

Abstract Submitted
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How Can the Accuracy of Neutron Nonelastic Cross Sections be Improved?¹ FRANK DIETRICH, Lawrence Livermore National Laboratory — The nonelastic cross section for incident neutrons is particularly important for applications because it directly determines the sum of all reaction processes other than elastic scattering, and is closely related to the compound-nucleus formation cross section. Scatter in available measurements of the nonelastic cross section shows that this quantity is not known very accurately ($\approx 5\text{--}10\%$). We will show examples of this, together with results from a new technique that shows promise of reducing uncertainties to $\approx 2\text{--}3\%$ in the range of a few MeV to a few tens of MeV [1]. Comparison of results using this technique on Fe, Pb, Th, and U with optical model calculations suggests that optical potentials are not reliable for predicting nonelastic cross sections to better than $\approx 5\%$, even when they reproduce total cross sections well ($\approx 1\%$). We will suggest a limited set of high-accuracy measurements of nonelastic cross sections that could be made to guide the further development of optical models that are able to predict nonelastic cross sections reliably.

[1] F. S. Dietrich, J. D. Anderson, R. W. Bauer, and S. M. Grimes, Phys. Rev. C **68**, 064608 (2003).

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