

First measurement of the ${}^7\text{Li}(\gamma, t){}^4\text{He}$ cross section using mono-energetic γ -ray beams

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The ${}^7\text{Li}(\gamma, t){}^4\text{He}$ cross section was measured for the first time using mono-energetic γ -rays with energies between 4.4 and 10 MeV at the High Intensity Gamma-ray Source (HI γ S) in USA. The reaction is important for the primordial Li-problem and for testing our understanding of the mirror alpha-capture reactions ${}^3\text{H}(\alpha, \gamma){}^7\text{Li}$ and ${}^3\text{He}(\alpha, \gamma){}^7\text{Be}$. Most measurements over the last 30 years of the ${}^3\text{H}(\alpha, \gamma){}^7\text{Li}$ reaction have explored the energy range below $E_{cm} = 1.2$ MeV but measurements at higher energies could restrict the extrapolation to astrophysically important energies.

The experimental arrangement for measuring the ${}^7\text{Li}(\gamma, t){}^4\text{He}$ reaction at HI γ S included a large-area annular silicon detector array (SIDAR) and several beam characterization instruments. The SIDAR was arranged in a lampshade configuration with twelve YY1 silicon detectors of 300, 500, and 1000 μm thickness. The results are in disagreement with the previous experimental measurements in the same energy range but the extrapolated S-factor agrees with the adopted value. Details of the experiment at HI γ S will be presented together with perspectives for future measurements.