars (Type-I X-ray bursts) are hot enough to allow for breakout from the Hot CNO hydrogen burning cycles to the rapid proton capture (rp) process. An important breakout reaction sequence is ^{15}O(α,γ)^{19}Ne(p,γ)^{20}Na and the ^{19}Ne(p,γ)^{20}Na reaction rate is expected to be dominated by a single resonance at 457 keV above the proton threshold in ^{20}Na. The reaction rate depends strongly on whether this ^{20}Na state at excitation energy 2647 keV has spin and parity of 1^+ or 3^+. Previous ^{20}Mg (J^π=0^+) β^+ decay experiments have relied almost entirely on searches for β-delayed proton emission from this resonance in ^{20}Na to limit the log ft value. However there is a non-negligible γ-ray branch expected that must also be limited experimentally to determine the log ft value and constrain J^π. We have measured the β-delayed γ decay of ^{20}Mg to complement previous β-delayed proton decay work and provide the first complete limit based on all energetically allowed decay channels through the 2647 keV state. Our limit confirms a 1^+ assignment for this state is highly unlikely.

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