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EPDL

Evaluated Photon Data Library of the
Lawrence Livermore National Laboratory, USA

by
D.E. Cullen, M.H. Chen, J.H. Hubbell, S.T. Perkins,
E.F. Plechaty, J.A. Rathkopf, J.H. Scofield

Summary documentation
(H.D. Lemmel, ed.)

Abstract: A brief summary documentation of the LLNL Evaluated Photon-Interaction Data Library EPDL is given. The data library is available from the IAEA Nuclear Data Section on magnetic tape, costfree, upon request.

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Contents

Introduction by the IAEA Nuclear Data Section

EPDL, the Evaluated Photon Data Library of the Lawrence Livermore National Laboratory, USA. This data library was published in tabular and graphical form in the report UCRL-50400 Vol. 6 Rev. 4 (1989) by D.E. Cullen, M.H. Chen, J.H. Hubbell, S.T. Perkins, E.F. Plechaty, J.A. Rathkopf, J.H. Scofield. This report has 804 pages in 2 volumes (Z = 1 to 50 resp. Z = 51 to 100). It contains photo-atomic cross-sections, from 10 eV to 100 GeV, average energy deposits, and form factors in tabular and graphic form; in addition, photoelectric cross-sections for each shell and coherent anomalous scattering factors are presented in graphic form.

This handbook is available as a set of microfiches from the IAEA INIS Microfiche Service, or from the US National Technical Information Service, 5285 Port Royal rd., Springfield, VA, USA-22161.

The data library has a size of 10 Mbytes. It is available from the IAEA Nuclear Data Section on magnetic tape, costfree, upon request.

The format of the data library is documented in the report UCRL-ID-117796 by S.T. Perkins and D.E. Cullen. This is available as IAEA-NDS-159.

Cross-reference

The photon-atomic interaction data sublibraries of ENDF/B-6 and JEF-2 have been deduced from the Livermore EPDL file, however using only the reduced energy range up to 100 MeV. See IAEA-NDS-58. Both are available online from the IAEA Nuclear Data Section.

Also derived from the Livermore EPDL file was a PC version "XCOM", see IAEA-NDS-89.

Related References

D.E. Cullen, S.T. Perkins, S.M. Seltzer: Photon and electron databases and their use in radiation transport calculations. Appl. Radiat. Isot. 44, p. 1343-1347, 1993.

D.E. Cullen, S.T. Perkins, J.A. Rathkopf: The 1989 Livermore Evaluated Photon Data Library (EPDL). Report UCRL-ID-103424 (1990).

The EADL/EEDL/EPDL package

Usually, the three data libraries EADL, EEDL and EPDL will be used together. For their use see the following note by D.E. Cullen:

1) EADL92 - The Evaluated Atomic Data Library (1992 version).
Atomic Parameters and Fluorescence Data in the ENDL format.

2) EEDL92 - The Evaluated Electron Data Library (1992 version).
Electron Interaction Data in the ENDL format.

3) EPDL92 - The Evaluated Photon Data Library (1992 version).
Photon Interaction Data in the ENDL format.

These are the three basic data bases described in the publications, UCRL-50400, Vol. 30, 31 and 6. In the form presented here they are the basic evaluated data that we start from to derive data for use in our applications, i.e., they should not be interpreted as exactly the data or form we use in our applications. For an example of the photon data derived from EPDL92 for direct use in transport calculations see the data in epdlbin, described below.

4) endlbin - A simple FORTRAN program to convert any of the above data bases from character to binary form, and a second simple FORTRAN program to illustrate how to access the binary form.

5) epdlbin - Data derived from EPDL92 for use in applications plus a simple FORTRAN program to convert this derived data from character to binary form.

6) photon - A simple FORTRAN program to use the binary library from epdlbin to perform Monte Carlo transport calculations in cylindrical geometry, or to test the algorithms in this code for speed and accuracy.

In additional to the data contained on this tape you should also receive a brief written description of each of the three data bases (EADL92, EEDL92 and EPDL92). In order to be able to really use these data bases you must become familiar with the ENDL method of classifying data, as described in these reports.

Please report to the authors any problems in using this data, or suggestions for improving this data.

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