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The ^{15}O(α,γ)^{19}Ne trigger for X-ray bursts[1] WANPENG TAN, JACOB FISKER, JOACHIM GÖRRES, MANOEL COUDER, MICHAEL WIESCHER, University of Notre Dame — Neutron stars in close binary stars systems often accrete matter from their companion star. Thermonuclear ignition of the accreted material in the atmosphere of the neutron star leads to a thermonuclear explosion which is observed as an X-ray burst occurring periodically between hours and days depending on the accretion rate. The burst conditions are characterized by a sensitive interplay between fuel supply and depletion by nuclear burning. This balance depends critically on the ignition through the nuclear trigger reaction ^{15}O(α,γ)^{19}Ne that regulates the flow between the β-limited hot CNO cycle and the rapid proton capture process. The reaction rate of ^{15}O(α,γ)^{19}Ne was previously not known experimentally and the theoretical estimates carried significant uncertainties. Here we report on the first successful measurement of the critical nuclear parameters for the determination of the rate of the ^{15}O(α,γ)^{19}Ne reaction and we analyze the impact of these experimental results on the burst pattern and burst periodicity for a range of accretion rates.

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