

Neutron yield uncertainty calculations for (α, n) reactions using the NeuCBOT program

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(α, n) reactions are an important source of neutron background in ultra-low-background detectors for dark matter and neutrino experiments. Precise neutron yield calculations are essential, but existing estimates of neutron yields and spectra from (α, n) reactions on light nuclei differ by tens of percent, so reliable uncertainty evaluations remain lacking. Existing uncertainties estimates are usually based on the spread between calculations rather than on physics input data uncertainties.

In this work, neutron yields and their uncertainties were calculated for a list of light nuclides using an upgraded NeuCBOT code with EXFOR experimental data. The uncertainties were derived directly from experimental cross-section errors, providing physically grounded uncertainty assessment. The preliminary results of calculated yield uncertainties for ^9Be , ^{13}C and ^{19}F are below 10%.

References

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