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Nuclear Data Newsletter

News from the Nuclear Data Section
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In this Issue

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Presentation on nuclear data given by Head, NDS during the 55th IAEA General Conference

From the Section Head

The photo above shows that the Nuclear Data Section was active at the recent IAEA General Conference introducing the importance of nuclear data and stressing how the Nuclear Data Section web site is the ideal place to access such data. As you will see in this newsletter, we are focusing on one of our core activities – the EXFOR database of experimental reaction data. In many ways this part of our work encapsulates all that we do; through our coordination of the NRDC we ensure that scarce resources are used most efficiently, we define the data formats to keep them relevant for new kinds of data, we are part of the technical work of compilation and we organise the training of new compilers. But perhaps our most important role is through our web site; by investing in a wide range of software tools the user is easily able to retrieve the relevant data and display them in many different ways. A new feature is the ability to renormalize or correct the data so that they are kept up to date.

I hope that after reading about some of the recent advances in EXFOR you will be inspired to visit the EXFOR part of our web site and try out the new features. As always we welcome feedback or suggestions for improvements, we rely on these to keep the web site fresh and relevant.

continued on page 2

Computer Codes and Data Libraries

Databases and libraries are available for download or on CD-ROM/DVD cost-free on request
Please find a complete list of all computer codes and data libraries available from NDS on:
http://www-nds.iaea.org/cd-catalog.html

ENDF collection on DVD-ROM: 25 evaluated data libraries for nuclear applications in original and pointwise formats, includes:

- BROND-2.2
- CENDL-2
- CENDL-3.1
- EAF-2010
- ENDF-B-VI.8
- ENDF-B-VII.0
- ENDF-HE-VI
- FENDL-2
- IAEA-Medical
- IAEA-STD
- IAEA-Therapeutic
- INDL-TSL
- IRDF-2002
- IRDF-2002-G
- JEFF-3.1
- JEFF-3.1.1
- JENDL-3.3
- JENDL-4.0
- JENDL-HE-2007
- MENDL-2
- MENDL-2P
- MINKSACT
- PADF-2007
- ROSFOND-2010
- RRDF98

Data Library News

If there is any Database News you would like to have mentioned in future issues of the Nuclear Data Newsletter send details to services@iaeand.iaea.org

EXFOR News is a list of experimental data sets newly added to the EXFOR library. The format of the list is quite similar to the CINDA book. The news also provides hyperlinks to the abstracts on publishers' website as well as hyperlinks to the EXFOR entries. Please send an email to n.otsuka@iaea.org or services@iaeand.iaea.org if you would prefer to be advised electronically when EXFOR News is released. The news is also available online through: http://www-nds.iaea.org/nrdc/exfor_news/

NSR Nuclear Science References (NSR) database is a bibliography of nuclear physics articles, indexed according to content and spanning nearly 100 years of research and maintained by the Brookhaven National Nuclear Data Center. Over 80 journals are checked on a regular basis for articles to be included. A revised version of NSR was released in September 2011. http://www-nds.iaea.org/nsr/index.jsp

EAF-2010 Corrected and updated version of the European Activation File covering 816 targets.

Stopping Power Data for Light Ions is collection of experimental data on stopping powers for hydrogen, helium and light (from Li to Ar) ions with energies up to 100 MeV/A in many elemental and 188 compound materials. Intercomparison of data with the theoretical or semi-empirical predictions allows a determination of their reliability and uncertainties. The site also contains the program developed by the authors and links to the available codes presently used to calculate the stopping powers of ions in matter.
Last update October 2011: http://www-nds.iaea.org/stoppinggraphs/

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This newsletter is the last of the current biennium, the two year period that the IAEA uses for its programme and budget planning. It has unfortunately been dominated over the last nine months by the disaster at Fukushima, and the IAEA is looking at the many ways that it can improve the situation and help ensure that such an event is even more unlikely in the future. One thing that was obvious was the need for information relevant to such an event, by experts and laypersons alike, and we are currently looking at ways that such information can be made more accessible.

Some of the more important products from the last two years have been RIPL-3 (library of parameters needed for theoretical calculations), new decay data files for actinides, improved medical data, particularly a new report on therapeutic radionuclides and updates to the Ion Beam Analysis database (IBANDL). Other CRPs are concluding and we look forward to a report on minor actinides (MANREAD) and new FENDL-3 libraries.

Nuclear data needs are continually expanding and with limited resources prioritisation is vital. The planned meeting on long-term nuclear data needs at the beginning of November looks to how the NDS can fulfil these most efficiently over the next ten years.

Many of our readers have made many valuable contributions during the past two years, by attending meetings and collaborating in the various CRPs and DDPs; I hope that this will continue over the next biennium, and I particularly request that you provide feedback on our web site so that new features and tools can be successfully added and the range of data expanded.

Robin Forrest

EXFOR
The Database of Nuclear Reaction Cross Sections

Experimental nuclear reaction cross sections are compiled in the EXFOR database (http://www-nds.iaea.org/exfor/exfor.htm), which is maintained by the International Network of Nuclear Reaction Data Centres (NRDC) (http://www-nds.iaea.org/nrdc/) under the coordination of the IAEA. It is a requirement that data be compiled for all reactions with incident projectiles with mass number up to 12 and incident energies up to 1 GeV. However, the voluntary inclusion of data is becoming increasingly common for reactions induced by photons, heavier projectiles and at higher energies, allowing EXFOR to follow modern physics trends and user interests. The data assembled in EXFOR cover integral, differential and partial cross sections, resonance parameters, fission products, neutron and gamma yields from thick targets, neutron thermal scattering by materials and polarization data.

The EXFOR database is continuously under improvement and extension. This year the extensions have focused on the comprehensive collection of neutron energy spectra produced by accelerators and fission reactors, which have been used to measure spectra averaged cross sections. For further details see the report of the Consultants Meeting on Neutron Source Spectra for EXFOR on page 6. After inclusion of the detailed information on neutron sources, it will be possible to use hundreds of the measured energy averaged cross sections, already available in EXFOR, for further validation of the evaluated data. It was also found that more than forty original articles reporting results on accelerator driven neutron sources were missing in EXFOR, and NRDC has now started to compile them.

Another recent example of the extension of EXFOR is the inclusion of Nuclear Resonance Fluorescence data. This mechanism refers to gamma scattering reactions (γ,γ') with excitation of strong dipole scissors resonances in the nucleus and consequent prompt γ ray decays providing a specific 'fingerprint' of the particular isotope. This method is experiencing a renaissance as a novel non-destructive method for detecting clandestine materials. The compilation of cross sections and decay modes for nuclear fusion synthesis of new super heavy elements and isotopes is evidence of the extension of EXFOR towards heavy projectiles and frontier physics.

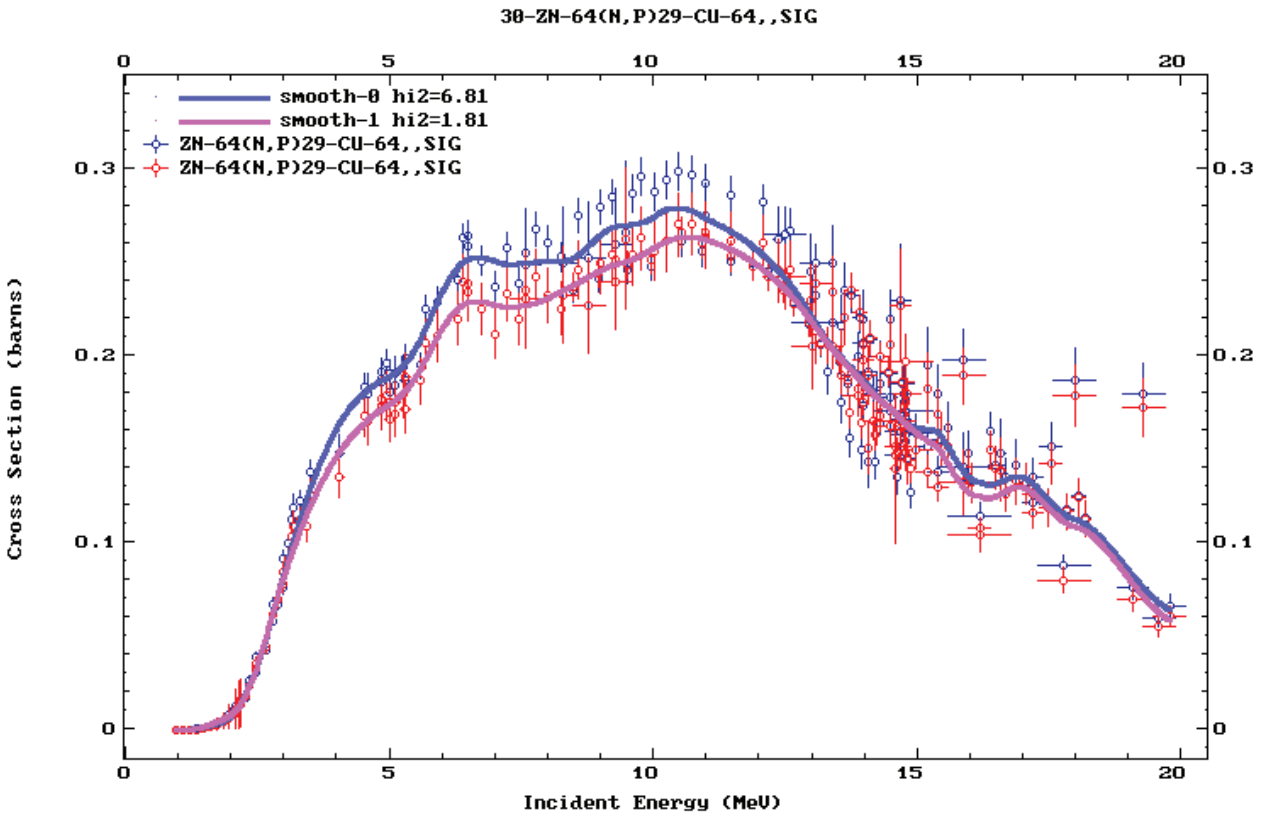


Fig. 1. Example of original (blue) and corrected (red) EXFOR data for the ^{64}Zn(n,p)^{64}Cu reaction. The two fitted curves act as eye-guides.

Currently the database contains information from more than 19,000 experiments with more than 141,000 numerical datasets. Due to the intensive work of the NRDC Network, the EXFOR database is updated four times per year and typically includes about 600 new entries annually. To aid in the selection of newly published articles from around 120 journals, conference proceedings and reports, NDS hosts and each week updates the EXFOR compilation control system (http://www-nds.iaea.org/nrdc/alloc/). This is invaluable for coordination and speeding up of the compilation process. To keep users informed about new entries, NRDC this year started to issue EXFOR newsletters (http://www-nds.iaea.org/nrdc/exfor_news/) which provide a summary of new work.

To make the use of these measured data easier and more efficient, NDS has developed the EXFOR/ENDF Web retrieval and plotting system. The numerical data for reactions can be searched and presented in various formats: the original EXFOR exchange format, in various extended (X4, X4+, X4±), tabulated (T4) and other formats including a test version in XML and HTML/XML. The system provides output in general computational (C4, TABLE) and special application (R33) formats for large scale conversion of experimental data for use by various external applications. Recently, new software converting data into C5 format with inclusion of the total systematic and statistical uncertainties was developed.

The EXFOR database is complemented by bibliographical information for references (NSR Keynumbers, DOI identifiers etc.); this year the system was further extended by enabling access for internal users to the pdf-file collection of original papers.

New capabilities for applying specific corrections to experimental data using modern values of monitors and standards and other renormalisations enables old datasets to be brought up to date and will significantly aid in the evaluation process (Fig. 1.).

The construction and plotting of covariance matrices from non-, partially and fully correlated uncertainties from EXFOR has been recently developed as a new option of the Web-retrieval system (Fig. 2).

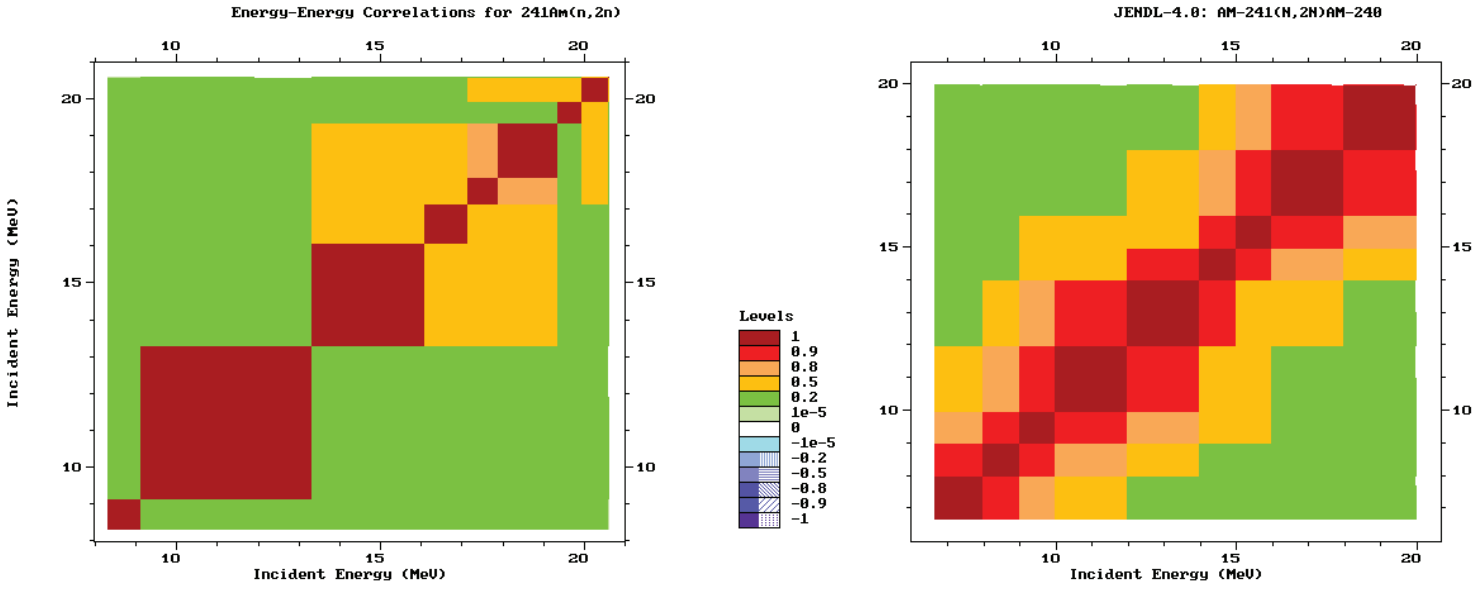


Fig. 2. Retrieval and plotting of experimental (left, Entry 23114) and evaluated (right, JENDL-4.0) energy-energy correlation matrices for the ^{241}Am(n,2n) reaction cross section

NDS Meeting Reports

Meeting reports, when finalised, available at http://www-nds.iaea.org/publications/

Coordination of the International Network of Nuclear Structure and Decay Data Evaluators
Vienna, April 4-8, 2011

Scientific Secretary: Daniel Abriola, 36 participants and IAEA staff

Participants of the TM: Coordination of the International Network of Nuclear Structure and Decay Data Evaluators

With 36 scientists from twenty Member States and IAEA staff involved in the compilation, evaluation and dissemination of nuclear structure and decay data, this was the biggest meeting in the history of the NSDD Network. In addition to the technical discussions on the need for new nuclear structure and decay data as well as diverse schemes to improve compilation and availability of the ENSDF database, the most important issue of concern to the meeting was its uncertain future due to aging of its major evaluators. Nevertheless, some promise for the future was achieved in that the IAEA was able to enlist six new evaluators. During the meeting, it was also stressed that it is in Member States' interest to provide an applicable working environment for the Network.

Consultants Meeting on Status of Data Needs for Neutron Activation Analysis
Vienna, April 11 – 13, 2011

Scientific Secretary: Mark A. Kellett, 5 participants

Five consultants, involved in different aspects of neutron activation analysis, discussed possible ways in which the IAEA could support relevant nuclear data activities. Each presented their expectations prior to in-depth discussions taking place which were finalised as a set of recommendations. The main recommendations being:

1. IAEA supporting the provision of relevant data via an appropriate set of webpages to be known as "Activation Data Portal". An initial version of this has been created and is available at: http://www-nds.iaea.org/naa/portal.html. Further updates are planned and comments are welcomed.
2. The reference database for k_0-*NAA* recommended by the IAEA in a recent Coordinated Research Project (which is an update of an earlier IUPAC version) should be used by all in the k_0 community.
3. The k_0-*IAEA* software and associated database should be made into two clearly separate entities and the format of the database be clearly defined. This database should be made available for comparison purposes.

Participants of the CM on Status of Data Needs for Neutron Activation Analysis

4. The analysis of several nuclei is required for the effect of the Westcott *g*-factor on σ_γ and k_0, and the effect of the neutron spectrum temperature on P_γ. Such an analysis would involve both the Neutron Activation Analysis (NAA) and Prompt Gamma Activation Analysis (PGAA) communities, and would require both measurements and calculations to be carried out. Such a piece of work might be performed through a Coordinated Research Project.
5. The efforts of the "k_0 International Scientific Committee" and the "k_0 Nuclear Data Committee" are recognised and continuing strong collaboration in this field is encouraged.

Consultants Meeting on Neutron Source Spectra for EXFOR
Vienna, April 13 – 15, 2011

Scientific Secretary: Stanislav Simakov, 8 participants and IAEA staff

Participants of the CM on Neutron Source Spectra for EXFOR

The main aim of the meeting was to complement the averaged cross section data already stored in EXFOR by the incident neutron energy spectra. The experts shared their experience on measurement and simulation of neutron fields produced at reactors and accelerators over a wide energy range. The source characteristics, format and rules needed for storage in EXFOR were discussed. The participants submitted the numerical information on spectra that will essentially increase the number of 'complete' data sets in EXFOR. The summary report of the meeting http://www-nds.iaea.org/publications/indc/indc-nds-0590/ additionally provides an overview of (i) neutron production cross sections and thick target yields missing from the EXFOR database; (ii) codes for neutron spectra calculations; (iii) informational resources for reactor, radioactive and spallation neutron sources; (iv) codes for spectrum unfolding and (v) EXFOR compilation rules for the Maxwellian averaged cross sections measured for reactor and astrophysical applications.

1st Research Coordination Meeting (RCM) on Reference Database of Cross Sections for Particle Induced Gamma Ray Emission (PIGE) Spectroscopy Vienna, May 16 – 20, 2011

Scientific Secretary: Daniel Abriola, 10 participants

Particle induced gamma ray emission (PIGE) is a powerful analytical technique that exploits the interactions of energetic (~1-10 MeV) charged particles with nuclei located near a sample surface to determine the composition and structure of the surface regions of solids (from ~ 0 to 50 μm) by measurement of characteristic prompt γ rays.

During the meeting, the extension of the IBANDL database format to include PIGE data was discussed. Different tasks to achieve the CRP objectives were assigned to participants. A list of priority measurements was produced and the individual sets of measurements assigned to participants. For further details see summary report of the meeting available as INDC(NDS)-0589.

2nd Research Coordination Meeting (RCM) on Light Element Atom, Molecule and Radical Behaviour in the Divertor and Edge Plasma Regions Vienna, May 23 – 25, 2011

Scientific Secretary: Bas Braams, 15 participants and IAEA staff

Participants of the 2nd RCM on
Light Element Atom, Molecule and Radical Behaviour in the Divertor and Edge Plasma Regions

This CRP is concerned with atomic and molecular data for light elements in plasma. Hydrogen, helium, lithium, beryllium, boron, carbon, nitrogen, oxygen and neon are all found in plasma physics experiments, either as the main plasma species (H and its isotopes and sometimes He) or as an impurity introduced by plasma contact with the wall or in some cases as a deliberately introduced impurity. Even molecules and molecular ions - primarily hydrides and hydrocarbons - occur in the edge plasma. The objective of the CRP is to improve the database on collisional and radiative properties of these impurities.

Technical Meeting of the International Network of Nuclear Reaction Data Centres Vienna, May 23 – 24, 2011

Scientific Secretary: Naohiko Otsuka, 25 participants and IAEA staff

Thirteen cooperating data centres in China, Hungary, India, Japan, the Republic of Korea, Russian Federation, Ukraine, USA, NEA and IAEA were represented at the meeting. Meetings of this Network are held annually, with full meetings, involving Centre heads and technical staff, every two years (last full meeting held in April 2010 in Hokkaido University, Sapporo, Japan).

Main topics of the meeting were EXFOR transmission statistics, EXFOR coverage and quality control, needs of EXFOR users, manuals, EXFOR/CINDA dictionaries, revision of the EXFOR formats, new quantity codes as well as improved web tools and software. Forty-three working papers were presented at the meeting. The results of the discussions were summarized in nineteen conclusions and fifty-six actions.

Compilation of experimental data for specific application was emphasized. In addition to compilation of experimental data in new publications, compilation of experimental data in old publication and still missing in the EXFOR library is an important task of NRDC. Priority of compilation for specific applications – neutron source spectra, nuclear resonance florescence (NRF), standard cross section and super-heavy element production was discussed.

A summary report of the meeting is available as INDC(NDS)-0593.

Participants of the TM of the International Network of Nuclear Reaction Data Centres

Workshop on Data Compilation of the Multinationally Maintained Experimental Nuclear Reaction Database (EXFOR) Vienna, May 25 - 27, 2011

Scientific Secretary: Naohiko Otsuka, 23 participants and IAEA staff

At the workshop on Data Compilation of the multinationally maintained experimental nuclear reaction database (EXFOR) the 23 participants represented 13 cooperating data centres from China, Hungary, India, Japan, the Republic of Korea, Russian Federation, Ukraine and the USA. Main topics of the workshop were (1) discussion on experience of EXFOR compilation and application, and (2) exercise with updated EXFOR software (editor and digitizer).

During the first part of the workshop, the following presentations were given:

1. Systematic studies of nuclear reactions using EXFOR - from a viewpoint of a database user (A. Kohama, Japan),
2. Experience of activation cross sections in EXFOR (V.M. Semkova, IAEA),
3. Software for compilation and evaluation used in CNDC (Guochang Chen, China),
4. Experience and observations with the use of EXFOR-Editor (Sarbjit Singh, India).

During the second part of the workshop, the recent update of the EXFOR editor maintained by CNPD (Sarov, Russia) and the graph digitizer maintained by JCPRG (Sapporo, Japan) were introduced, following which participants undertook compilation exercises with these updated utilities.

Participants of the Workshop on Data Compilation of the Multinationally Maintained Experimental Nuclear Reaction Database (EXFOR)

Consultants Meeting on Data Needs for Erosion and Tritium Retention in Beryllium Surfaces
Vienna, May 30 – 31, 2011

Scientific Secretary: Bas Braams, 5 participants

Beryllium is an important material in present day fusion energy research. ITER will use beryllium for the main vacuum vessel wall and the Joint European Torus (JET) experiment has also recently installed a beryllium main wall. In 2012 NDS is planning to initiate a CRP on 'Data for erosion and tritium retention in beryllium plasma-facing materials'. The processes of interest for this CRP include physical and chemical sputtering by H, He and Be, which release beryllium impurities into the plasma, trapping and reflection of hydrogen (H, D, T) on beryllium surfaces in the plasma environment, the transport of hydrogen in beryllium and means to extract trapped tritium. The objective of the CM was to provide advice about the scope and aims of the planned CRP and about other activities of the NDS in the area of plasma-material interaction with beryllium. For further details see the summary report of the meeting available as INDC(NDS)-0592.

Consultants Meeting related to EMPIRE
Brazil, May 31 – June 3, 2011
Hosted by B.V. Carlson at the Instituto Tecnológico de Aeronáutica, Sao José dos Campos, Brazil

Scientific Secretary: Roberto Capote, 4 participants

EMPIRE is a modular system of nuclear reaction codes, comprising various nuclear models, and designed for theoretical calculations and nuclear data evaluation over a broad range of energies and incident particles. A projectile can be a neutron, proton, any ion (including heavy ions) or a photon. The energy range extends from the beginning of the unresolved resonance region for neutron induced reactions (~keV) and goes up to several hundred MeV for heavy ion induced reactions. The latest official version of EMPIRE (2.19) was released in 2005. The EMPIRE reference paper was published by M. Herman *et al*. in Nucl. Data Sheets **108** (2007) 2655.

Participants (and other guests) of the CM related to EMPIRE

The purpose of the meeting was to coordinate a new release of the EMPIRE system including the latest developments in theory and data processing capabilities. The meeting involved the most active EMPIRE developers. A new setup script was developed and extensively tested during the meeting. Comprehensive technical discussions on development of the EMPIRE system were held. A resulting work plan of the activities needed for timely release of EMPIRE 3.2 was agreed. The new EMPIRE 3.2 version is scheduled for release in December 2011 simultaneously at the IAEA (http://www-nds.iaea.org/empire/) and the United States National Nuclear Data Center (http://www.nndc.bnl.gov/empire/).

Consultants Meeting on Nuclear Data for Charged Particle Monitor Reactions and Nuclear Data for Medical Isotope Production Vienna, June 21 – 24, 2011

Scientific Secretary: Roberto Capote Noy, 6 participants

The meeting was convened to define the scope, deliverables and appropriate work programme of a possible CRP on nuclear data for charged particle monitor reactions and nuclear data for medical isotope production. It was determined that the main data areas requiring improvements are:

1. Monitor reactions for charged-particle beams;
2. Production of novel positron emitters;
3. Production of alpha emitters.

In all these areas special attention should be given to the need for measurement and re-evaluation of decay data. Detailed deliverables of the planned CRP were proposed; additional information is available in the Summary Report published as INDC(NDS)-0591.

Participants of the CM on Nuclear Data for Charged Particle Monitor Reactions and Nuclear Data for Medical Isotope Production

1st Research Coordination Meeting (RCM) on Atomic and Molecular Data for State-Resolved Modelling of Hydrogen and Helium and their Isotopes in Fusion Plasmas Vienna, August 10-12, 2011

Scientific Secretary: Bas Braams, 12 participants and IAEA staff

A CRP on 'Atomic and Molecular Data for State Resolved Modelling of Hydrogen and Helium and Their Isotopes in Fusion Plasma' has been started. Hydrogen and helium are the primary constituents of fusion plasma and their behaviour in the near wall region of fusion devices determines the nature of plasma wall interaction. At its first meeting, the participants reviewed the status of the existing data and their application in plasma modelling codes, especially for the International Tokamak Experimental Reactor (ITER). They made plans for development of new primary data (basic collision cross sections) and for the conversion of these primary data into forms (collisional radiative models) that are more suitable for use in plasma modelling codes.

Technical Meeting (TM) on Intermediate Term Nuclear Data Needs for Medical Applications: Cross Sections and Decay Data Vienna, August 22 – 26, 2011

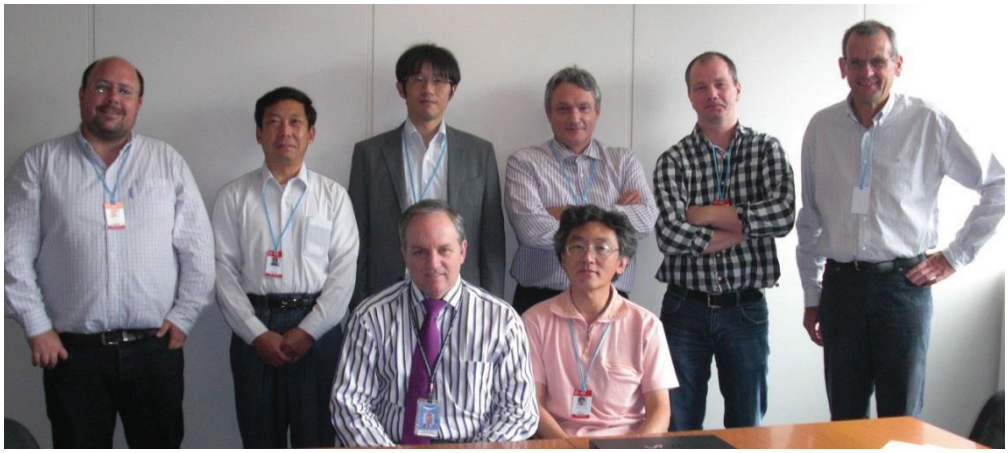
Scientific Secretary: Roberto Capote Noy, 8 participants and IAEA staff

The TM was convened to provide the impetus towards improving the quantification of nuclear data for medical applications on a medium term timescale beyond 2012. This initiative follows on naturally from earlier IAEA CRPs (see Refs. 1 and 2) dedicated to improving the decay and reaction nuclear data for radionuclide production of radionuclides. The current database containing data from both CRPs is available on http://www-nds.iaea.org/medportal/ Presentations by the consultants at the TM are available on IAEA-NDS web page: http://www-nds.iaea.org/nds-technical-meetings/TM-Med-Apps-2011/.

Various needs for atomic and nuclear data will arise during the course of the next 5 to 15 years with respect to the development, followed by the adoption or rejection of particular radionuclides for diagnostic and therapeutic applications. Specific radionuclides were identified for consideration within the agreed time frame, and discussions ensued as to the nature of the data requirements in the preparation of the desired high purity nuclides with well-defined decay characteristics. A number of proposals and possibilities were considered, and statements on requirements and their consequences summarised. Detailed radionuclidic assessments and requirements were also tabulated.

Technical Meeting on U-238 Inelastic Scatterings and Capture Cross Section Data Vienna, September 6 – 9, 2011

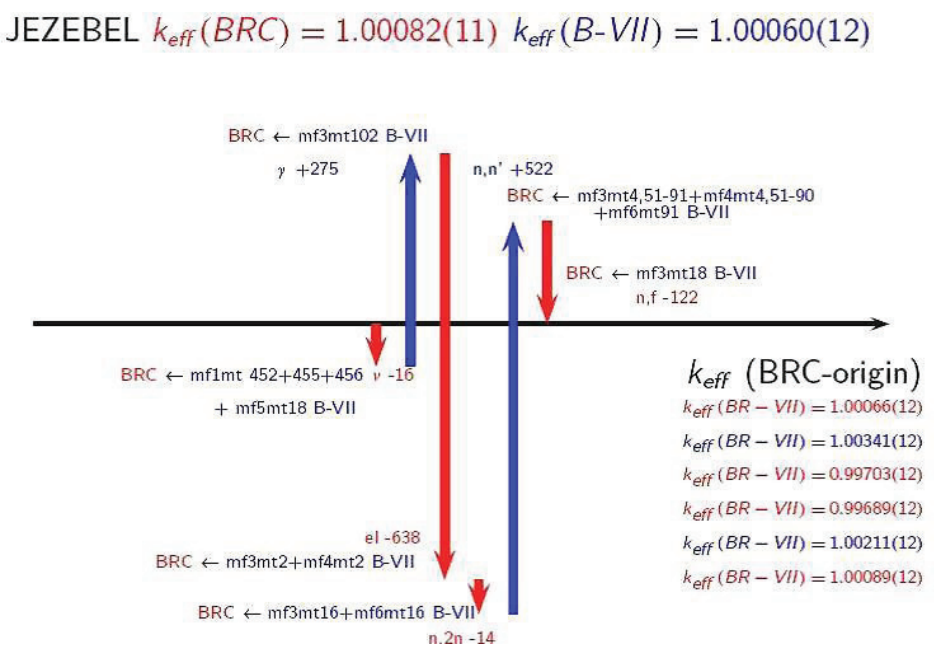
Scientific Secretary: Roberto Capote Noy, 7 participants



Participants of the TM on U-238 Inelastic Scatterings and Capture Cross Section Data

[1] **IAEA-TECDOC-1211**, 'Charged Particle Cross-Section Database for Medical Radioisotope Production: Diagnostic Radioisotopes and Monitor Reactions', IAEA, Vienna, May 2001. Available online: http://www-pub.iaea.org/books/IAEABooks/6050/Charged-Particle-Cross-Section-Database-for-Medical-Radioisotope-Production-Diagnostic-Radioisotopes-and-Monitor-Reactions

[2] **IAEA Technical Reports Series No. 473**, 'Nuclear Data for the Production of Therapeutic Radionuclides', E. Běták *et al.*, 2011, Editors: S.M. Qaim, F. Tárkányi and R. Capote, IAEA, Vienna, Austria.



Recent nuclear data files, e.g. JENDL-4.0, CENDL-3.1, ENDF /B-VII.0, and JEFF-3.1, show significant differences in the inelastic scattering cross sections in the fast energy range. Despite observed differences, all files perform very well in criticality benchmarks as shown in this figure for the 'clean' Jezebel benchmark. This is a fast neutron benchmark which is expected to be sensitive to inelastic scattering cross sections, which implies that deficiencies in inelastic cross sections from evaluated nuclear data files are compensated by other data (e.g. nubar, elastic cross sections, capture, fission, and prompt fission neutron spectra (PFNS)). The data differences in major actinides need to be resolved as these data are critical to determine the main characteristics of nuclear fissioning systems. Consultants agreed to undertake a comprehensive comparison of optical model calculations and selected U-238 as the target nucleus for this exercise. Results of the planned intercomparison together with a comprehensive review of ongoing experiments on inelastic and capture cross sections will be available in the summary report.

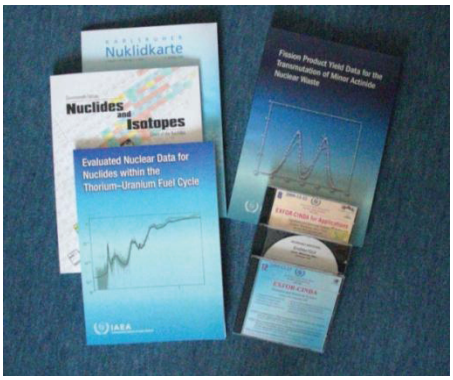
Technical Meeting (TM) on Coordination of Network of A & M Data Centres
Vienna, September 7 – 9, 2011

Scientific Secretary: Hyun K. Chung, 14 participants and IAEA staff

Participants of the TM on Coordination of Network of A & M Data Centres

The Atomic and Molecular (A+M) Data Unit organized the bi-annual meeting on the 'Technical Aspects of Atomic and Molecular Data Processing and Exchange', the 21st Meeting of the A+M Data Centres. Participants from twelve data centres of seven Member States and two international organizations attended the three day meeting and reported the progress in A+M/PSI (plasma surface interaction) data related activities in the data centres. They discussed the issues on data exchange formats, bibliographical data compilation, data evaluation and data needs for fusion research, and made the work plans related to data issues for the next period.

Selected Charts, Reports and Documents



Recent Releases:

All INDC series reports are available online:
http://www-nds.iaea.org/publications/indc_groups.php

INDC(NDS)-0582 Summary Report of an IAEA Technical Meeting on Neutron Cross Section Covariances, Vienna, 27-30 September 2010, prepared by A. Trkov, D.L. Smith, R. Capote Noy, January 2011.

INDC(NDS)-0586 Summary Report of an IAEA Consultants Meeting on Review Benchmarking of Nuclear Data for the Th/U Fuel Cycle, Vienna, 20-22 December 2010, prepared by R. Capote Noy, February 2011.

INDC(NDS)-0588 A Small Guide to Generating Covariances of Experimental Data, prepared by W. Mannhart, May 2011.

INDC(NDS)-0589 Summary Report of the First Research Coordination Meeting on Particle-induced Gamma Ray Emission (PIGE) Spectroscopy, Vienna, 16-20 May 2011, prepared by D. Abriola and A. Pedro de Jesus, July 2011.

INDC(NDS)-0590 Summary Report an IAEA Consultants Meeting on Neutron Sources Spectra for EXFOR, Vienna, 13-15 April 2011, prepared by S. Simakov and F. Kaeppeler, October 2011.

INDC(NDS)-0591 Summary Report of an IAEA Consultants Meeting on Improvements in Charged-Particle Monitor Reactions and Nuclear Data for Medical Isotope Production, Vienna, 21-24 June 2011, prepared by R. Capote Noy and F.M. Nortier, September 2011.

INDC(NDS)-0592 Summary Report of an IAEA Consultants Meeting on Erosion and Tritium Retention, Vienna, 30-31 May 2011, prepared by B.A. Braams, July 2011.

INDC(NDS)-0593 Summary Report of an IAEA Technical Meeting of the International Network of Nuclear Reaction Data Centres, Vienna, 23-24 May 2011, prepared by N. Otsuka, July 2011.

INDC(NDS)-0594 Table of Nuclear Magnetic Dipole and Electric Quadrupole Moments, prepared by N.J. Stone, April 2011.

INDC(CCP)-0452 Development of Nuclear Data Library for Nucleon-Induced Reactions on Heavy Nuclei in Wide Energy Region, prepared by S. Yavshits, May 2011.

INDC(CCP)-0453 Experimental and Theoretical Study of Residual Nuclide Production in 40-2600 MeV Proton-irradiated Thin Targets of ADS Structure Materials, prepared by Yu. E. Titarenko, *et al.*, October 2011.

INDC(ITY)-0018 Activity Report of the ENEA Nuclear Data Project in 2010, prepared by A. Ventura, September 2011.

Also Available:

Nuclear Data Sheets *Special Issue on Nuclear Reaction Data*, Vol. 111, No. 12 (2010). Special Issue Editor: P. Obložinský. Containing papers on NJOY data processing code, and studies of fission product yields. Limited hard copies available on request.

Nuclear Data Sheets *Special Issue on Nuclear Reaction Data*, Vol. 110, No. 12 (2009). Special Issue Editor: P. Obložinský. Two papers documenting results of IAEA projects are included in this edition, one paper on Reference Input Parameter Library (RIPL) and another on Neutron Cross Section standards. Limited hard copies available on request.

Chart of the Nuclides 2010 JAEA Nuclear Data Centre.

Chart of the Nuclides *(Wall chart) prepared by Knolls Atomic Power Laboratory (KAPL) and distributed by Lockheed Martin (17th edition, revised 2009).* Available cost-free on request only for **teachers and scientists from developing countries.**

Chart of the Nuclides *(Book) prepared by Knolls Atomic Power Laboratory (KAPL) and distributed by Lockheed Martin (17th edition, revised 2009).* Available cost-free on request only for **teachers and scientists from developing countries.**

Karlsruher Nuklidkarte *Wall chart of the nuclides from Karlsruhe, 7th edition (2006).* Available cost-free on request only for **teachers and scientists from developing countries**.

Karlsruher Nuklidkarte *Desk chart of the Nuclides from Karlsruhe, 7th edition (2006).* Available cost-free on request only for **teachers and scientists from developing countries**.

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.

NOTE to Universities: earlier editions of KAPL and Karlsruhe Nuclides Charts, in book form, are available cost free for student use (as long as supplies last).

Staff Items

For all NDS staff details: http://www-naweb.iaea.org/napc/nd/aboutus.asp

No change in NDS staffing has taken place since the last (51st) issue of the ND Newsletter.

In Memoriam

It is with deep regret that we have to report the passing of our colleague and friend Victoria McLane. In 1962 Vicki joined the Sigma Center at the Brookhaven National Laboratory which then developed into the National Nuclear Data Center (NNDC). Throughout 43 years until her retirement in 2005 she was one of the key persons in nuclear data compilation and international nuclear data exchange. In the process when the international cooperation of data centres was developing, when the data exchange system EXFOR was created and implemented, when the scope of EXFOR was widened from neutron data to charged particle and photonuclear data, when the correctness and completeness of data compilations had to be verified, she was the technical expert from the US side, contributing a lot to the regular data centre coordination meetings that took place in Brookhaven, Obninsk/Moscow, Saclay/Paris, Vienna and elsewhere. She was also responsible for the technical support of data evaluation efforts and for the editing of various publications. Vicki's dedication to nuclear data compilation and her expertise in the EXFOR system were highly appreciated in the nuclear data community. In 2002 she organized the 50 years Jubilee Meeting of the NNDC, and even after her retirement she supported the EXFOR network and continued to participate in its development. Only a year ago we were sitting together here in Vienna to review documents and photographs on the nuclear data centres history, in which she was an important participant.

John Rowlands, known for his work in the field of nuclear data and reactor physics, has died at age 82. John read physics and mathematics at Manchester University and after graduation in 1950 continued with postgraduate work in the theoretical physics department. After completing his national service he joined the UKAEA, working initially at Capenhurst, and then at Winfrith from 1961. At 60 John took early retirement but later that year he went to work at Cadarache where he stayed for seven years. He continued to publish papers and review scientific articles until 2010 and was still being consulted on the supervision of postgraduate theses. Colleagues have paid tribute to his expertise in neutron cross section measurements, in nuclear data in general, and as a reactor physicist. Special mention has been made of his co-editing of a special issue of Progress in Nuclear Energy in 2002 on delayed neutron data, and of his significant contributions to the JEF library and his role in the JEFF nuclear data project. He was known for his willingness to share his knowledge and for his open minded and diplomatic attitude in discussions with other scientists.

Some Forthcoming NDS Events in 2012

In 2012 the IAEA-NDS is organizing two Workshops at the International Centre for Theoretical Physics (ICTP) in Trieste:

Fusion Plasma Modelling using Atomic and Molecular Data, 23–27 January, 2012
http://www-amdis.iaea.org/Workshops/

and

Nuclear Structure and Decay Data, 6 – 17 August, 2012.

Coordinated Research Projects

IAEA Coordinated Research Projects (CRPs) are a valuable mechanism for stimulating research in IAEA Member States of relevance to the IAEA programmes. Details of the CRPs of the Nuclear Data Section, both active and recently completed, can be found at: http://www-naweb.iaea.org/napc/nd/crps.asp

Technical reports detailing the outcome of IAEA-CRPs can be accessed electronically on:
http://www-pub.iaea.org/MTCD/publications/

Hardcopies of IAEA reports can be purchased from the IAEA Sales and Promotion Unit.

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This newsletter, as well as previous issues, can be accessed electronically at:
http://www-pub.iaea.org/books/IAEABooks/View_Newsletters/60/Nuclear-Data-Newsletter

To ensure continued receipt of your Nuclear Data Newsletter, please keep us informed of any change in address:
email: services@iaeand.iaea.org

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 regarding on-line services, contact: B. Pritychenko: pritychenko@bnl.gov
For information regarding general NNDC services, contact: M. Blennau: blennau@bnl.gov

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: Emmeric.Dupont@oecd.org or db@nea.fr; Worldwide Web: http://www.oecd-nea.fr/databank/ contact: E. Dupont, ext. 1084.

For services to the customers from the former USSR:
Neutron data: Russia Nuclear Data Center, Centr Jadernykh Dannykh (CJD), Fiziko-Energeticheskij Institut, Ploschad Bondarenko,
249020 Obninsk, Kaluga Region, Russian Federation.
Tel. +7 08439-9-8982; Fax +7 095-230-2326;
Email: blokhin@ippe.ru; Worldwide Web: www.ippe.ru/podr/cjd/; contact: A.I. Blokhin.
Charged-particle data: Russia Nuclear Structure and Reaction Data Center (CAJAD), Kurchatov Institute,
Kurchatov Square 1, 123 182 Moscow, Russian Federation.
Tel. +7 095-196-9968; Fax +7 095-882-5804;
Email: sbabykina@polyn.kiae.su; contact: S. Babykina.
Photonuclear data: Centre for Photonuclear Experiments Data, Centr Dannykh Fotoyadernykh Eksperimentov (CDFE),
Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Leninskie Gory, 119 922 Moscow, Russian Federation.
Tel. +7 495-939-3483; Fax +7 495-939-0896;
Email: varlamov@depni.sinp.msu.ru or varlamov@depni.npi.msu.su; Worldwide Web: http://cdfe.sinp.msu.ru/; 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@ciae.ac.cn; contact: Ge Zhigang.

Computer codes of US origin to all countries (there are charges and release restrictions):
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: pdc@ornl.gov Worldwide Web: http://rsicc.ornl.gov/CustomerService.aspx

Computer codes of non-US origin to all countries (there may be release restrictions):
NEA Data Bank (see above)
Email: Juan.Galan@oecd.org; contact: J. Galan, ext. 1008.

IAEA Nuclear Data Section offers data centre services primarily to non-OECD countries
(except Russian Federation 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.
IAEA-NDS on-line services at Worldwide Web: http://www-nds.iaea.org/
Users of countries in Latin America and the Caribbean may use
IAEA-NDS mirror at Worldwide Web: http://www-nds.ipen.br
Users in India and neighbouring countries may use
IAEA-NDS mirror at Worldwide Web: http://www-nds.indcentre.org.in

Impressum

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