

Nuclear Data Resources for Capture Gamma-Ray Spectroscopy and Related Topics

B. Pritychenko, M.W. Herman, P. Oblozinsky, A. A. Sonzogni and V. Zerkin*

National Nuclear Data Center, Brookhaven National Laboratory, Upton, NY 11973-5000, U.S.A.

** Nuclear Data Section, International Atomic Energy Agency P.O. Box 100, A-1400, Vienna, Austria*

Abstract

We discuss nuclear data resources of the National Nuclear Data Center (NNDC) of relevance to nuclear structure, reactions, astrophysics as well as nuclear science applications. These resources include databases, tools and powerful web service at www.nndc.bnl.gov.

Bibliography database Nuclear Science References (NSR) covers more than 80 journals and offers some 180,000 references, providing extremely effective way of searching scientific literature on a broad range of nuclear physics topics.

Experimental nuclear reaction database (CSISRS), covering more than 14,500 experiments and being comprehensive for neutrons and extensive for charged particles, is of relevance to capture and astrophysics. Web serves both sophisticated users and those expecting transparent response.

Evaluated Nuclear Data File (ENDF) contains neutron cross sections for 340 isotopes relevant to nuclear technology, including capture in keV region of interest to astrophysics. A new version, ENDF/B-VII, is under development, scheduled for release in 2005.

EMPIRE is a powerful code for nuclear reaction model calculations, equipped with input parameters libraries, suitable for stable and unstable targets. It can be readily used to calculate capture cross-sections to be converted into reaction rates.

Evaluated Nuclear Structure Data File (ENSDF) represents enormous resource for nuclear structure and γ -ray spectroscopy. It provides information on almost all known nuclei (2,927), including some 136,000 levels and 197,000 γ -rays. Related database NuDat and highly popular web service offers extensive options for simple and complex retrievals.

Other resources of interest include handy booklet Nuclear Wallet Cards with its 7th edition published in May 2005, and thermal neutron capture γ -ray database (CapGam) providing energies and intensities of γ -rays observed in capture.

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