

The Measurement of the ${}^6\text{Li}(n, t){}^4\text{He}$ Reaction Cross-Section in the Energy Range of 4.25–7.50 MeV

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The measurement of the total cross-section of the ${}^6\text{Li}(n,t){}^4\text{He}$ reaction was carried out over the energy range of 4.25–7.50 MeV by a time-of-flight method relative to the cross-section of the ${}^{235}\text{U}$ fission. The $\text{Cs}_2\text{LiYCl}_6\text{:Ce}$ based scintillation detector was used as a lithium containing target. The scintillation detector was placed in an axially symmetrical geometry relative to a monitor fission chamber containing ${}^{235}\text{U}$ layers. The pulsed quasi-monoenergetic neutron beam from the ${}^2\text{H}(d,n){}^3\text{He}$ reaction was used as a neutron source. The total systematic uncertainty in the experiment was 4.6–6.7% with the statistical uncertainty of 2.0–3.7%. The obtained data do not support the evaluated cross-section of the ${}^6\text{Li}(n,t){}^4\text{He}$ reaction from the ENDF-B/VIII.0 library. At the same time, the average difference between the evaluated cross-section from the JENDL-5.0 library and the experimental data obtained in this work also exceeds the total systematic uncertainty of the measurements.