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Nuclear Data Newsletter

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From the Section Head

This is the first of the two Newsletters of 2019, in which we summarize the activities and accomplishments of the Nuclear Data Section in the past half year.

The Coordinated Research Project (CRP) on Photonuclear Reactions and Photon Strength Functions is now in the final stages. We have held the third Research Coordination Meeting (RCM) last December and data libraries for both photonuclear cross sections and strength functions are soon going to be completed and available from our website. The results of the CRP will also be published.

During the fall, our Section also organized a Consultancy Meeting on Uncertainty Methodologies for the Neutron Standards, and a Consultancy Meeting on Maintenance and Improvement of the Fusion Evaluated Nuclear Data Library (FENDL), as well as a new initiative to compile experimental integral radiation data for direct validation of evaluated data.

As usual, the various other meetings we have held can be found in this Newsletter.

In the past half year, we have hosted several interns in our Section, from Japan, assisting our EXFOR team with the compilation of experimental data (Takanari Fukuda, Tetsuaki Tada) and on integral data validation (Daichi Imazato), from Slovenia (Jan Malec-intern, and Ingrid Vavtar-consultant) on uncertainties and integral data, and from the USA (Natalie Gaughan) for proton data for medical isotope production. From January 2019 we are also hosting Mark Mawdsley from UK as an intern to work on nuclear model code simulation: resolved and unresolved resonance parameters.

Finally, as you can see at the end of this Newsletter, we managed to complete a successful crowdsourcing challenge for molecular dynamics simulations of damage in fusion materials. We hope this will give rise to similar follow-up initiatives.

I hope to see many of you at the upcoming ND-2019 conference in Beijing in May!

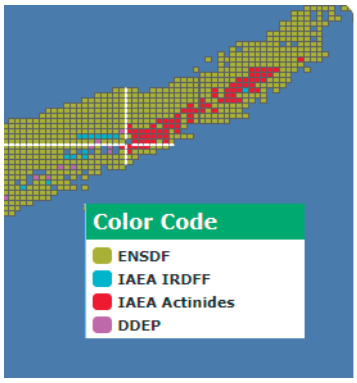


Arjan Koning-Section Head, Nuclear Data Section, Natalie Gaughan-intern, USA, Ingrid Vavtar-consultant, Slovenia and Mark Mawdsley-intern, UK.

Computer Codes, Data Libraries and Web News

Decay Data Portal

It is a web tool to compare different evaluations of a nuclide decay. The colour code on the Chart of Nuclides shows the libraries available, and tabulated data can be accessed by clicking on a nuclide.



When a nuclide has more than one evaluation, a specific tab on the page shows a comparison of the evaluated quantities. In the example below, an evaluation performed for the IAEA Decay Data Library for Actinides is compared with the corresponding ENSDF evaluation.

γ ^{243}Am α decay to ^{239}Np

E_γ		I_γ(abs)	
ENSDF	IAEA	ENSDF	IAEA
31.14 *3*	31.140 *30*	0.071 *5*	0.048 *11*
43.1	43.1	0.0652 *12*	0.065 *0*
43.53 *2*	43.53 *2*	5.90 *15*	5.89 *10*
50.6	50.6 *10*	0.00296 *5*	0.0062 *10*
55.4	55.18 *5*	0.01035 *18*	0.0168 *11*
68.1		(0.0000336)	
71.2			

The Decay Data Portal can be accessed directly with this link https://www-nds.iaea.org/relnsd/vcharthtml/VChartHTML_libs.html

Or with one of the tails placed at the bottom of the Livechart web page



ENDF Web database

The ENDF Web database has been updated with two new libraries:

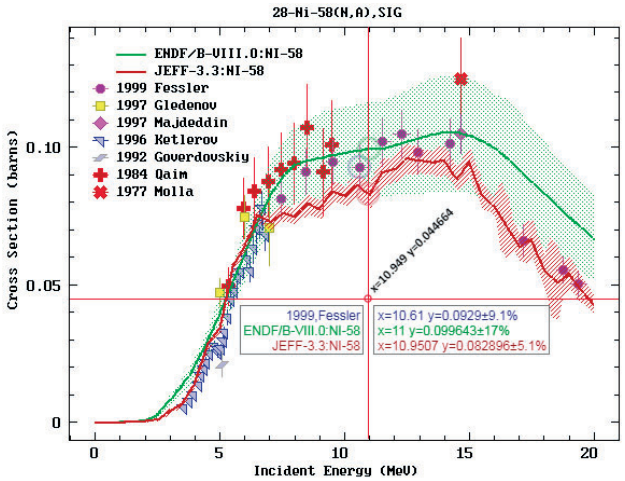
- IAEA/PD-1999, IAEA Photonuclear Data Library (1999), https://www-nds.iaea.org/photonuclear/
- MINKS-ACT, Minsk Actinides Library (Maslov, et al.), 2011, https://www-nds.iaea.org/minskact/

DICEBOX : γ decay simulation tool

(F. Becvar and M. Krticka, Charles University at Prague)
DICEBOX is a Monte-Carlo code for simulation of γ decay of an excited nucleus from a region of high-level density where individual levels are not well known but still resolved using different models of level density and photon strength functions. Any cascade-related quantity can be prepared from simulated cascades. The source code, manual and examples where the code can be used are provided at https://www-nds.iaea.org/dicebox/.

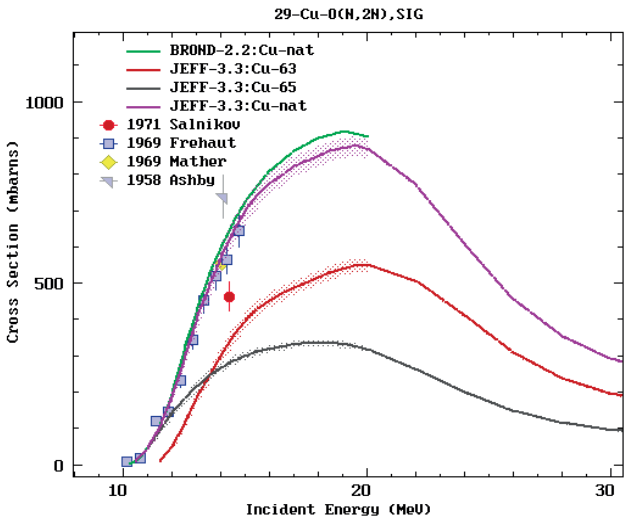
Web plotting tools

New element on Web-ZVView: extended "Marker"; works in EXFOR, ENDF, IBANDL plotting.



EXFOR-ENDF Web tools

On-line reconstruction of ENDF elemental reaction data using natural isotopic abundancy in EXFOR-ENDF Web retrieval system (via ENDVER software).



NDS Meeting Reports

(TM = Technical Meeting, RCM = Research Coordination Meeting, CM = Consultants' Meeting, WS = Workshop, CRP = Coordinated Research Project)

Third Research Coordination Meeting on Updating the Photonuclear Data Library and Generating a Reference Database for Photon Strength Functions

17-21 December 2018, Vienna, Austria
Scientific Secretary: P. Dimitriou
20 participants and IAEA staff



Participants of the 3. RCM on Photonuclear Data Library

Participants discussed the final results of the evaluation of photonuclear cross sections and made recommendations for the Updated Photonuclear Data Library. The compilation and assessment of Photon Strength Function data as well as the comparison with global semi-microscopic and empirical models were reviewed. Recommendations were made about the data to be included in the final Reference Database for Photon Strength Functions. Participants also agreed on the outline, content and scientific journals for publishing the final reports on Updating the Photonuclear Data Library and Reference Database for Photon Strength Functions, respectively.
All the presentations are available from our web page: https://www-nds.iaea.org/CRP-photonuclear/index_3RCM.html.

Technical Meeting on Nuclear Data for Medical Applications

10-13 December 2018, Vienna, Austria
Scientific Secretary: R. Capote Noy
20 participants and IAEA staff

Twenty participants from fourteen Member States (Australia, Argentina, Germany, Hungary, Italy, Japan, Romania, Russia, Spain, Sweden, United Kingdom and USA) were represented at the comprehensive Technical Meeting. One IAEA intern and several IAEA staff also attended the meeting. Participants assessed future medical applications for the next five to ten years for radionuclides based upon their existing and potential diagnostic and therapeutic properties. Reaction data needs focused upon charged-particle induced reaction routes and corresponding production cross sections, derivation of optimal yields and minimization of radionuclidic impurities, along with outstanding decay data requirements. The summary report of the meeting is in preparation and will be published as **INDC(NDS)-0776**. Presentations made at the meeting are available at: www-nds.iaea.org/index-meeting-crp/TM-Med-Apps-2018/.



Participants of the TM on Nuclear Data for Medical Applications

Technical Meeting on the Improvement of Analysis Codes for Nuclear Structure and Decay Data (NSDD) Evaluations

3-7 December 2018, Vienna, Austria
Scientific Secretary: P. Dimitriou
10 participants and IAEA staff

Participants reviewed the status of the analysis and checking codes as well as the new editors since the previous meeting in 2015, discussed new codes that have emerged since then such as ALPHAD_RADd, Java-Ruler, ConsistencyCheck, NS_Radlist, and recommended actions to finalize and validate the codes before the upcoming NSDD meeting in 2019. Additional needs, such as an ENSDF editor and updating of the ENSDF Manual were also discussed.
The presentations are available from https://www-nds.iaea.org/nsdd/ensdfcodes.html.



Participants of the TM on Analysis Codes

Consultants' Meeting on Uncertainty Quantification in Neutron Standards

3-6 December 2018, Vienna, Austria
Scientific Secretary: R. Capote Noy
10 participants and IAEA staff



Participants of the CM on UQ

Ten participants from seven Member States (Australia, Austria, France, Russia, Spain, Sweden, and USA) and two International Organizations (EC JRC Geel and IAEA) were represented at the Consultants' meeting. The main purpose of the meeting was to discuss the use of unrecognized systematic uncertainties (USU) and it's impact on evaluated mean values and covariances. These uncertainties were already employed to increase assessed uncertainties of Neutron Standards; additional advice and consensus was sought. It was agreed that a technical publication will be prepared with in-depth discussions of USU and its importance for nuclear data evaluation. The summary report of the meeting is in preparation and will be published as **INDC(NDS)-0775**. Presentations made at the meeting are available at: www-nds.iaea.org/index-meeting-crp/CM-UQ-STD/.

Technical Meeting on Atomic, Molecular and Plasma-Material Interaction Data Evaluation and Development

19-21 November 2018, Vienna, Austria
Scientific Secretary: C. Hill
20 participants and IAEA staff



Participants of the TM of the Experimentalists Network

This meeting founded the Global Network for the Atomic and Molecular Physics of Plasmas (GNAMPP), a consortium of research groups working in the area of fundamental atomic and molecular physics relevant to plasma processes. Its aim is to promote collaboration and communication, particularly between experimentalists and theoreticians. Eighten groups from 11 Member States were represented at this first meeting, which established the terms of reference, membership and protocols of the Network. More information is available at the AMD Unit's new prototype website: https://www-amdis.org/GNAMPP/.

Consultants' Meeting on INDEN (International Nuclear Data Evaluation Network) on the Evaluation of the Structural Materials

29 October – 1 November 2018, Vienna, Austria
Scientific Secretary: R. Capote Noy
12 participants and IAEA staff

Within this INDEN working group on structural materials the status and problems of the evaluations for mid-mass nuclei in the vicinity of closed shells were addressed. All such nuclei have rather low-level densities; therefore, the evaluations have to cope with similar problems, which are essentially different from the problems encountered in other mass regions.
In the energy range between 1 and 5 MeV the cross sections still exhibit strong fluctuations that cannot be addressed by

R-matrix analysis (or treatment by methods of URR) nor by the optical model calculations. A special optical model needs to be developed to correctly predict the average cross sections for nucleon scattering on these nuclei. Therefore, one of the main goals of this working group was to identify good practices in the evaluation methodology.
Another point of concern was that for many of these isotopes direct capture might be of importance, and a consistent approach of how direct capture could/should be included in evaluated data files would be desirable. Many of the elements addressed have a number of stable isotopes, and although the evaluations are done per isotope, the performance for a combined natural composition is most important for application.
Presentations made at the meeting and some evaluated data files reflecting the work in progress are available at: www-nds.iaea.org/index-meeting-crp/CM-INDEN-III-2018/. The summary report of the meeting is in preparation and will be published as **INDC(NDS)-0770**.



Participants of the CM on INDEN

Workshop on the Compilation of Experimental Nuclear Reaction Data

22-25 October 2018, Vienna, Austria
Scientific Secretary: N. Otsuka
25participants and IAEA staff



Participants of the EXFOR Workshop

The purpose of this workshop was to discuss various aspects of the EXFOR compilation process as well as recent trends of measurements and evaluations including compilation exercises and software demonstration. There were several presentations dedicated to fission product yield data evaluation, compilation and dissemination in connection with the forthcoming CRP on this subject. The afternoon sessions were dedicated to compilation exercises where the participants compiled three recent articles reporting fission product yields and presented their EXFOR drafts for discussion. EXFOR and INIS (International Nuclear Information System) have common interest on compilation of bibliographies, and the INIS coordinator introduced INIS management including recent topics and automatic subject indexing. The summary report is available as INDC(NDS)-0773.

Joint ICTP-IAEA Workshop on Nuclear Structure and Decay Data: Experiment, Theory and Evaluation

15-26 October 2018, ICTP, Trieste, Italy
Directors: P. Dimitriou (IAEA), E.A. McCutchan (BNL, USA), local organizer: C. Tuniz (ICTP)
17 participants and 10 lecturers



Ten lecturers from 7 countries and 17 participants from 12 countries participated in the two-week workshop. The scientific programme was formed in cooperation with the co-director Elisabeth McCutchan (BNL). The workshop was very successful. Participants worked diligently throughout the two weeks and produced some impressive results: they compiled 10 articles into XUNDL data sets. The data sets were finalized with the help of the supervisors and uploaded into the XUNDL database. They worked on the evaluation of 6 nuclides from mass chain A=218. The evaluation of mass chain A=218 is in the final stages of preparation and will be submitted for publication in Nuclear Data Sheets, and participants presented their own research activities.
The link to the event is available from our webpage: http://indico.ictp.it/event/8338/.

Consultants' Meeting on the FENDL Library for Fusion Neutronics Calculations

15-18 October 2018, Vienna, Austria
Scientific Secretary: A. Trkov
10 participants and IAEA staff



Participants of the CM on FENDL Library

The current version is FENDL-3.1d and is available on the IAEA web site https://www-nds.iaea.org/fendl/. It has gone through several iterations and extensive benchmarking and we believe it is THE library for fusion neutronics at present. However, nuclear data evaluation work is always in progress and it is necessary to consider if any changes to the current FENDL library are urgently needed.

The objectives of the meeting were to discuss current experience with the library, identify any deficiencies that need to be resolved, particularly regarding heating and damage calculations, and in view of the newly released ENDF/B-VIII.0 and JEFF-3.3 libraries, is there a need to redo the FENDL library from scratch?

The summary document from the meeting is available on https://www-nds.iaea.org/publications/indc/indc-nds-0769/.

Consultants' Meeting on Inter-comparison of PIGE Analysis Codes

1-4 October 2018, Vienna, Austria
Scientific Secretary: P. Dimitriou
5 participants and IAEA staff



Participants of the CM on PIGE Analysis codes

The meeting was held to discuss the results of a systematic inter-comparison of available IBA analysis codes coordinated by the IAEA. The inter-comparison focused on establishing the consistency of the codes for bulk analysis as a first step, with the overall objective of making recommendations to the user community. The codes compared are: SIMNRA, ERYA, PIGRECO, NDF. Participants agreed to publish the results of the inter-comparison and final conclusions and recommendations in a joint paper in NIMB and make them available online from the IBANDL interface. The presentations are available from: https://www-nds.iaea.org/index-meeting-crp/CM-PIGE-analysis2018/.

Technical Meeting on Nuclear Data Processing

3-6 September 2018, Vienna, Austria
Scientific Secretary: A. Trkov
24 participants and IAEA staff



Participants of the TM on Nuclear Data Processing

The purpose of the meeting was to discuss current issues in the data processing codes. A significant part of the meeting was devoted to the results of Stage 1 of the ACE library verification project. This first stage was discussed at the meeting in December 2017 (see Report INDC(NDS)-0748). Prior to the meeting, participants submitted ACE files processed with their respective codes. The cross sections in the ACE files were compared to the reference cross sections as processed by PREPRO (IAEA-NDS-39 Rev. 18). PREPRO was chosen as the reference processing code because it is considered robust and reliable.

To test the ACE files submitted by participants, 32 critical benchmarks from the ICSBEP Handbook were used and the keff values calculated. Monte Carlo keff calculations were performed with the MCNP 6.1 using the same input decks and the U-235 and U-238 ACE files generated and submitted by the participants. The results of the 1st stage of this study can be found on https://www-nds.iaea.org/ACE_verification. Overall the participating codes showed excellent consistency, which is a good start for the next stage, which will involve self-shielding in the unresolved resonance range.

The summary of the Meeting is available from https://www-nds.iaea.org/publications/indc/indc-nds-0766/.

Consultants' Meeting of INDEN - International Nuclear Data Evaluation Network II – Light Elements

30-31 August 2018, Vienna, Austria
Scientific Secretary: P. Dimitriou
12 participants and IAEA staff

Participants reviewed the existing evaluations for light elements ^{9}Be, ^{14,15}N, ^{16}O and ^{23}Na, identified areas for improvements in the evaluations, and agreed on a timeline to provide improved evaluations for these light elements within the INDEN collaboration. The presentations are available from: https://www-nds.iaea.org/index-meeting-crp/CM_INDEN-II/.

Consultants' Meeting on R-Matrix Codes for Charged-Particle Reactions in the Resolved Resonance Region

27-29 August 2018, Vienna, Austria
Scientific Secretary: P. Dimitriou
11 participants and IAEA staff



Participants of the CM on R-Matrix

Participants discussed the results of a coordinated exercise to verify R-matrix codes through comparisons of calculations for charged-particle reactions producing Be-7. Eight R-matrix codes were included in this verification exercise: AMUR, AZURE2, EDA, RAC, FRESCOX, SAMMY, CONRAD and GECCCOS. The contents of the final publication of the results and conclusions of the exercise were agreed at this meeting. The presentations are available from: https://www-nds.iaea.org/index-meeting-crp/CM_R-matrix2018/.

Consultants' Meeting on Compilation of Nuclear Data Experiments for Radiation Characterization (CoNDERC)

6-9 August 2018, Vienna, Austria
Scientific Secretary: J. C. Sublet
9 participants and IAEA staff



Participants of the CM on CoNDERC

The purpose of the project is to compile experimental integral radiation information (e.g., spectrum-averaged cross sections, decay heat, time dependent measurements) that can be used as part of the Validation and Verification (V&V) of nuclear data. Characteristic spectra associated with experimental data will be also provided together with the corresponding input files for the validation exercise. The IAEA will setup a web page for dissemination of compiled information and associated examples of input/result files.
The presentations are available from https://www-nds.iaea.org/index-meeting-crp/CMconderc/.

In Memoriam

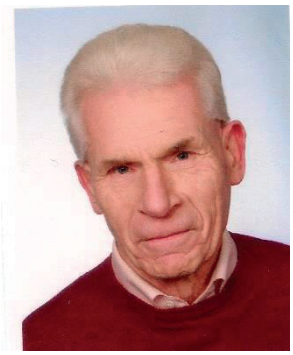
Pamela Atree



As a young programmer, Pamela Atree joined the Agency's nuclear data programme in 1963. She was one of the early digital pioneers working on the historical Harwell Dekatron computer and introducing the first small computer "IBM-1401"at the Agency. From the very beginning she led the entire data processing development of the Nuclear Data Section, from magnetic tapes and diskettes to the online internet services. Together with the Brookhaven counterpart (Red Cullen) she designed the programme for the EXFOR system and related data exchange routine. She was an excellent guide to her data processing and programming staff. Her work laid a solid foundation for our present Nuclear Data Center. After having worked for the NDS for 15 years, she moved to the Safeguards department until her retirement in 1989.
She passed away on 2 August 2018 in her apartment in Vienna leaving behind relatives in the UK.

Charles William Reich passed away in September 2017 but only recently were we informed about it. He was born in Oklahoma City, Oklahoma in 1930. He received his bachelor's degree in physics in 1952 from the University of Oklahoma and pursued a graduate degree in Physics at Rice University. He completed his Physics PhD in 1956. Charles joined the National Reactor Testing Station (now the INL) in 1956. In 1958, he developed the Reich-Moore formalism for the analysis of neutron resonance data. He was given major responsibility for the Evaluated Nuclear Data File/B. From 1976–1984, he served as US Coordinator/ Representative to the International Atomic Agency's Coordinated Research Project for Trans-actinium Isotope Nuclear Data. He collaborated in the evaluation of nuclear properties of odd-mass rare-earth elements.
Charles contributed a lot to the ENSDF and his work on Reich-Moore formalism has far-reaching consequences for nuclear resonances, nuclear reaction evaluations and ENDF/B as a whole.

Wolf Mannhart



passed away on 11 November 2018 after short sickness at the age of 77.
He was an internationally recognized scientist who worked at the Physikalisch Technische Bundesanstalt (PTB), Braunschweig at first, and was involved in many of the Coordinated Research Projects activities and standing committees of the IAEA. His "Small Guide to Generating Covariances of Experimental Data", published in 1981, is still available and helped many nuclear physicists in their analysis of correlated uncertainties. From 1984 to his retirement in 2006 he was the head of the Fast Neutron Cross Section Laboratory. Apart from his own work, he encouraged measurements of differential scattering cross sections with neutron time-of-flight spectrometers, and very often his measurements were the only ones available in the 7-15 MeV energy range.
Even beyond his retirement he was collaborating with the IAEA in evaluation of ^{235}U fission neutron spectra.
He was an engaged scientist who followed his projects diligently to the end and will be remembered for that.

Selected Charts, Reports and Documents

INDC(JPN)-0204 Proceedings of the 2017 Symposium on Nuclear Data, 16-17 November 2017, Tokai-mura, Japan, edited by K. Nishio, Y. Utsuno, S. Chiba, H. Koura, O. Iwamoto and S. Nakamura, December 2018.

INDC(KOR)-006 Ninth AASPP Workshop on Asian Nuclear Reaction Database Development, edited by S.C. Yang and N. Otuka, January 2019.

INDC(NDS)-0692 Inelastic Scattering Data for Major Actinides, Vienna, prepared by R. Capote Noy, January 2019.

INDC(NDS)-0752 Summary Report of the Technical Meeting on Technical Aspects of Atomic and Molecular Data Processing and Exchange Centre Network, 4-6 September 2017, Vienna, prepared by C. Hill and H.K. Chung, October 2018.

INDC(NDS)-0753 Summary Report of the Technical Meeting of the International Atomic and Molecular Code Centre Network on a Database of Atomic Configurations Formed in Collisional Cascades, 16-17 November 2017, Vienna, prepared by A.E. Sand, S.L. Dudarev and C. Hill, August 2018.

INDC(NDS)-0763 Summary Report from the Consultants Meeting on Nuclear Data Portal Web Tools, 30 July-1 August 2018, Vienna, prepared by J. Shimwell and J.-C. Sublet, August 2018.

INDC(NDS)-0764 Summary Report from the Consultants Meeting on Compilation of Nuclear Data Experiments for Radiation Characterization (CoNDERC), 6-9 August 2018, Vienna, prepared by JM. Gilbert and J.-C. Sublet, August 2018.

INDC(NDS)-0766 Summary Report of the Technical Meeting on Nuclear Data Processing, 3-6 September 2018, Vienna, prepared by J.L. Conlin and A. Trkov, November 2018.

INDC(NDS)-0767 Summary Report of the Consultants Meeting on R-matrix Codes for Charged-particle Reactions in the Resolved Resonance Region (4), 27-29 August 2018, Vienna, prepared by H. Leeb, P Dimitriou and I. Thompson, November 2018.

INDC(NDS)-0768 Summary Report of the Consultants Meeting on International Nuclear Data Evaluation Network (INDEN) Meeting on the Evaluation of Light Elements, 30-31 August 2018, Vienna, prepared by R. DeBoer and P Dimitriou, November 2018.

INDC(NDS)-0769 Summary Report of the Consultants Meeting on FENDL Library for Fusion Neutronics Calculations, 15-18 October 2018, Vienna, prepared by L. Packer and A. Trkov, December 2018.

INDC(NDS)-0772 Revision and Update of Experimental Gamma-Ray Strength Functions Derived from the Discrete Neutron Resonance Capture, prepared by J. Kopecky, December 2018.

INDC(NDS)-0773 Summary Report of the Workshop on the Compilation of Experimental Nuclear Reaction Data, 22-25 October 2018, Vienna, prepared by S. Okumura and M. Odsuren, December 2018.

INDC(NDS)-0774 Summary Report of the Technical Meeting on Improvement of Analysis Codes for Nuclear Structure and Decay Data Evaluations, 3-7 December 2018, Vienna, prepared by T. Kibedi and P. Dimitriou, February 2019.

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

Chart of the Nuclides 2014 JAEA Nuclear Data Centre.

Karlsruher Nuklidkarte *Wall chart of the nuclides and folding chart with booklet, 10th edition (2018).*

Chart of the Nuclides *(Wall chart) prepared by Knolls Atomic Power Laboratory (KAPL) and distributed by Lockheed Martin (17th edition, revised 2009).*

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Feedback
Your comments, suggestions and questions can be sent to:
NDS.Contact-Point@iaea.org

NDS Staff Items

More details about the Nuclear Data Section Staff can be found at: http://www-naweb.iaea.org/napc/nd/aboutus.asp.

We welcome **Shin Okumura** who joined the Nuclear Data Section as Associate Nuclear Data Physicist within the Nuclear Data Services Unit as of 1 September 2018. She started her nuclear data career at the Laboratory for Advanced Nuclear Energy in Tokyo Institute of Technology working with Prof. S. Chiba. She has been working on calculations of fission product yield, many other fission observables, cross sections of some fission products, and the evaluation of their impacts on nuclear energy applications. Shin's original research interest was to reduce the high-level radioactive waste from spent nuclear fuel by partitioning and transmutation (P&T) technology. Her interest in nuclear data and nuclear physics came along with understanding of their importance in various fields of nuclear energy applications. Her particular interest in nuclear fission is to give an explanation of the fission products yield distribution and predict it for actinide nuclides which have experimental difficulties.



Winners of the IAEA Crowdsourcing Challenge for Materials for Fusion Technology



Aldo Malavasi, Deputy Director General and Head of the Department of Nuclear Sciences and Applications (retired in December 2018), hands over the IAEA Challenge on Materials for Fusion Award to Udo von Toussaint, Group Leader of the Plasma-Material Modeling and Foundations group at the Max Planck Institute of Plasma Physics. (Photo: IAEA)

The IAEA Challenge on Materials for Fusion presented participants with a set of data files from a simulation of neutron damage in two materials of interest for use in a controlled nuclear fusion reactor: iron and tungsten. The data files consisted of the locations of the atoms after the 'collisional cascade' of displacements caused by the 'primary knock-on atom': the first atom to interact with the neutron.

Participants were invited to come up with innovative ways to visualize, analyze and explore the provided data. The winning submission was submitted by the group of Udo von Toussaint, J. Dominguez, M. Rampp and M. Compostella at the Max Planck Institut für Plasmaphysik, Garching Germany.

The winners will make their code available on a cost-free, open-source basis to any interested party, he added. It could be used by other institutions and experts – mainly material scientists – to analyse the results of their simulations, particularly those relating to radiation damage in solids.

The IAEA is planning to build on the success of this challenge by developing and distributing a computing application that volunteers can download onto their computers to run simulations of damage in materials for fusion, said A.J. Koning, Head of the Nuclear Data Section. This has the potential to greatly increase the speed at which new candidate materials for a fusion reactor can be explored and will further enhance scientists' understanding of the behaviour of these materials in such extreme conditions.

For the full, scientific description of the method, please see IAEA Challenge on Materials for Fusion: Winning Submission.

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: michael.fleming@oecd.org; data@oecd-nea.org; Worldwide Web: http://www.oecd-nea.org/databank/ contact: M. Fleming, ext. 1072.

For services to the customers from the former USSR:
Neutron data: Russia Nuclear Data Center, Centr Jadernykh Dannykh (CJD), Fiziko-Energeticheskij Institut, Ploschad Bondarenko,1,
249033 Obninsk, Kaluga Region, Russian Federation.
Tel. +7 08439-9-5803; Fax +7 08439-68235;
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; 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 10-6935-8119; 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 37831-6003, USA.
Tel. +1 865-574-6176; Fax +1 865-241-4046;
Email: pdc@ornl.gov

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

IAEA Nuclear Data Section offers data centre services primarily to non-OECD countries
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