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Nuclear Data Newsletter

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Contents

From the Section Head

Let me start by wishing you all a healthy 2017.

For many of us, THE nuclear data event of 2016 was the International Conference on Nuclear Data for Science and Technology in Bruges. In the warmest second week of September in Belgian history, no less than 450 nuclear scientists gathered for this "Olympics of nuclear data" as it is sometimes called. It was a very enjoyable week, with presentations of many impressive new developments in nuclear data. I congratulate Arjan Plompen and his colleagues from European Commission - Joint Research Center in Geel on a very successful conference. For more details see our Nuclear Data Story (page 10).

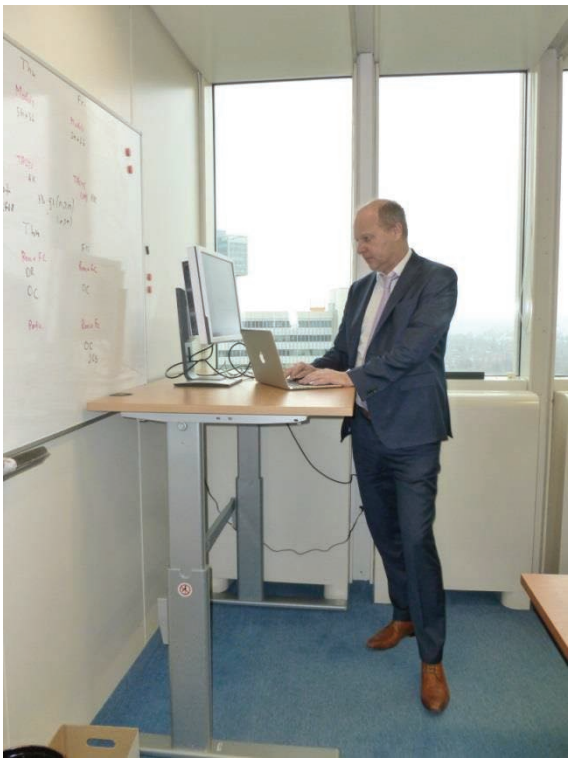
During the summer, our Section organized a final Technical Meeting of the Data Development Project on Neutron Standards, which are going to be essential for the next release of various world nuclear data libraries, and a Consultancy Meeting on maintenance and improvement of the Fusion Evaluated Nuclear Data Library (FENDL).

A relatively new activity is the Meeting on R-matrix codes development, which was held for the second consecutive year, in December 2016. It was interesting to see the development of new R-matrix codes, both from the neutron evaluation community and other fields such as astrophysics.

And finally a personal note: In 1992 I went, fresh off my PhD, to a nuclear data evaluation symposium in Brookhaven to present my work on pre-equilibrium nuclear models. During that week, I met Olivier Bersillon from the CEA, Bruyeres-le-Chatel, and he invited me as a guest scientist to the CEA, a proposal I gladly accepted. From thereon, under his guidance, I learned everything about the optical model, started TALYS, etc. In short, my visits to Bruyéres were tremendously important for my career. Last month during the JEFF meeting in Paris, we learned that Olivier has passed away. He will be greatly missed.

Just before this Newsletter was released, we learned that my other mentor and friend, Phil Young from Los Alamos National Laboratory also passed away. There was no one like him, and a lot of the nuclear data world, especially from the ENDF/B data library community, is what it is nowadays thanks to him.

My apologies to close this introduction on such a somber note; I sincerely hope the rest of 2017 will be better.

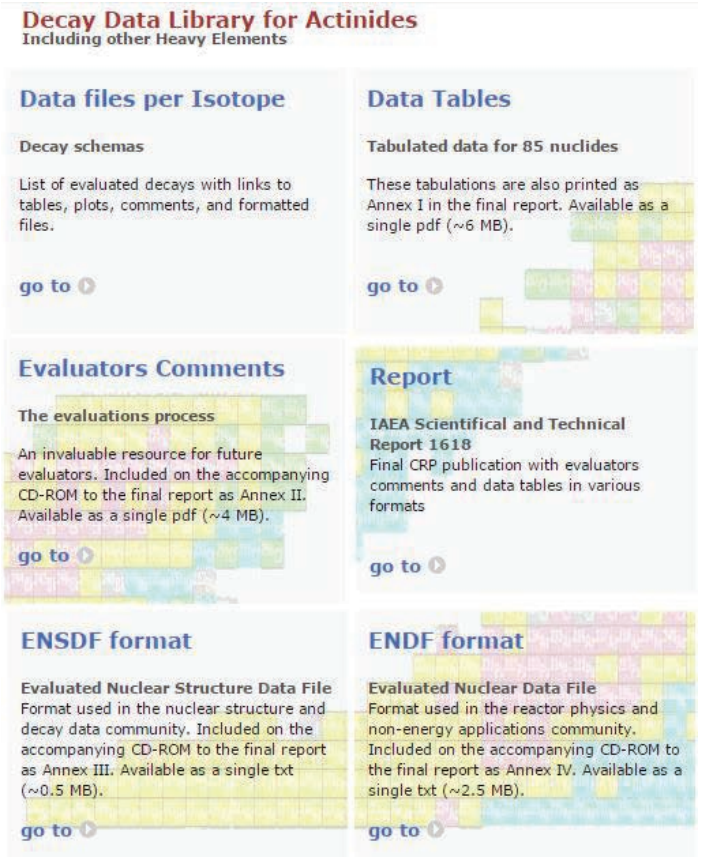


Arjan Koning-Section Head, Nuclear Data Section

Computer Codes, Data Libraries and Web News

Decay Data Library for Actinides

The evaluations of decay data of actinides and other heavy elements produced by an IAEA CRP (STI/PUB-1618) are now available on the Web. Data can be downloaded in HTML, ENSDF, and ENDF formats allowing for further processing. In addition to the tabulated data, the user can also view the decay schemes in graphical form. The detailed comments provided by the evaluators are an invaluable resource for the proper understanding of the data, and form the basis for future evaluations. The Decay Data Library for actinides and other heavy elements can be accessed at: https://www-nds.iaea.org/act_ddl/.



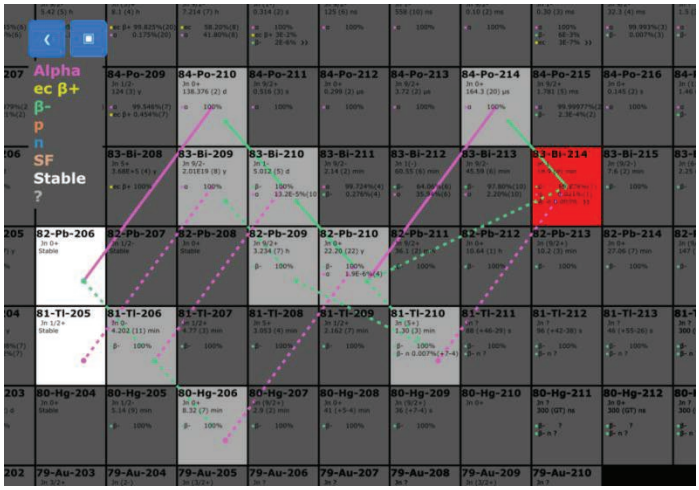
Portable EMPIRE-3.2.2 for Windows

Distribution of software package "Portable EMPIRE-3.2.2 for Windows" was resumed. The package is available from https://www-nds.iaea.org/cdroms/#EMPIRE-3.2.2

Web mirror-site in Russian Federation

New Nuclear Data Services mirror-site is established and can be accessed at http://www-nds.atomstandard.ru/. It is hosted at the private institution "Atomstandart" in Moscow. The site will provide EXFOR, ENDF, CINDA, IBANDL Web database retrieval systems, as well as specialized systems for EXFOR compilers, ENDF and ENSDF evaluators.

Decay Chains on the Isotope Browser



The app for Android and Apple mobile devices – phones, tablets, and Kindle – has been updated with the most requested feature: the decay chain display on the chart of nuclides. By long-press on the chart, or following the "decay chain" link on a nuclide detail page, the chart of nuclides selects the nuclide and its decay chain. At the moment only established decays, the ones having a defined branching ratio, are shown.

The Isotope Browser gives properties of more than 4 000 nuclides and isomers, and data are updated twice a year following the Evaluated Nuclear Structure Data Files master release.

To get the app, search for "Isotope Browser" on the following distribution platforms:

Apple
https://itunes.apple.com

Android
https://play.google.com

Amazon kindle
https://www.amazon.com/

NDS Meeting Reports

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

Technical Meeting on Uncertainty Assessment and Benchmark Experiments for Atomic and Molecular Data for Fusion Applications

19-21 December 2016, Vienna, Austria
Scientific Secretary: Hyun-Kyung Chung
54 participants and IAEA staff

The meeting gathered 54 participants and IAEA staff from 20 countries and 1 international organization. It was by far one of the largest meetings that Atomic and Molecular Data Unit ever organized, with 41 presentations and 16 posters along with 3 technical discussion sessions. The purpose of meeting was to prioritize data needs for fusion applications, discuss experimental benchmarks and uncertainty quantification methods for atomic and molecular data, and promote network of atomic and molecular physicists doing benchmark experiments and computations. Technical discussions led to proposals of benchmarking measurements taking into account the most recent developments in the experimental as well as theoretical areas and networking activities to reinvigorate experimental work to support atomic and molecular databases for plasma applications.

Participants of the TM on Uncertainty Assessment and Benchmark Experiments for Atomic and Molecular Data for Fusion Applications

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

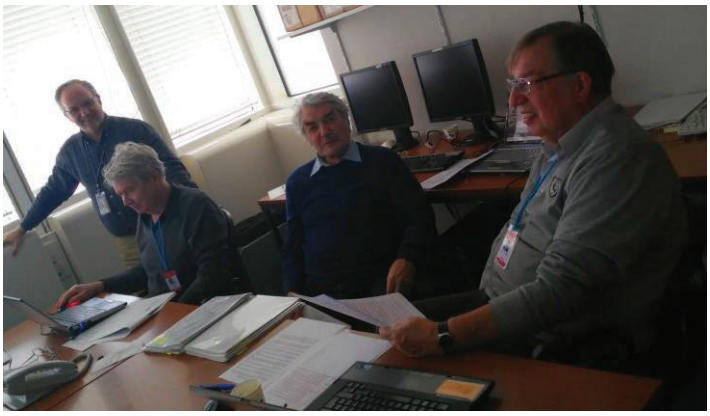
5-7 December 2016, Vienna, Austria
Scientific Secretary: Paraskevi Dimitriou
8 participants and IAEA staff

The purpose was to gather R-matrix code developers from the various communities of practice (astrophysics, nuclear reactions, neutron data evaluation, etc.) to discuss their R-matrix codes capabilities, the physics and fitting procedures implemented in them, and how they can be used in evaluations of cross-section data for charged-particle-induced reactions in the Resolved-Resonance-Region (RRR). Participants reviewed the current best practices on issues regarding R-matrix theory and its approximations, relativistic kinematics, alternate R-matrix forms, unitarity, fitting procedures, extending above 3-body thresholds, closed channels, and the Unresolved Resonance Region. The development, dissemination and testing of the Ferdinand code for exchange of inputs was further discussed. Finally, participants agreed to perform an exercise to compare the fitting procedures and capabilities of the codes. The exercise consisted of fitting the data relevant to the compound system ^{7}Be. The details of this exercise and the technical discussions are included in the meeting summary report. Presentations are available on the meeting web page: https://www-nds.iaea.org/index-meeting-crp/CM-R-matrix-2016/

Participants of the CM on R-Matrix Codes for Charged-particle Reactions in the Resolved-Resonance Region

Consultants' Meeting on Data Assessment for Medical Isotopes

7-11 November 2016, Vienna,
Scientific Secretary: Roberto Capote
3 participants and IAEA staff



Participants of the CM on Data Assessment for Medical Isotopes

This was a small meeting to review additional experimental data available for evaluation of charged particle-induced reactions for medical radionuclide production and monitor reactions. A final set of data were agreed, and least-square evaluations using a Pade approximants were reviewed. Technical discussions on preparation of forthcoming publications were held. No report of this meeting will be published as all data will be presented in technical papers documenting the Coordinated Research Project: www-nds.iaea.org/CRP-CP-monitor/public.html.

Workshop on Experimental Nuclear Reaction Data (EXFOR) Compilation

24-28 October 2016, Vienna, Austria
Scientific Secretary: Valentina Semkova
15 participants and IAEA staff

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

EXFOR is a comprehensive database of experimental nuclear reaction data and associated information, developed as a product of the international collaboration of Nuclear Reaction Data Centres (NRDC) under the auspices of the IAEA Nuclear Data Section since 1970. The scope of the data library has evolved and new types of data, respectively compilation rules, have been introduced. The IAEA-NDS organizes periodically Workshops to discuss the new developments and to provide training for the EXFOR compilers in order to improve the consistency and the quality across the data library. About fifteen participants attended the Workshop to discuss: the decisions and the recommendations of the Consultants' Meeting on the EXFOR compilation of thermal scattering data; some specific data measurement techniques; the compilation and research activities carried out at Nuclear Reaction Data Centres; and the new functionalities of the EXFOR compilation tools. In addition hands-on practical sessions were organised for compilation of the nuclear reaction data types included in the discussions. The Workshop report is in preparation.

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

22 August-2 September 2016, Vienna, Austria
Directors: E. McCutchan (BNL) M. Thoennessen (MSU), Paraskevi Dimitriou (IAEA)
23 participants and IAEA staff

Participants of the Joint ICTP-IAEA Workshop on Nuclear Structure and Decay Data: Experiment, theory and Evaluation

The workshop is part of a series that has been running since 2003. 13 participants from seven countries attended the workshop, and ten lecturers including the two co-directors lectured and supervised the afternoon practical course work. M. Thoennessen, H. Sakurai (RIKEN), and P. Regan (Univ. Surrey) gave an overview of the development and achievements of experimental nuclear physics over the past decades. P. Van Isacker (GANIL) covered aspects of nuclear structure theory, while E. McCutchan (BNL), B.

Singh (McMaster Univ.), J. Tuli (BNL), S. Basunia (LBL), and F. Kondev (ANL) presented selected topics on ENSDF evaluation procedures, formats and policies, and the various ENSDF data sets. A dedicated session on analysis and checking codes, as well as additional specialised demonstrations were also given by T. Kibedi, B. Singh, and E. McCutchan. Online databases, editors, dissemination tools and retrieval systems were discussed by M. Verpelli, J. Tuli, V. Zerkin and E. McCutchan. Hands-on exercises consisted of the critical compilation of 25 experimental papers into XUNDL data sets, and the evaluation of the isotopes of mass chain A=217. All the XUNDL data sets have been included in XUNDL, and the mass chain evaluation is in the final stages of preparation before submission for review. The goal is to publish the mass chain in Nuclear Data Sheets, as has been done in previous workshops. More information about the workshop including the lecture notes can be found at: http://indico.ictp.it/event/7641/

Consultants' Meeting on the Fusion Evaluated Nuclear Data Library (FENDL)

1-4 August 2016, Vienna, Austria
Scientific Secretary: Andrej Trkov
6 participants and IAEA staff

Participants of the CM on FENDL

Participants of the Technical Meeting on Nuclear Data Library for Advanced Systems - Fusion Devices, held from 31 October -2 November 2007 (INDC(NDS)-0525) defined the objective of the CRP, which was to update and extend the FENDL-2.1 library to make it applicable to both fusion devices such as International Thermonuclear Experimental Reactor (ITER) and DEMO and to material test facilities such as International Fusion Materials Irradiation Facility (IFMIF). The extension required the addition of several materials, an extension of the energy range to 60 MeV and the addition of data for charged particle-induced reactions. Special attention was needed to ensure realistic covariance data that would make the library suitable for all fusion technology studies.

The main conclusion from the Meeting was that the FENDL-2.1 library, which is currently the standard for ITER design studies, under predicts heating in the TF coils by about 6% due to missing gamma-production data. Gas-production in Eurofer specimens in IFMIF using the preliminary test library for IFMIF is under predicted by more than 20% due to missing gas-production data above 20 MeV compared to the FENDL-3.1b results. The advantages of the current FENDL-3.1b library were clearly demonstrated. Further testing of the library revealed the need for additional improvements and removal of a few processing problems; these will be implemented in the FENDL-3.2 update, scheduled for release soon. The next general update named FENDL-4 will be considered when the major libraries ENDF/B-VIII, JEFF-3.3 and JENDL-5 become available. The summary report is available as INDC(NDS)-724.

Consultants' Meeting on Developments in Data Exchange

28-29 July 2016, Vienna, Austria
Scientific Secretary: Hyun-Kyung Chung
6 participants and IAEA staff

Participants of the CM on Developments in Data Exchange

The meeting was called to help guide the database work of Atomic and Molecular (A+M) Data Unit over the next seven years. There is an increased emphasis on very large datasets containing relatively unprocessed data, all backed up by new technologies for data analysis; keywords here are machine learning, Gaussian processes and polynomial chaos. In the area of calculated A+M data this may lead towards very different databases than currently exist; for example storing full scattering matrices and not just integrated cross sections, and in addition storing enough calculated data to allow simulations to include uncertainty propagation. In the area of data for Plasma-Material Interaction (PMI), developments towards providing detailed representations of material microstructure and parameterizations of interaction potentials and their uncertainties are expected and not just reflection coefficients and sputtering yields. Again, data should be presented in a form that permits further uncertainty propagation.

Technical Meeting on the Development of Neutron Standards

25-29 July 2016, Vienna, Austria
Scientific Secretary: Roberto Capote
12 participants and IAEA staff

This was the final meeting before releasing the new IAEA Neutron Standards, which is a critical IAEA contribution to the international NEA collaboration (CIELO). Generalized least-square evaluations are being done for the H(n,n), ^{6}Li(n,t), ^{10}B(n,αγ), ^{10}B(n,α), C(n,n), Au(n,γ), ^{235}U(n,f) and ^{238}U(n,f) standard cross sections. Evaluations are also being done for data that are not traditional standards including: the Au(n,γ) cross section at energies below where it is considered a standard; reference cross sections for prompt gamma-ray production in fast neutron-induced reactions; reference cross sections for very high energy fission cross sections up to 1 GeV; the ^{235}U thermal neutron fission spectrum and the ^{252}Cf spontaneous fission neutron spectrum and the thermal neutron constants (TNC). All proposed standard cross sections and reference quantities were carefully reviewed. A roadmap was established to release Neutron Standards in December 2016, which took place as scheduled. New neutron standards will be available online at www-nds.iaea.org/standards/ soon, and will be documented in a journal publication which is in preparation (planned publication in January 2018). Presentations at the meeting are available on the web page: https://www-nds.iaea.org/index-meeting-crp/TM%20STD%202016/

Participants of the TM on Neutron Standards

Joint ICTP-CAS-IAEA School and Workshop on Plasma-Material Interaction in Fusion Devices

18-22 July 2016, Hefei, China, People's Republic
Scientific Secretaries:
Bastiaan Braams and Hyun-Kyung Chung
44 participants, 10 Directors and IAEA staff

In 2016 the Atomic and Molecular Data Unit worked with the Chinese Academy of Sciences Institutes of Plasma Physics (ASIPP) and of Solid State Physics (CAS ISSP) to organize this one-week school and workshop devoted to computational methods and their application for the study of plasma-material interaction processes in fusion devices and of related material properties. Please see the event web page for the list of topics, lecturers, participants and the detailed schedule.
https://www-amdis.iaea.org/Workshops/ICTP2016Hefei/.
The principal co-Directors and local organizers of the ICTP event were Professor Guang-Nan Luo of ASIPP and Professor Chang-Song Liu of CAS ISSP. There were 10 Directors and Lecturers present at the event and 44 participants by application that presented a talk or a poster. The level of the participants was high and they came from many institutes; besides the local hosts IPP and ISSP, there were Chinese participants from Beihang, Tsinghua, Sichuan, Hunan, Sun Yat-Sen, Fudan, Shanghai Jiao Tong and Dalian Universities, from the University of Science and Technology and from the Southwestern Institute of Physics.

In Memoriam

Olivier Bersillon

Olivier Bersillon passed away on 29 November 2016. Before his retirement, Olivier was the Deputy Head of the Physics Division in CEA/DAM in Bruyeres-le-Chatel. He was equally active in nuclear reaction and nuclear structure physics, and many of his developments are here to stay. He is the author of the SCAT2 code for optical model calculations, and has been a main developer of the NUBASE data library. Together with contemporary physicists like Audi and Blachot, he was leading the French contribution to nuclear structure and decay data for decades. He also contributed to many IAEA research projects, in particular to the RIPL and IRDFF database. He remained active after his retirement, among others for the JEFF Radioactive Decay Data library.

Olivier Bersillon (right) with Enrico Sartori and others at Olivier's retirement party in 2009.

Stepan Georgievich Mashnik

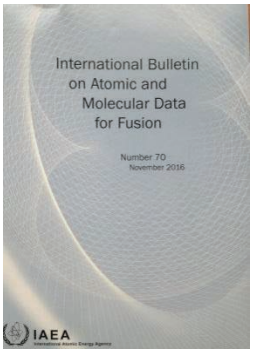
Stepan Mashnik passed away on 8 September 2016 at the age of 64.
He was born in a small rural village of Republic of Moldova in Soviet Union and found a passion for physics and science at the age of 14, to which he dedicated his entire life. He received his PhD in Physics from Lomonosov Moscow State University and worked at the Joint Institute for Nuclear Research in Dubna, Russia after his postdoctoral research.
In 1997, he immigrated with his family to Los Alamos, United States where Stepan continued his scientific journey at the Los Alamos National Laboratory for the next 20 years until a few days before his death (Theoretical Division, followed by the X-Division). He has made a great contribution to the scientific community, publishing hundreds of papers, presenting at countless international conferences and mentoring young researchers. He loved and found great purpose in his work until his last days.

Phil Young

Phil Young passed away on 10 February 2017, at the age of 79.
Phil was born in 1937, in Beeville, Texas, and in 1965 Phil joined Los Alamos National Laboratory, where he worked for over 30 years and achieved accolades for numerous contributions in his field. He acted several years as the Head of the T2 division in Los Alamos. In 1993 he was named a Los Alamos National Laboratory Fellow. The nuclear data world probably knows him best for the GNASH nuclear model code, of which he was the prime developer, and for his large impact on the ENDF/B nuclear data library, for which he provided many evaluated nuclear data files. Phil was also a leading contributor to several IAEA CRPs, in particular to the RIPL project.
Besides his huge contributions to the nuclear data world, he will be remembered for his kind heart, generosity, and the big smiles he had for everyone.

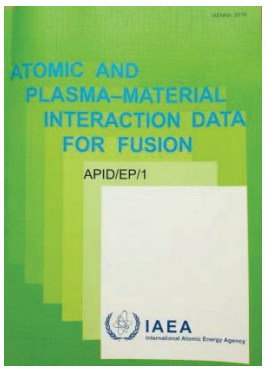
Selected Charts, Reports and Documents

Recent Release



International Bulletin on Atomic and Molecular Data for Fusion, Volume 70, November 2016

The present edition of the Bulletin contains data mainly on atomic structure, spectra and transition probabilities published in the years 2013{2014, electron collisions and surface interaction that appeared in the years 2009{2014. Data for heavy particle and photon collisions will be considered for the next Bulletin.



APID/EP/1 - Atomic and Plasma-Material Interaction Data for Fusion, 2016

This publication on Atomic and Plasma-Material Interaction Data for Fusion is a reproduction by agreement with Institute of Physics Publishing of Journal of Physics: Conference Series Volume 576 (2015). The publication represents the final report of an IAEA Coordinated Research Project (CRP) on light element atom, molecule and radical behaviour in the divertor and edge plasma regions in magnetic fusion devices.

Light elements are the dominant impurity species in fusion experiments and in the near-wall plasma they occur as atoms or ions and also as hydrides and other molecules and molecular ions. Hydrogen (H or D, and T in a reactor) is the dominant species in fusion experiments, but the light elements He, Li, Be, B, C, N, O and Ne are all of significant interest. Helium is a product of the D+T fusion reaction and is introduced in experiments for transport studies. Lithium is used for wall coating and also as a beam diagnostic material. Beryllium is foreseen as a wall material for the ITER experiment and is used on the Joint European Torus (JET) experiment. Boron may be used as a coating material for the vessel walls. Carbon (graphite or carbon-fiber composite) is often used as the target material for wall regions subject to high heat load. Nitrogen may be used as a buffer gas for edge plasma cooling. Oxygen is a common impurity in experiments due to residual water vapor. Finally, neon is another choice as a buffer gas. Data for collisional and radiative processes involving these species are important for plasma modelling and for diagnostics.

INDC(AUS)-0020 Cross Sections of n-3He between 3.5 and 30 MeV. An Evaluation Using Results of an Ab-Initio Calculation, prepared by M. Drosg and A. Deltuva, October 2016.

INDC(CZR)-0003 Validation of ^{nat}Fe and ^{nat}Cr Activation Cross Sections in Quasi-Mono Energetic Neutron Spectra (<35MeV) Including Irradiation, Measurements and Computational Analysis, prepared by M. Majerle, *et al.*, October 2016.

INDC(JPN)-0202 Proceedings of the 2015 Symposium on Nuclear Data, 19-20 November 2015, Ibaraki Quantum Beam Research Center, Tokai, Japan, edited by O. Iwamoto, *et al.*, September 2016.

INDC(NDS)-0712 Summary Report from the First Research Coordination Meeting on Updating Photonuclear Data Library and Generating a Reference Database for Photon Strength Functions, 4-8 April 2016, Vienna, prepared by S. Goriely and P. Dimitriou, July 2016.

INDC(NDS)-0713 Summary Report from the Technical Meeting on Fission Product Yields: Current Status and Perspectives, 23-26 May 2016, Vienna, prepared by P. Dimitriou, F.-J. Hambsch and S. Pomp, October 2016.

INDC(NDS)-0715 Summary Report from the Second Research Coordination Meeting on Plasma-Wall Interaction for Irradiated Tungsten and Tungsten Alloys in Fusion Devices, 8-11 September 2015, Seoul, Korea, Republic of, prepared by H.-K. Chung and B.J. Braams, November 2016.

INDC(NDS)-0716 Summary Report from the Consultants' Meeting on Current Status and Open Issues of the 235-U Evaluation, 24-27 May 2016, Vienna, prepared by G. Noguere and A. Trkov, August 2016.

INDC(NDS)-0717 Summary Report from the Third Research Coordination Meeting on Nuclear Data for Charged-particle Monitor Reactions and Medical Isotope Production, 30 May-3 June 2016, Vienna, prepared by G. A.L. Nichols, F. Meiring Nortier and R. Capote Noy, January 2017.

INDC(NDS)-0718 Summary Report from the Technical Meeting on International Network of Nuclear Reaction Data Centres, 7-10 June 2016, Beijing, China, People's

Republic, prepared by N. Otuka and M. Herman, July 2016.

INDC(NDS)-0719 Summary Report from the Technical Meeting on Nuclear Reaction Data and Uncertainties for Radiation Damage, 13-16 June 2016, Vienna, , prepared by P.J. Griffin, H. Sjöstrand and S.P. Simakov, August 2016.

INDC(NDS)-0722 Summary Report from the First Research Coordination Meeting on Plasma-Wall Interaction with Reduced-Activation Steel Surfaces in Fusion Devices, 9-11 December 2015, Vienna, prepared by H.-K. Chung and B.J. Braams, August 2016.

INDC(NDS)-0724 Summary Report from the Consultants' Meeting on Fusion Evaluated Nuclear Data Library (FENDL), 1-4 August 2016, Vienna, prepared by M. Fleming and A. Trkov, August 2016.

INDC(NDS)-0726 Summary Report from the Consultants' Meeting on R-Matrix Codes for Charged-particle Reactions in the Resolved-Resonance Region, 5-7 December 2016, Vienna, prepared by H. Leeb, P. Dimitirou and I. Thompson, January 2017.

INDC(NDS)-0727 Summary Report from the Consultants' Meeting on Developments in Data Exchange, 28-29 July 2016, Vienna, prepared by H.-K. Chung and B.J. Braams, January 2017.

INDC(NED)-0013 Present Status of Experimental Gamma-Ray Strength Functions Derived from Neutron Capture, J. Kopecky, September 2016.

INDC(SLO)-0003 MCNP Modelling of the LMT-006 Integral Criticality Benchmark Experiment, B. Kos, *et al*., August 2016.

NEW RELEASE:

Chart of the Nuclides 2014 JAEA Nuclear Data Centre. Available cost-free on request only for **teachers and scientists from developing countries.**

Karlsruher Nuklidkarte *Wall chart of the nuclides and folding chart with booklet, 9th edition (2015).* Available cost-free on request only for **teachers and scientists from developing countries.**

Also Available:

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.**

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

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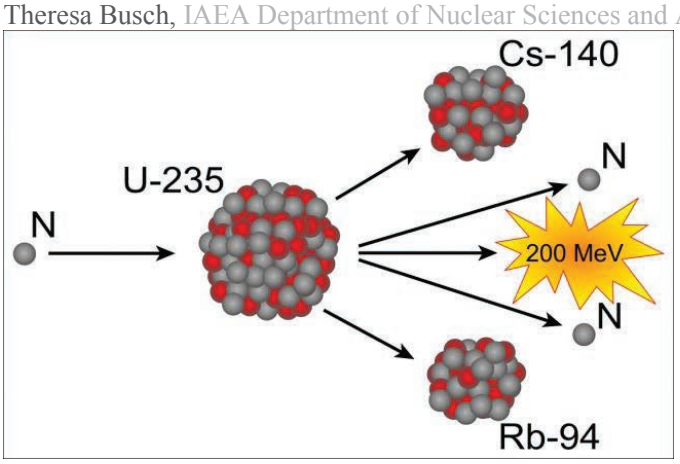
NUCLEAR DATA STORY – at ND2016

Tackling the Challenges of Nuclear Data in the Future

Article published on IAEA webpage News, 19 October 2016.

Theresa Busch, IAEA Department of Nuclear Sciences and Applications



Neutron fission reaction of a Uranium 235 nuclide.

International experts came together from 11 to 16 September 2016 to participate in the International Conference on Nuclear Data for Science and Technology, held in Bruges, Belgium.

The conference was organised by the Joint Research Centre of the European Commission in Geel in cooperation with the Nuclear Energy Agency (NEA) and the International Atomic Energy Agency (IAEA). It is part of a series of conferences which started in 1978 in Harwell, UK and are organised every three years under the patronage of the Nuclear Energy Agency of the Organisation for Economic Cooperation and Development (OECD-NEA).

As computing power increases, nuclear data will become even more important – for medical isotopes, fusion and fission inter alia. Aldo Malavasi, IAEA Deputy Director General, Department of Nuclear Sciences and Applications

Nuclear data is used to characterize nuclear physics processes in a wide range of applications such as fundamental nuclear physics, fusion research and development, astrophysics, nuclear energy, nuclear medicine, nuclear non-proliferation, safeguards and arms control. The International Conference on Nuclear Data aims to present and discuss all aspects related with the production and use of nuclear data in those fields.

Aldo Malavasi, IAEA Deputy Director General of the Department of Nuclear Sciences and Applications delivered a keynote speech at the conference. Looking towards future challenges, he said: “Modern communication tools to transfer nuclear data knowledge are here to stay. A large proportion of the web traffic of the IAEA goes through the Nuclear Data Section whose iPhone and Android Apps and databases are reaching an ever increasing number of users throughout the world.” He further stated: “As computing power increases, nuclear data will become even more important – for medical isotopes, fusion and fission inter alia. The IAEA is leading an effort to decrease uncertainties in nuclear data for safer nuclear technology production.”

The Nuclear Data Section (NDS) of the IAEA has two major fields of work: data production and data dissemination. It develops nuclear data standards as a basis of measurement methods and equipment. The data is disseminated through the NDS website which provides open access to nuclear data of all kinds. The website is used as a key reference by experts, scientists and students in the field.

Of particular success in sharing valuable nuclear data worldwide was the launch of the Isotope Browser App for Android and iOS in 2013. The interactive app for tablet or smartphones provides nuclide properties for 4,000 nuclides and isomers and has been downloaded about 40,000 times.

EXFOR, a master open access data library on experimental nuclear reactions is also hosted by the NDS webpage. It compiles about 22,000 experiments by Nuclear Reaction Data Centres. Its development was recently discussed by

international experts at the 31st Meeting of the International Nuclear Data Committee (INDC) at the IAEA headquarters in Vienna. Also discussed were the Collaborative International Evaluated Library Organization (CIELO) initiative, a worldwide concerted effort to bring data on nuclear reactions to the next level of quality.

One recent achievement of the Nuclear Data Section has been the production of two nuclear data libraries for U-235 and U-238 (Uranium), two of the 3 most important isotopes for nuclear energy production (the third one being Pu-239 (Plutonium), which support the safety of nuclear reactors. These nuclear data libraries are basically two huge sets of numbers which describe a nuclear reaction. When these nuclear data libraries are used in software that drive or develop nuclear power reactors, it is expected that the simulations of nuclear energy production and all other aspects of the fuel cycle can be better analyzed, and therefore produce answers which lead to safer and more economical power production.

Arjan Koning, Head of the IAEA Nuclear Data Section, stated: “We have come to a point, where several fields of nuclear science development, which used to be isolated from each other, are blending together. This has been enabled thanks to the huge increase of computer power. It is now possible to perform the evaluation of nuclear data and its validation by experiments directly relevant for technology, e.g. power reactors, in one and the same process. All that is needed is the brains to drive it.” He further emphasized that, “the Nuclear Data Section has the knowledge on how to empower and enable many nuclear scientists to realize these developments.”

Background

The Nuclear Data Section of the IAEA was founded in 1964 as the Nuclear Data Unit (NDU) and has been working under the guidance of the INDC (formerly International Nuclear Data Scientific Working Group, INDSWG) ever since. The Section collects nuclear, atomic and molecular data for various databases.

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: Oscar.cabellos@oecd.org; data@oecd-nea.org; Worldwide Web: http://www.oecd-nea.org/databank/ contact: O. Cabellos, 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,1,
249033 Obninsk, Kaluga Region, Russian Federation.
Tel. +7 08439-9-5803; Fax +7 08439-68235;
Email: dvoytenkov@ippe.ru; Worldwide Web: http://www.ippe.ru/podr/cjd; contact: D.A.Voitenkov.
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: 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, IAEANDS-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 in India, China, Russia and neighbouring countries may use
IAEA-NDS mirror at Worldwide Web:
http://www-nds.indcentre.org.in (India); http://www-nds.ciae.ac.cn/ (China); http://www-nds.atomstandard.ru/ (Russia).

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