

## Constraining the Primordial Lithium Abundance: New Cross Section Measurement of the ${}^7\text{Be} + n$ Reactions Updates the Total ${}^7\text{Be}$ Destruction Rate

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The cosmological lithium problem (CLP) stems from the outstanding discrepancy between theoretical predictions and astronomical observations of primordial lithium abundances. For the radiogenic production of  ${}^7\text{Li}$ ,  ${}^7\text{Be}$  plays a pivotal role in the Big Bang nucleosynthesis (BBN). Nevertheless, the data for neutron-induced  ${}^7\text{Be}$  destruction processes were still sparse, and especially lacked information on the contributions of transitions to the  ${}^7\text{Li}$  excited states. In this work, we have determined the  ${}^7\text{Be}(n,p_0){}^7\text{Li}$ ,  ${}^7\text{Be}(n,p_1){}^7\text{Li}^*$ , and  ${}^7\text{Be}(\alpha,n){}^4\text{He}$  reaction cross sections by means of the Trojan Horse method. The present and the previous data were analyzed together by a multichannel R-matrix fit, providing an improved uncertainty evaluation of the  $(n,p_0)$  channel and the first-ever quantification of the  $(n,p_1)$  contribution in the BBN-relevant energy range. We implemented the revised total reaction rate summing both the  $(n,p_0)$  and  $(n,p_1)$  contributions in a state-of-the-art BBN code PRIMAT. As a consequence, the present nuclear-physics data offers a reduction of the predicted  ${}^7\text{Li}$  abundance by about one-tenth, which would impose a stricter constraint on BBN and head us in the correct direction to the CLP solution.

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