

**A newsletter of the Nuclear Data Section (NDS)
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On-line News

Ongoing Service

The Nuclear Data Section is currently compiling an accessible electronic library of all documents produced by the IAEA pertaining to our Nuclear Data Services. These documents include IAEA-NDS, INDC and other NDS technical reports. Many only existed on microfiche or in paper form. All known documents will eventually be converted to PDF and placed on our web site.

This project is on-going and can be accessed on:

<http://www-nds.iaea.org/reports-new/>

Staff Items

The Nuclear Data Section extends a warm welcome to Dr. Daniel Abriola. A nuclear physicist, Daniel has taken the position of Deputy Head of the Nuclear Data Section. As well as being directly responsible for the availability and provision of nuclear data to all Member States, Daniel is involved in the organization of workshops and CRPs related to a wide range of nuclear data development initiatives. Telephone: +41-1-2600-21717; email: d.abriola@iaea.org

Coordinated Research Projects

IAEA Coordinated Research Projects (CRPs) are a valuable mechanism for stimulating research in IAEA Member States of relevance to IAEA programmes. CRPs of the Nuclear Data Section, both active and recently completed, can be found at:

<http://www.iaea.org/programmes/ripc/nd/crps.htm>

Announcement

Prof. Syed Muhammed Qaim

Professor Dr. Syed M. Qaim retired in 2006 as Head of the Nuclear Data and Radionuclide Production Research Group at the Institute of Nuclear Chemistry in the Research Centre Jülich, Professor at the University of Köln and chairman of the International Nuclear Data Committee. IAEA Nuclear Data Section staff and the wider nuclear physics community wish him an enjoyable and healthy retirement.

A German National of Pakistani origin, Prof. Qaim obtained his BSc and MSC from Punjab University, Lahore (1958 and 1961), PhD from Liverpool University (1964), DSc in Applied Nuclear Chemistry from Birmingham University (1977), and a Habilitation Certificate from the University of Köln (1993). Professor Qaim worked at the Research Centre, Jülich, Germany, from 1970 onwards, and was awarded his professorship in 1997.

Professor Qaim became chairman of the International Nuclear Data Committee (INDC) at the beginning 2001, providing valuable guidance on the future activities of the Nuclear Data Section. He has also been an active advisor and participant in IAEA Coordinated Research Projects on nuclear data for medical applications (1981–2007). Prof. Qaim has published over 240 research and review articles, as well as several reports and books, and is a Fellow of the Royal Society of Chemistry, London (1974), Fellow of the Royal Institute of Physics, London (1974), Foreign Fellow of the Pakistan Academy of Sciences (1990), Fellow of the Islamic Academy of Sciences (1994) and Associate Fellow of the Third World Academy of Sciences (2002). He is Co-ordinating Editor of the journal *Radiochimica Acta*.

Dr Qaim has been awarded the Romand Etovos Medal of the Hungarian Physical Society (1988), and the Pergamon Press JARI Award (1990). He was made an honorary citizen of Kossuth University, Debrecen, Hungary (1995), and has been presented with the high civil award of 'Sitara-i-Imtiaz' by the President of the Islamic Republic of Pakistan (1999).

Database News

CINDA — Bibliographical references to experimental nuclear reaction data, and calculations, reviews, compilations and evaluations of neutron reaction and spontaneous fission data.

- Extended by information from EXFOR
- Available via retrieval systems on CD and the Web: <http://www-nds.iaea.org/cinda/>

- Contains 438,688 lines, 55,823 publications and 185,435 blocks.

CD-ROM of ENDF/B-VII.0 libraries

Nuclear Reaction Database with Emphasis on Neutron-Induced Reactions. Containing evaluated cross sections, angular distributions, fission product yields, thermal reaction scattering and other data. This CD-ROM contains the ENDF/B-VII.0 nuclear applications library, released in December 2006 by NNDC, USA. The data are stored as sets of zipped files – one file for every sub-library (14 in total); every zip-file contains ENDF-6 data files ordered by material. In addition, the neutron reactions sub-library is presented in unzipped text files. The CD-ROM also includes an ENDF-6 format manual in PDF format and a listing of all materials.

These libraries are available on CD-ROM on request.

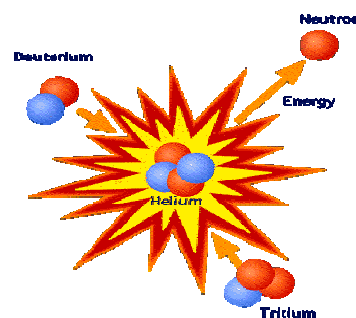
POINT 2007:

A Temperature Dependent ENDF/B-VII.0 Data Cross Section Library, by Dermot E. Cullen. Available on two DVDs on request.

EXFOR — Comprehensive library of experimental nuclear reaction data induced by neutrons, charged particles and photons.

- Available via retrieval systems on CD and the Web: <http://www-nds.iaea.org/exfor/>
- Contains 16,198 entries and 109,176 data tables
- Master file, trans files, dictionaries and software for compilers are regularly updated and available on the Web: <http://www-nds.iaea.org/exfor-master>
- New service: upload users' data on the Web: <http://www-nds.iaea.org/exfor/x4send.htm>

Computer Codes and Data Libraries



The following databases and libraries are available cost-free on CD-ROM on request:

EXFOR-CINDA Database and Retrieval Systems, version 1.95, data updated to January 2007:

- Integrated CINDA and EXFOR
- Advanced interactive search
- Help based on Dictionaries
- Interactive graphics with ZVView
- Can run from the CD without installation
- Works with local and remote databases
- Includes non-interactive EXFOR retrievals

Two CD-ROMs are available:

- for Windows with MS-Access databases
- for Applications on Linux and Windows with MySQL databases

Developed by V. Zerkin, Nuclear Data Section, IAEA, 2001-2007.

EndVer/GUI and EXFOR-CINDA package, January 2007:

An integrated software package for comparison of evaluated nuclear data files with experimental data from the EXFOR database (also contains interactive plotting).

Features:

- EndVer with software graphics and user interface
- Integrated EndVer-EXFOR-CINDA
- PostScript graphics with PlotC4
- Interactive graphics with ZVView
- Non-interactive EXFOR retrievals
- Can run from the CD without installation
- Advanced interactive search
- Help based on Dictionaries
- Works with local and remote Databases
- CINDA with charged particle and photonuclear reactions

Developed by A. Trkov and V. Zerkin, Nuclear Data Section, IAEA, 2004-2007.

IBANDL-Ion Beam Analysis Nuclear Data Library:

The database contains most of the available experimental nuclear cross-sections relevant to Ion Beam Analysis-Ion Beam Analysis Nuclear Data Library (IBANDL) produced according to the recommendations of an IAEA Technical Meeting held at IAEA Headquarters, Vienna (29 to 30 October 2003). These data are a result of merging SigmaBase and NRABASE. Excitation functions are presented both as graphs and data files. The numerical data are in R33 format, and all the entries are supplied with references to the data sources. Although all efforts were made to ensure that the most accurate information was adopted, no guarantee can be given concerning the

full validity of the data, and the IAEA accepts no responsibility for usage of IBANDL.

Maintaining IBANDL as a dynamically developing collection of IBA nuclear data depends significantly on the activity of all members of the IBA community. Contributions to IBANDL are welcome. Update of November 2006 is available on CD-ROM or on-line at:

<http://www-nds.iaea.org/ibandl/>

WIMSD: updates

- New **WIMSD libraries** have been prepared, based on the JEFF-3.1 and ENDF/B-VII.0 libraries
- **Programs, procedures and data files** were updated
- Release of **XnWlup package version 3.0**
- **IRPhE D2O benchmarks** added to the benchmarking sequence
- **Plots** added and updated
- **IAEA evaluated nuclear data files** have been uploaded to the web-site
- New list files were added to the **XnWlup package**

Also available on CD-ROM on request.

Selected Charts, Reports and Documents



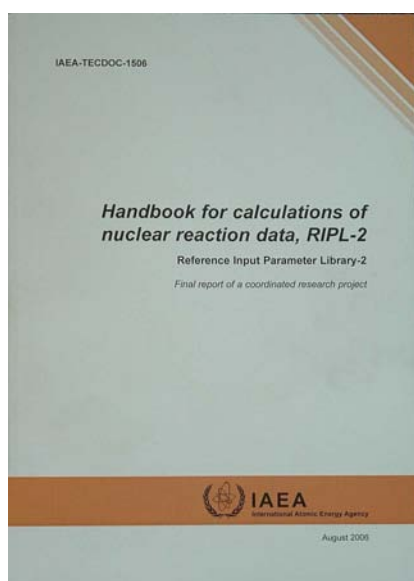
Chart of the Nuclides Prepared by Knolls Atomic Power Laboratory and distributed by Lockheed Martin (16th edition, revised to 2002). Available cost-free on request only for **teachers and scientists from developing countries**.

Chart of the Nuclides Book Prepared by Knolls Atomic Power Laboratory and distributed by Lockheed Martin (16th edition, revised to 2002). This book form of

the Nuclides Chart is available cost-free on request only for **teachers and scientists from developing countries**.

Karlsruher Nuklidkarte Desk Chart of the *Nuclides from Karlsruhe, 6th edition (1995). Updates from 1998*. Available cost-free on request only for **teachers and scientists from developing countries**.

Handbook for calculations of nuclear reaction data, RIPL-2 (Reference Input Parameter Library-2)



by T. Belgya, O. Bersillon, R. Capote, T. Fukahori, Ge Zhigang, S. Goriely, M. Herman, A.V. Ignatyuk, S. Kailas, A.J. Koning, P. Oblozinsky, V. Plujko and P. G. Young,
IAEA-TECDOC-1506, International Atomic Energy Agency, Vienna, August 2006.

An important trend in the evaluation of neutron and charged-particle nuclear data is the increased use of nuclear reaction theory codes to compute cross sections, spectra and angular distributions that are required for a large variety of applications. The use of model codes offers many advantages such as preservation of the energy balance and coherence of partial cross sections with total and/or reaction cross sections. In addition, the theoretical approach permits the prediction of data for unstable nuclei and fills gaps in the experimental data. Nuclear reaction theory is believed to be sufficiently advanced to meet the many requirements for various practical applications. The major sources of uncertainty are the input parameters needed to perform such theoretical calculations. Following extensive development and testing, a Reference Input Parameter Library (RIPL-2) has been assembled that contains recommended numerical values for most of the parameters needed to model nuclear reactions (along with a number of useful computer codes). However, RIPL-2 does not fully supersede the original

RIPL-1 library, and therefore RIPL-1 information and data continue to be fully traceable through IAEA-TECDOC-1034 and <http://www-nds.iaea.org/ripl/>.

RIPL-2 is targeted at users of nuclear reaction codes interested in low-energy nuclear applications. Incident and outgoing particles include neutrons, protons, deuterons, tritons, He-3 and He-4, as well as gamma rays, with energies up to approximately 100 MeV. The numerical data and computer codes included in the library are described in the IAEA-TECDOC as being arranged in seven separate segments/directories:

1. Masses — atomic masses and deformations.
2. Levels — discrete level schemes.
3. Resonances — average neutron resonance parameters.
4. Optical model parameters.
5. Total and partial level densities.
6. Gamma ray strength functions.
7. Fission barriers and level densities.

The RIPL-2 library is physically located at a Web server operated by the IAEA, and can be conveniently accessed by pointing any Web browser at:
<http://www-nds.iaea.org/RIPL-2/>

INDC(CCP)-0444 *Articles translated from Journal Yadernye Konstanty (Nuclear Constants). (Series: Nuclear Constants, Issue No. 1-2, 2005), April 2007.* This report contains 2 papers translated from Russian:

- *Evaluation of the ²⁴⁸Cm Resolved Resonance Region* by G.B. Morogovskij and L.A. Bakhovich

- *Modelling of the Transmutation of Atomic Nuclei in Intensive γ -Ray Beams* by B.S. Ishkhanov, I.A. Lyutikov, S.I. Pavlov and M.V. Lomonosov

This report is available as hard copy on request or online at:

http://www-nds.iaea.org/indc_sel.html

INDC(ITY)-0014 *Activity Report of the ENEA Nuclear Data Project in 2006*, Bologna, March 2007, prepared by A. Ventura, March 2007. This report is available as hard copy or on-line at:

http://www-nds.iaea.org/indc_sel.html

INDC(NDS)-0501 *Summary Report of Third Research Coordination Meeting, on Nuclear Data for the Production of Therapeutic Radionuclides*, Vienna, 29 May–2 June 2006, prepared by J.-Ch. Sublet and R. Capote Noy, August 2006. This report is available as hard copy or on-line at:

http://www-nds.iaea.org/indc_sel.html

INDC(NDS)-0502 *Handbook of Nuclear Data for Safeguards*, prepared by A.L. Nichols, D.L. Aldama and M. Verpelli, January 2007. This report is available as hard copy or on-line at:

http://www-nds.iaea.org/indc_sel.html
and <http://www-nds.iaea.org/sgnucdat/>

INDC(NDS)-0503 *Report on the IAEA Technical Meeting on Network of Nuclear Reaction Data Centres*, Vienna, 25-28 September 2006, prepared by O. Schwerer, December 2006. This report is available as hard copy or on-line at:

http://www-nds.iaea.org/indc_sel.html

INDC(NDS)-0504 *Summary Report of Consultants' Meeting on Nuclear Data of Charged-Particle Interactions for Medical Therapy Applications*, Vienna, 20-22 November 2006, prepared by R. Capote Noy and S. Vatsnitskiy, January 2007. This report is available as hard copy or on-line at:

http://www-nds.iaea.org/indc_sel.html

INDC(NDS)-0505 *Summary Report of IAEA Workshop on Atomic and Molecular Data for Fusion Energy Research*, Trieste, 28 August – 8 September 2006, prepared by R.E.H. Clark. This report is available as hard copy or on-line at:

http://www-nds.iaea.org/indc_sel.html

INDC(NDS)-0506 *Summary Report of IAEA Technical Meeting on 15th Meeting of the IFRC Subcommittee on Atomic and Molecular Data for Fusion*, Vienna, 20-21 April 2006, prepared by R.E.H. Clark, February 2007. This report is available as hard copy or on-line at:

http://www-nds.iaea.org/indc_sel.html

INDC(NDS)-0507 *Summary Report of Consultants' Meeting on Review the Requirements to Improve and Extend the IRDF library (International Reactor Dosimetry File (IRDF-2002))*, Vienna, 25-26 January 2007, prepared by L.R. Greenwood and A.L. Nichols, January 2007. This report is available as hard copy or on-line at:

http://www-nds.iaea.org/indc_sel.html

INDC(UK)-0090 *Progress Report of Data Studies During 2003 and 2004*, edited by N.P. Hawkes, March 2006. This report is available as hard copy only.

JAEA-Conf 2006-009 *Proceedings of the 2005 Symposium on Nuclear Data*, 2-3 February 2006, edited by Y. Tahara and T. Fukahori. This report is available as hard copy.

NEA/WPEC-7 *Nuclear Data Standards*. A Report by the Working Party on International Evaluation Cooperation of the NEA Nuclear Science Committee, coordinated by A.D. Carlson. Available as hard copy on request.

NEA/WPEC-22 *Nuclear Data for Improved LEU-LWR Reactivity Predictions*. A Report by the Working Party on International Evaluation Cooperation of the NEA Nuclear Science Committee, coordinated by A. Courcelle. Available as hard copy on request.

Nuclear Data Sheets *Special Issue on Evaluated Nuclear Data File ENDF/B-VII.0*, Special Issue Editors: P. Oblozinsky and M. Herman. Limited hard copies available on request. Also available on CD-ROM.

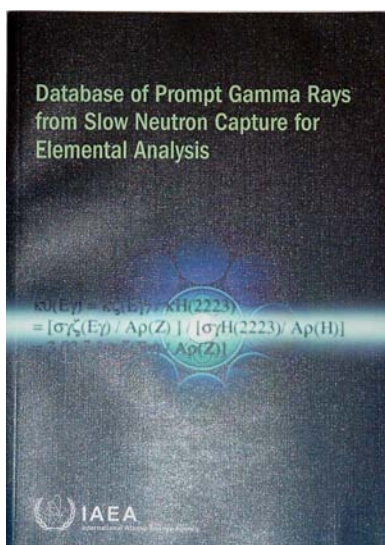
Nuclear Wallet Cards 2005 7th Edition, by Jagdish K. Tuli, National Nuclear Data Center. These pocket size wallet cards are available as hard copy on request

Database of Prompt Gamma Rays from Slow Neutron Capture for Elemental Analysis

Prompt gamma activation analysis (PGAA) from neutron capture is particularly valuable as a non-destructive nuclear analysis method. This database improves the quality and quantity of the data for reliable applications of PGAA in fields such as materials science, geology, mining, archaeology, environmental science, food analysis and medicine. The database provides, for all the natural elements, tables that include the following data: isotopic composition, thermal radiative cross-sections (total and partial), Westcott g factors, energies of gamma rays (prompt and delayed), decay modes, half-lives and branching ratios. The CD-ROM included in the report contains the complete database, the retrieval system and important electronic documents related to the database.

H.D. Choi, R.B. Firestone, R.M. Lindstrom, G.L. Molnár, S.F. Mughabghab, R. Paviotti-Corcuera, Z. Révay, A. Trkov, V. Zerkin, Chunmei Zhou.

ISBN 92-0-101306-X. International Atomic Energy Agency, Vienna, Austria (2007).

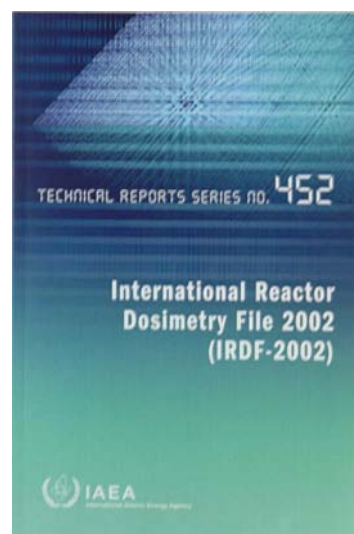


International Reactor Dosimetry File 2002 (IRDF-2002)

An updated, tested and standardized reactor dosimetry cross-section database with associated uncertainty data and relevant decay data has been assembled to create a new data library for use in assessments of the service life of reactor pressure vessels. The resulting IRDF-2002 data library is available on CD-ROM and through the Internet, and the selection procedure and contents are described in this publication. This set of recommended high-quality data is also appropriate for use in other neutron metrology applications, such as boron neutron capture therapy, therapeutic use of radioisotopes, nuclear physics measurements and reactor safety studies.

O. Bersillon, L.R. Greenwood, P.J. Griffin, W. Mannhart, H.J. Nolthenius, R. Paviotti-Corcuera, K.I. Zolotarev, E.M. Zsolnay, P.K. McLaughlin and A. Trkov.

Technical Reports Series No. 452, ISBN 92-0-105106-9. International Atomic Energy Agency, Vienna (2006).



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Meeting Reports

Consultants' Meeting to Review the Requirements to Improve and Extend the IRDF Library (International Reactor Dosimetry File (IRDF-2002)), 25 and 26 January 2007

The main aims of this meeting were to discuss scientific and technical matters related to reactor dosimetry and to consider the needs for improvements to the existing data in IRDF-2002 and possible extension to higher neutron energy applications. Cross-section data requirements for fusion studies are particularly challenging (up to 60 MeV) and should include adequate covariance data – the provision of these neutron cross sections will require additional assessment prior to initiating any work programme.

Participants: L. R. Greenwood (PNL, USA); K.I. Zolotarev (IPPE, Obninsk, Russian Federation); E.M. Zsolnay (BUTE, Hungary); H.J. Nolthenius (Schagen, Netherlands); U. Fischer (FZK, Karlsruhe, Germany); S.P. Simakov (FZK, Karlsruhe, Germany); and data specialists from within the IAEA Nuclear Data Section (D.H. Abriola, R. Capote Noy, A. Mengoni, A.L. Nichols and V. Zerkin).

A number of specific problems have been identified by users since the assembly and release of IRDF-2002 in 2004 [*International Reactor Dosimetry File 2002 (IRDF-2002)*, IAEA Technical Reports Series No. 452, IAEA, Vienna, Austria, 2006, ISBN 92-0-105106-9 accessed at: <http://www-nds.iaea.org/irdf2002/>]. Furthermore, improved standards data are available to renormalize the various measurements, and new evaluations have been released along with their covariance matrices. Newly evaluated and re-evaluated data files will be made available directly or through the IAEA Web site, and participants agreed to assess the contents of these new files and come forward with recommendations concerning their acceptance into IRDF.

Further database development work for the multinational ITER programme is desirable, with the need to extend the IRDF data files to assist in studies of the design and construction of IFMIF (International Fusion Materials Interaction Facility) and assess a range of proposed materials for the DEMO fusion reactor (Demonstration power plant). Information is required on flux distributions, and the quantification and facility responses to nuclear heating, accumulation of radiation damage and gas production. Participants agreed to consider the best means of formulating and assembling/generating the desired cross section data files with uncertainty covariance matrices by means of evaluation of experimental data and theoretical modelling.

More detailed information can be found in INDC(NDS)-0507.

Consultants Meeting to assess the viability of a new IAEA Coordinated Research Project (CRP) on *Charged-Particle Interaction Data for Radiotherapy*, 20–22 November 2006

The main aim of this meeting was to identify the needs for comprehensive evaluated data for nuclear interaction cross sections, including recommendations on types of nuclear data and their accuracy. One further aim was to cover all steps of proton and heavier ion therapy delivery by ensuring discussions among experts in the field of proton and ion therapy, proton and ion dosimetry and proton and ion Monte Carlo simulations.

Participants: H. Paganetti (MGH, USA); O. Jäkel (DKFZ, Germany); H. Palmans (NPL, UK); N. Sobolevsky (INR, Russian Federation); J. M. Quesada (UDS, Spain); A. Lomax (PSI, Switzerland) and specialists from within the IAEA (R. Capote Noy (NAPC/NDS); and S. Vatnitskiy (NAHU/DMRP).

Needs for nuclear data on heavy-charged particle radiotherapy have been identified and are listed on the basis of sensitivity to nuclear data:

Research Area	Protons	Light-Ions
Treatment nozzle simulation and beam characterisation	Total and differential cross sections for materials of beam shaping devices.	Total and differential cross sections for incident ions and secondary charged fragments for materials of beam shaping devices.
Primary standards and reference dosimetry	Total and differential cross sections with high accuracy needed for a limited set of detector materials.	Total and differential cross sections with high accuracy needed for incident ions, secondary charged fragments, and a limited set of detector materials.
Activation for PET	Production cross sections for limited set of tissues.	Production cross sections for incident ions and secondary charged fragments for a limited set of tissues.
Neutron production for protection and shielding	Double differential production cross sections for tissues, beam shaping devices and shielding materials.	Double differential production cross sections for incident ions and secondary charged fragments on tissues, beam shaping devices and shielding materials.
Treatment planning dose calculations	Differential production cross sections for protons and total nonelastic for other charged secondaries.	Differential production cross sections for incident ions and secondary charged fragments.

A programme to compile and evaluate charged-particle nuclear data for therapeutic applications was strongly recommended. Both the technical discussions and the expected outcomes of such a project are described in **INDC(NDS)-0504**, along with detailed recommendations for implementation. The meeting was jointly organized by NAPC/Nuclear Data Section and NAHU/Dosimetry and Medical Radiation Physics Section.

The first Research Coordination Meeting on *Heavy Charged-Particle Interaction Data for Radiotherapy* will be held in Vienna in November 2007.

Second Research Coordination Meeting (RCM) on Updated Decay Data Library for Actinides, 28–30 March 2007



Held at IAEA Headquarters in Vienna, participants met to review the progress of their evaluation and measurement work. Comprehensive decay scheme data for nearly 40 actinides and over 40 natural decay daughters are being considered for extensive evaluation within this project (see table). A third and final RCM will take place in September 2008 and the database, along with a publication describing the methodology employed, will be prepared in late 2009.

Participant	Actinides	Decay daughters
M.-M. Bé	^{243}Am , 234 , ^{238}U , ^{252}Cf	^{210}Tl , 210 , ^{214}Pb , 210 , ^{214}Bi , 210 , 214 , ^{218}Po , ^{218}At , 218 , ^{222}Rn , ^{226}Ra
V. P. Chechev	^{233}Th , ^{233}Pa , 237 , ^{239}U , 236 , $^{236\text{m}}$, 237 , 238 , ^{239}Np , 238 , 239 , 240 , 241 , ^{242}Pu , ^{241}Am , 242 , ^{244}Cm	^{227}Ac
Huang Xiaolong	^{231}Th , ^{235}U	^{213}Bi , ^{213}Po , ^{217}At , ^{217}Rn , 221 , ^{223}Fr , ^{225}Ra , ^{225}Ac
F. G. Kondev	243 , 245 , ^{246}Cm	^{206}Hg , 206 , 207 , ^{209}Tl , 209 , ^{211}Pb
A. Luca	^{234}Th , ^{236}U	^{228}Ra
G. Mukherjee	^{229}Th , ^{233}U	
A. L. Nichols	^{228}Th , 242 , $^{242\text{m}}$, 244 , $^{244\text{m}}\text{Am}$	^{208}Tl , ^{212}Pb , 212 , ^{215}Bi , 212 , ^{216}Po , 211 , ^{219}At , 219 , ^{220}Rn , ^{224}Ra
A. Pearce	^{232}Th , ^{231}Pa , ^{232}U	^{223}Ra , ^{228}Ac
Unallocated		^{211}Bi , 211 , ^{215}Po , ^{215}At

Allocation of actinide and daughter radionuclides among the participants for decay scheme evaluations.

An ICTP/IAEA Workshop on Nuclear Data for Science and Technology: Medical Applications, 12–23 November 2007, Trieste, Italy.

The Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste, Italy) in cooperation with the International Atomic Energy Agency (IAEA, Vienna, Austria) is organizing a Workshop on *Nuclear Data for Science and Technology: Medical Applications* to be held at ICTP, Trieste, Italy. The Workshop will continue a series of Nuclear Data for Science and Technology workshops initiated in 1999.

Recent years have witnessed a rapid development and increasing use of nuclear radiation in medicine both for diagnostic and therapeutic purposes. Diagnostic nuclear techniques (e.g., SPECT and PET) offer formidable possibilities for human body research, which are complementary or superior to non-nuclear methods. Specific nuclear radiations have been used in cancer therapy treatments for many years (X rays and gamma rays), and very promising results can often be obtained with neutron, proton and heavy-ion irradiation. New radioisotopes have been introduced for diagnosis and therapeutic processes. Radio- compounds can be used to follow and quantify the metabolism of newly developed drugs. Targeted radiotherapy linking monoclonal antibodies and radioactive compounds is gaining widespread use. Efficient and safe application of these techniques requires appropriately trained and dedicated personnel.

The workshop constitutes a unique opportunity for scientists and engineers to gain extensive and up-to-date training on the use and understanding of those nuclear data of relevance to the application of modern nuclear technology in therapy and diagnostics. Furthermore, the attendees will be introduced to the rapidly advancing information technology for on-line retrieval of nuclear data. Applications of the Monte Carlo method to medical physics will also be extensively covered.

Workshop lecturers: H. Herzog (Research Center Jülich, Germany); O. Jäkel (DKFZ, Germany); R. Jeraj (University of Wisconsin – Madison, USA); D.T.L. Jones (iThemba Labs, South Africa); I. Kawrakow (NRCC, Canada); A. Lomax

(PSI, Switzerland); H.R. Maecke (University Hospital Basel, Switzerland); H. Paganetti (MGH, USA); S. M. Qaim (INF, Jülich, Germany); D.W.O. Rogers (Carleton University, Canada); O. Schwerer (IAEA/NDS, Austria); A. Wambersie (UCL - IMRE, Belgium); L. Waters (LANL, USA); and R. Capote (IAEA/NDS, Austria).

Additional information and application forms for the Workshop and agenda can be found on the Web server of ICTP at: http://cdsagenda5.ictp.trieste.it/full_display.php?ida=a06223

The closing date for receipt of applications for participation is 2 JULY 2007.

IAEA Phase-Space Database for External Beam Radiotherapy

- awaiting submissions at http://nds121.iaea.org/send_phsp

A Consultants' Meeting was held in Vienna in December 2005 to discuss and recommend actions and activities to prepare a *Phase-space Database for External Beam Radiotherapy*. During 2006 the recommendations of the meeting have been implemented: the new IAEA phase-space (*phsp*) format has been established and corresponding read/write subroutines have been developed. Members of the International Advisory Committee (IAC) consist of recognized experts in the area of accelerator Monte Carlo simulations, and were appointed by the IAEA to assess *phsp* data and rank the quality of the submissions using well specified criteria.

IAC members: R. Jeraj (University of Wisconsin, USA); I. Kawrakow (NRCC, Canada); C.-M. Ma (Fox Chase Cancer Center, USA); D.W.O. Rogers (Carleton University, Canada); F. Sánchez-Doblado (University of Seville, Spain); J. Sempau (Universitat Politècnica de Catalunya, Spain); J. Seuntjens (McGill University, Canada); and J.V. Siebers (Virginia Commonwealth University, USA).

The new *phsp* database should serve to disseminate phase-space data of accelerators and ^{60}Co units used in radiotherapy through the compilation of existing data that have been properly validated. This IAEA project is jointly organized by staff in the NAPC-Nuclear Data Section and NAHU-Dosimetry and Medical Radiation Physics Section.

We are waiting for your data. All necessary information for *phsp* data submission can be obtained from the Project webpage http://nds121.iaea.org/send_phsp. A detailed description of the IAEA format can be found in **INDC(NDS)-0484** available on the Project webpage. Additional information can be obtained by contacting the IAEA technical officer for this project – Roberto Capote (R.CapoteNoy@iaea.org).

Neutron Reaction Data for Minor Actinides (MANREAD): Coordinated Research Project set to begin in 2007

The strategies foreseen for future development and employment of nuclear power generation emphasise the use of nuclear energy systems in which the nuclear fuel contains consistent and controlled amounts of the minor actinides (MA). These minor actinides, particularly neptunium and americium, are produced as normal by-products of the operation of thermal power reactors. Because of the existence of long lived isotopes of these elements, they constitute the major sources of radiation in spent fuel and in wastes resulting from their reprocessing. Reliable and accurate neutron-induced reaction cross-section data are required for the important isotopes of these MAs, including reasonably low uncertainties for sound core design studies and high burn-up strategies.

The IAEA has launched a Coordinated Research Project on *Neutron Reaction Data for Minor Actinides (MANREAD)* as part of a worldwide effort to determine the present status of our knowledge on MA neutron reaction data. Experimental facilities will be assessed and a plan will be formulated to undertake measurements of neutron reaction cross-sections for the important MA isotopes. The CRP is set to start in 2007 and is expected to deliver the results of this experimental, theoretical and nuclear data evaluation work by the end of 2011.

KARLSRUHER Nuklidkarte

J. Magill | G. Pfennig | J. Galy 7th Edition 2006



The 7th edition of the Karlsruhe Nuklidkarte contains new and updated radioactive decay data on 618 nuclides not found in the previous 1998 edition. In total, nuclear data on more than 2962 experimentally observed nuclides and 692 isomers is presented. Most recent values of the atomic weights, isotopic abundances and cross sections are included together with the thermal fission yields for both ^{235}U and ^{239}Pu . The accompanying booklet has been considerably revised to include a history and overview of nuclear science. The multi-lingual Explanation of the Chart of the Nuclides has been extended from the original four languages (English, German, French, Spanish) and now includes Chinese and Russian.

For almost 50 years, the Karlsruhe Nuclide Chart has provided scientists and students with structured, accurate information on the half-lives and decay modes of radionuclides, as well as the energies of emitted radiation. Beyond the more traditional physical sciences such as health physics and radiation protection, nuclear and radiochemistry, and astrophysics, the Chart is now in wide and common usage in the life and earth sciences (biology, medicine, agriculture, geology, etc.). An important characteristic of the Chart is its great didactic value in education and training in the nuclear sciences. It has been used in training programmes worldwide and is a valuable and welcome addition to many books on nuclear science including school physics textbooks.

Since the previous 1998 edition of the Karlsruhe Nuclide Chart, many comprehensive nuclear data sources have become available in electronic form on CD-ROM and on the internet. Nevertheless, the paper-based Karlsruhe Nuclide Chart, with its foldout and wall chart versions, remains an aesthetically appealing record of human achievement in nuclear science. It provides a unique overview of current knowledge and is for many the preferred medium for ease of use, convenience and practicality. This new 2006 edition coincides with the 50th anniversary of the Forschungszentrum Karlsruhe which has overseen management of the chart since its inception there in 1958. The European Commission's Joint Research Centre will continue this tradition through support and development of the current and future editions of the chart at the Institute for Transuranium Elements (ITU) in Karlsruhe.

Available cost-free on request only for teachers and scientists from developing countries.

Nuclear Data Services – contact points

For services to customers in USA and Canada:

US National Nuclear Data Center, Bldg. 197D, Brookhaven National Laboratory, P.O. Box 5000, Upton, NY 11973-5000, USA. Tel. +1 631-344-2902; Fax +1 631-344-2806; Email: nndc@bnl.gov; Worldwide Web: <http://www.nndc.bnl.gov/> For information on on-line services and requests contact: D. Rochman.

For services to customers in OECD/NEA Data Bank member countries:

NEA Data Bank: OECD Nuclear Energy Agency, Le Seine Saint-Germain, 12 blvd des Iles, F-92130 Issy-les-Moulineaux, France. Tel. +33 1 4524 (plus extension); Fax +33 1 45241110; Email: (name)@nea.fr or nea@nea.fr; Worldwide Web: <http://www.nea.fr> Contact: A. Hasegawa, ext. 1080.

For services to the countries of the former USSR:

Neutron data: Russia Nuclear Data Center, Centr Jadernykh Dannyykh (CJD), Fiziko-Energeticheskij Institut, Ploschad Bondarenko, 249020 Obninsk, Kaluga Region, Russia. Tel. +7 08439-9-8982; Fax +7 095-230-2326; E-mail: manokhin@ippe.obninsk.ru. Worldwide Web <http://rncd.ippe.obninsk.ru/> Contact: V.N. Manokhin.

Charged-particle data: Russia Nuclear Structure and Reaction Data Center (CAJAD), Kurchatov Institute, Kurchatov Square 1, 123 182 Moscow, Russia. Tel. +7 095-196-9968; Fax +7 095-882-5804; Email: chukreev@polyn.kiae.su Contact: F.E. Chukreev.

Photonuclear data: Centre for Photonuclear Experiments Data, Centr Dannyykh Fotoyadernykh Eksperimentov (CDFE), Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Leninskie Gory, 119 922 Moscow, Russia. Tel. +7 095-939-3483; Fax +7 095-939-0896; Email: varlamov@depni.sinp.msu.ru or varlamov@depni.npi.msu.su. Worldwide Web <http://depni.sinp.msu.ru/cdfe/> Contact: V.V. Varlamov.

For services to customers in China:

China Nuclear Data Center, China Institute of Atomic Energy, P.O. Box 275(41), Beijing 102413, China. Tel. +86 10-6935-7275; Fax +86 10-6935-7008; Email: gezg@iris.ciae.ac.cn Contact: Ge Zhigang.

Computer codes of US origin to all countries:

Radiation Safety Information Computational Center (RSICC), Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6362, USA. Tel. +1 865-574-6176; Fax +1 865-574-6182; Email: cdc@ornl.gov. Worldwide Web <http://epicws.epm.ornl.gov/> (there are charges and release restrictions)

Computer codes of non-US origin to all countries:

NEA Data Bank, see above, contact: E. Sartori, ext. 1072; Email: sartori@nea.fr (there may be release restrictions) IAEA Nuclear Data Section offers data centre services primarily to non-OECD countries (except Russia and China, see above). However, most products advertised in this Newsletter, specifically INDC reports, IAEA-NDS-documents, etc., are provided upon request to customers in all countries. For on-line services see the first page of this Newsletter. Users of countries in Latin America and Caribbean may use IAEA-NDS mirror at

Worldwide Web <http://www-nds.ipen.br>

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