
STATUS OF THE INTERNATIONAL NEUTRON CROSS SECTION STANDARDS FILE

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Progress achieved in the framework of the IAEA Co-ordinated Research Project (CRP) on improvement of the standard cross sections will be reported. The primary aim of this CRP is the international evaluation of the neutron cross section standards. An area of concern is the improvement of the evaluation methodology and to better understand the origin of a strong reduction of uncertainties observed in R-matrix model fits for light elements. New evaluations will be produced for the ${}^6\text{Li}(n,t)$, ${}^{10}\text{B}(n,\alpha)$, ${}^{10}\text{B}(n,\alpha_1)$, ${}^{197}\text{Au}(n,\gamma)$, ${}^{235}\text{U}(n,f)$, ${}^{238}\text{U}(n,f)$ standard reactions as well as the ${}^{238}\text{U}(n,\gamma)$, and ${}^{239}\text{Pu}(n,f)$ reactions that are simultaneously evaluated along with the standards due to the strongly coupled databases for these two reaction categories. Also independent R-matrix evaluations will be prepared for the $\text{H}(n,n)$ and ${}^3\text{He}(n,p)$ standard cross sections.

The methodology, codes, and experimental databases developed by W. Poenitz and G. Hale for the ENDF/B-VI standards evaluation project were taken as a starting point for this new evaluation activity. The new contributions of the current evaluation effort include: - use of theory to predict the position and widths of remote R-matrix poles to decrease an ambiguity in the R-matrix fit; - tests and inter-comparisons of various R-matrix and least-squares codes as well as their correction and updating; - studies of data uncertainty reduction and elimination of the non-physical effects leading to such reduction; - analyses of discrepant data and resolution of some of these discrepancies; - studies of the experimental database for the presence of the Peelle's Pertinent Puzzle (PPP) phenomenon and revision of both data and codes to minimize or eliminate biases that it may introduce; - updates to the experimental database by inclusion of new experimental data and corrections to some older measurements; - expansion of the energy range for the fission cross section database to 200 MeV along with a joint evaluation of both low- and high-energy standards; - adaptation of a least-squares procedure for combining the results of R-matrix fits for light-nuclei standards with least-squares fits for both light- and heavy-nuclei standards; - preparation of standards data files in convenient formats as is required by the major users.

A general trend observed for the new standards evaluation is a clear increase of most cross sections; the magnitude of the increase varies from less than a percent to a few percent.