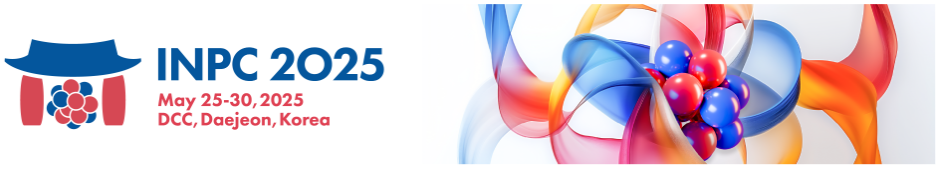

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17O burning rate in star: a revision

Thursday, 29 May 2025 16:45 (15 minutes)

When stars approach the red giant branch, a deep convective envelope develops and the products of the CNO cycle appear at the stellar surface. In particular, the 17O is enhanced in RGB and AGB stars. Then, spectroscopic analyses of O isotopic ratios of these stars provide a powerful tool to investigate the efficiency of deep mixing processes, such as those powered by convective overshoot, rotation, thermohaline instability, gravity wave and magnetic field. However, this method requires a precise knowledge of the reaction rates that determine the 17O abundance in a H-burning shell, among which the 17O(p, γ)18F and the 17O(p,α)14N reactions are the more relevant. Since the last release of rates compilations (see the JINA reaclib database) a number of experiments have updated the reaction rates, incorporating new low-energy cross section measurements. To provide up-to-date input to the astrophysics community, we performed simultaneous multi-channel and Monte Carlo R–matrix analyses of the two reactions including all newly available data, resulting in realistic uncertainty ranges for the rates.

Consent

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