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Nuclear Data Newsletter

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

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Contents

From the Section Head

It is too late for an official "Happy New Year" but I still wish you all the best for 2018, in good health and a peaceful state of mind that leaves a lot of room for nuclear data progress.

We have met with several of you at the various meetings that we have organized in the past half year. This Newsletter contains, as usual, the complete overview of meetings. Notable large ones, in terms of number of participants, were Research Coordination Meetings on Photon Strength Functions and Photonuclear Data, Primary Radiation Damage Cross Sections, and a Technical Meeting on Data Processing.

Just before the end of 2017, we held a Technical Meeting on the International Nuclear Data Evaluation Network, which is one of the follow-ups of the CIELO initiative that was hosted by the NEA in past years. This nuclear data evaluation network will focus on the next list of high-priority nuclides which need to be evaluated with high precision. The website of the meeting is available at https://www-nds.iaea.org/index-meeting-crp/TM_IAEACIELO/.

As a related topic, this is also the time and place to congratulate the nuclear data communities in the US and the OECD on the release of their ENDF/B-VIII and JEFF-3.3 libraries, respectively. Our Section has monitored these releases closely, and contributed evaluations. Therefore, it is good to see that a new level of international nuclear reaction data has been reached. By the way, as mentioned in this Newsletter a third data library, TENDL-2017, was also released last month.

Personally, I have also been able to fulfil my "professor role" in the past half year, by giving TALYS related lectures at ICTP, Trieste, Italy and Manipal, India. It is always nice to see several young, and some not so young, participants at these Workshops. One of them may be writing this introduction in the future!

Arjan Koning - Section Head, Nuclear Data Section

Computer Codes, Data Libraries and Web News

JENDL/PD-2016

JENDL Photonuclear Data File 2016 (JENDL/PD-2016) provides the data of photon-induced nuclear reactions: photoabsorption, photofission, and particle and residual-nuclide production cross sections, and double-differential cross sections of emitted particles.
The library contains data of 2681 nuclides with the energy range of incident photon mostly from 1 MeV to 140 MeV.
This is the data source:
http://wwwndc.jaea.go.jp/ftpnd/jendl/jendl-pd-2016.html.
The data are available via ENDF Web retrieval system:
http://www-nds.iaea.org/endf/.

GRUCON-Evaluated Data Processing Package

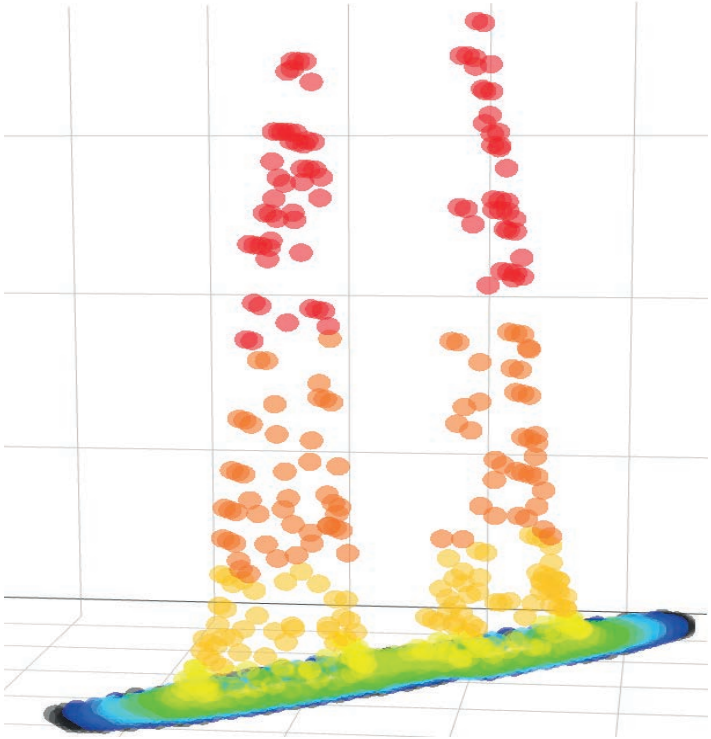
(V.V. Sinitsa, NRC "Kurchatov Institute", Moscow, Russia)
This package (IPPE-NRCKI, 1980-2017) is a system of modules for evaluated nuclear data processing for production of detailed and multi-group working libraries for transport calculations in reactor physics and radiation shielding applications (see INDC-CCP-344). From this edition on, it is distributed with the source code. The package can be downloaded from our webpage: https://www-nds.iaea.org/grucon/.

Portable EMPIRE-3.2.3 for Windows-64 - System for nuclear reaction modelling and nuclear data evaluation

Experimental version of the package for MS-Windows (64-bit) includes Empire-3.2.3, Rev. 4600 (2017-02-13), full EXFOR in XC4 format (vers. 2017-04-24), executables for Windows-64, source codes, gfortran (64, 32-bit) compiler, Tcl/Tk binaries, Python, Postscript-viewer, etc. The package does not require installation nor compilation and is available from
https://www-nds.iaea.org/cdroms/#EMPIRE-3.2.3.

Livechart 3D

A 3D-plotting web application is now part of the Livechart set of tools. Each axis of the plot can be linked to quantities like Q-values, separation energies, fission yields, charge radius, and more will be linked in the future. The so-called "adaptive design" of the page, and the plotting technology implemented, make it possible to display LC3D on mobile devices as well. The plotting is interactive, it can be rotated and zoomed using the mouse or fingers on touch screen. Filter options are present to refine the data sector displayed, and by clicking on a nuclide a detailed page on structure and decay data is opened. Even though some older browser versions do not support the technology adopted, more than 90% of Livechart users are already enabled, a figure that will increase over time. LC3D can be accessed within a link on www-nds.iaea.org/livechart, or directly through https://www-nds.iaea.org/relnsd/vcharthtml/lc3d.html.



Apple
https://itunes.apple.com

Android
https://play.google.com

Amazon kindle
https://www.amazon.com

TENDL-2017

New release of the TALYS Evaluated Nuclear Data Library, TENDL-2017, is now available from https://tendl.web.psi.ch/tendl_2017/tendl2017.html and is succeeding the TENDL-2015. The collection contains complete ENDF-6 formatted data files, including covariance data, and up to 200 MeV, for 2813 isotopes (all stable or with half-life >1sec) for incident neutrons, photons, protons, deuterons, tritons, Helium-3, and alpha particles.
Specific features of the neutron files:
- All cross-section covariance data are now in MF33, including resonance range, i.e. no MF32 (which are still available in the TENDL special purpose files).
- Revision of the so-called 'best' TALYS input files for many fission products and fusion-relevant materials, performed by N. Dzysiuk at NRG for the European F4E and CHANDA projects.

- Adoption of $U^{235,238}$, Pu^{239} from the NEA-WPEC/CIELO collaboration including the uranium evaluations coordinated at the IAEA that were adopted in ENDF/B-VIII.0.
- Adoption of all-natural isotopes up to, and including, F-19 from ENDF/B-VIII.0
- Up to 300 random files per isotope for Total Monte Carlo analyses.

Specific features of the photon and charged particle files:
- Correction of a major bug in the TENDL production system which led to some large anomalies in TENDL-2015 for several important reaction channels. Especially several (p,n) cross sections were not correct in the previous version
- Construction of 'best' input files for photonuclear reactions, leading to the TENDL-2017 photonuclear data with cross sections closer to experimental data.
- Covariance data, MF33-40, for incident photons, protons, as well as the corresponding random ENDF-6 files for Total Monte Carlo.

First validation has already taken place, like comparison (and adjustment) to thermal cross sections, MACS, Resonance Integral, and integral activation measurements, while more extensive validation will follow in 2018.

TALYS-1.9

The current release is called TALYS-1.9, which is a deviation from the usual 0.2 increase, since TALYS-2.0 is reserved for the upcoming major release which has more extensive capabilities (uncertainty propagation and ENDF-6 formatting) that the TALYS-1.x series lacks.
You may want to read the Introduction of the TALYS-1.9 manual for the new features compared to the TALYS-1.8 version.
You can find the new version of TALYS at www.talys.eu or directly via this link ftp://ftp.nrg.eu/pub/www/talys/talys.tar.

NDS Meeting Reports

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

Technical Meeting of Collaborative International Evaluated Library Organization (CIELO)

18-21 December 2017, Vienna, Austria
Scientific Secretary: Roberto Capote Noy
23 participants and IAEA staff

Participants of the TM on CIELO

This Technical Meeting is a follow-up of the evaluation activities undertaken within the OECD/NEA CIELO project (2011-2017), where the IAEA made a large contribution (see IAEA CIELO webpage).
The main purpose of the meeting was to define the scope and goals of the new International Nuclear Data Evaluation Network (INDEN), and coordinate interaction among international evaluators, theoreticians and experimentalists. It has been recognized that the evaluation process and technical interactions have been as important as the evaluated files. The IAEA plans to hold a series of meetings within the new INDEN collaboration.
A priority list for new evaluations has been defined: $^{14,15}N$; ^{9}Be; ^{23}Na; ^{59}Co, ^{58}Ni, $^{238\text{-}242}Pu$. It was recognized that additional work is required on $^{56,57}Fe$; ^{238}U; and ^{239}Pu as issues have been identified in new CIELO evaluations.
A summary report of the meeting is in preparation. Presentations made at the meeting are available at: www-nds.iaea.org/index-meeting-crp/TM_IAEACIELO/.

Consultants' Meeting on Benchmarking New Evaluated Beta-Delayed Neutron Data and Proposing New Group-Constants

13-15 December 2017, Vienna, Austria
Scientific Secretary: Paraskevi Dimitriou
7 participants and IAEA staff

Participants of the CM on Benchmarking New Evaluated Beta-Delayed Neutron Data

The meeting was held to discuss the validation of the new evaluated beta-delayed neutron emission properties (half-lives and emission probabilities) that were produced by the CRP on Development of a Reference Database for Beta-Delayed Neutron Emission. Participants and IAEA staff presented the results of summation calculations for delayed neutron yields using the new CRP data, identified the sources of differences from evaluated libraries and discussed the impact on specific reactor simulations and benchmark systems. The preliminary draft of a purely numerical table containing the new beta-delayed neutron emission data for use in the various applications was agreed and the outline of the macroscopic data section of the final CRP document was completed. The minutes of the meeting as well as presentations are available at: https://www-nds.iaea.org/index-meeting-crp/CM-BEBD2017/.

Technical Meeting on Nuclear Data Processing

4-7 December 2017, Vienna, Austria
Scientific Secretary: Andrej Trkov
18 participants and IAEA staff

Participants of the TM on Nuclear Data Processing

This large technical meeting was a follow-up of the Consultants' Meeting on "New Evaluated Data File Processing Capabilities", held at the IAEA Headquarters in Vienna from 5 to 9 October 2015. Recent progress on codes for the processing of evaluated nuclear data files was presented, including the outlook for future developments. Significant progress was made in the capabilities for generating libraries in ACE format for Monte Carlo calculations. Established codes like NJOY and GRUCON are joined by newly developed systems like ACEMAKER/PREPRO, FUDGE and FRENDY. An exercise on the verification of code capabilities for 'Generating Ace-Formatted Files' (GAFF) was endorsed. Specifications for the exercise were defined. A preliminary study was already initiated including four different codes capable of generating ACE files; additional contributions are expected from other participants.
The details of the presentations and technical discussions, as well as additional actions that were proposed are summarized in the meeting report INDC(NDS)-0748.
The presentations are available from https://www-nds.iaea.org/index-meeting-crp/CM-IDNDE-2017/.

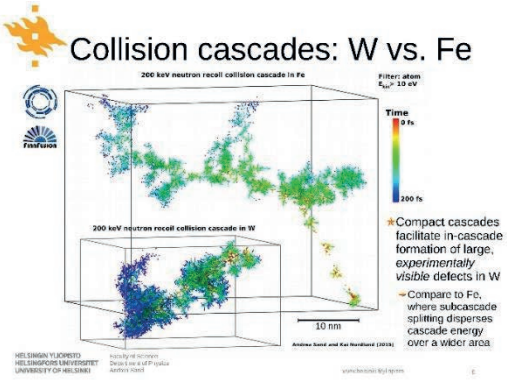
Technical Meeting of the International Atomic and Molecular Code Centre Network on Molecular Dynamics Data of Collisional Cascades after Irradiation

16-17 November 2017, Vienna, Austria
Scientific Secretary: Christian Hill
15 participants and IAEA staff

Participants of the TM of CCN

This meeting was attended by 15 scientists from 13 institutes with the aim of creating a database of collisional cascade molecular dynamics (MD) simulations of the effect of neutron radiation on materials of relevance to nuclear fusion applications. Such simulations provide valuable insight into the evolution, at the atomic scale, of a material after its impingement by a highly-energetic particle. However, the codes used are often not compared, benchmarked or cross-validated. CascadesDB, an online database of collisional cascade simulations is being developed by the University of Helsinki, in cooperation with the Culham Centre for Fusion Energy in the UK, in an activity coordinated and hosted by the NDS at the IAEA.

The CascadesDB database is hoped to form the basis for two crowd-sourcing activities: a competition seeking to find new ways of interpreting the atom position data to reveal larger-scale features, and, in the longer term, a distributed-computing activity inviting many users to further evolve the state of the material through an MD simulation code executed on their own computers. The presentations can be found at https://www-amdis.iaea.org/CCN/Meetings5/.



A.E. Sand and K. Nordlund,
Department of Physics, University of Helsinki, Finland

Consultants' Meeting on Integral Data in Nuclear Data Evaluations

14-17 November 2017, Vienna, Austria
Scientific Secretary: Andrej Trkov
6 participants and IAEA staff

Participants of the CM on Integral Data

The main purpose of the meeting was to discuss the validity and scope of the use of integral data in the process of the assembling evaluated nuclear reaction data files. Integral quantities can usually be measured much more accurately than differential nuclear data, so it is tempting to use such data to tune evaluations to improve integral performance. Integral data imply spectrum-averaged cross sections or cross section ratios, kinetic parameters, leakage spectra, scattered-neutron yields, multiplication factor, etc.

Experience from the analysis of criticality benchmarks indicates that data adjustments on such benchmarks are not unique. Blind application of data adjustment techniques can lead to data files that apparently perform well in selected integral benchmarks, but violate the uncertainties in experimentally measured differential nuclear data. Criteria to define what and how integral information can be used in evaluations were defined.

A document summarizing the recommendations on the use of integral data in the nuclear reaction data evaluation process, including the definition of criteria for acceptability and procedures for compilation of such data was published as INDC(NDS)-0746.

The presentations at the meeting are available from https://www-nds.iaea.org/index-meeting-crp/CM-IDNDE-2017/.

Third Research Coordination Meeting on Primary Radiation Damage Cross Section

23-25 October 2017, Vienna, Austria
Scientific Secretary: Jean-Christophe Sublet
17 participants and IAEA staff

Participants of the RCM on Primary Radiation Damage

The CRP on Primary Radiation Damage Cross Section has been extended for additional year to allow for the final review of the results achieved and how to best report them. Participants emphasized numerical databases for revised standards as a platform to introduce and define new/refined metrics for damage and a CRP document describing the research performed as major outputs. It was decided that the outcomes of the CRP will be reported and published in the joint journal papers.
More information on the CRP as well as presentations from the meeting can be obtained through the website: https://www-nds.iaea.org/CRPdpa/.

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

16-20 October June 2017, Vienna, Austria
Scientific Secretary: Paraskevi Dimitriou
20 participants and IAEA staff

Participants of the RCM on Photonuclear Data Library

All 15 participants and three advisors from 13 countries including IAEA staff attended the meeting to discuss progress in their work. New measurements and evaluations of photoneutron cross sections, uncertainties and model dependence of correction functions for photoneutron multiplicities, as well as updated GDR parameters were presented. Photon strength functions extracted by different techniques were compared and assessed, a new Atlas of strengths from average resonance capture data was presented and all the compiled data were compared against QRPA and empirical SLO/SMLO parameterizations. A preliminary version of the online retrieval interface of the new database was discussed. The list of actions assigned at the first RCM was reviewed and new tasks were assigned in order to achieve the goals of the CRP. A summary of the meeting is given in INDC(NDS)-0745 while the presentations are available at: https://www-nds.iaea.org/CRP-photonuclear/index_2RCM.html.

Second Research Coordination Meeting on Plasma-Wall Interaction with Reduced-Activation Steel Surfaces in Fusion Devices

16-18 October 2017, Vienna, Austria
Scientific Secretary: Christian Hill
9 participants and IAEA staff

Participants of the RCM on Steel Surfaces

Representatives of the seven participating research groups in this small CRP on Plasma-Wall Interaction with Reduced-Activation Steel Surfaces in Fusion Devices met for the second RCM. Various kinds of reduced-activation (RAFM) steel are being considered as the wall material for a fusion reactor, but not enough is known about plasma interaction, erosion and tritium retention in such steels. This CRP brings together experimentalists and theorists involved in studies of plasma and neutron interaction with steels. It will enhance the knowledge base and develop new databases on the interaction of fusion plasma with the reduced-activation steel alloys that are considered for fusion applications. In

addition, it seeks to quantify the erosion in such materials due to plasma exposure and to quantify the retention and transport properties of tritium in the surface.
Participants reported on and reviewed their progress towards the aims of the CRP and outlined their plans for future work. Two further research institutes have expressed an interest in joining the CRP and applications from them are expected to be welcomed soon. Plans for a joint experiment on erosion of RAFM steel were discussed and will be coordinated in a breakout meeting at the PSI conference in Princeton, USA. The results will be discussed at the final RCM of the CRP. The presentations can be found at https://www-amdis.iaea.org/CRP/SteelSurfaces/RCM2/.

Joint ICTP-IAEA Workshop on the Evaluation of Nuclear Reaction Data for Applications

2-13 October 2017, ICTP, Trieste, Italy
Directors: Arjan Koning and Jean-Christophe Sublet (IAEA)
27 participants and IAEA staff

Participants of the Workshop

27 participants from 18 Member States attended the event held at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. The purpose of the school was to provide lectures, computer code training and information exchange for young students and early career nuclear physicists. The course included techniques for basic experimental nuclear data, nuclear structure and reaction models, TALYS, FISPACT-II and NJOY exercises, evaluation procedures and creation and processing of nuclear reaction data libraries for applications.
The lectures and poster presentations are available at http://indico.ictp.it/event/7994/.

Joint ICTP-IAEA Workshop on Monte Carlo Radiation Transport and Associated Data Needs for Medical Applications

18-29 September 2017, ICTP, Trieste, Italy
Directors: Roberto Capote Noy (IAEA)
68 participants and IAEA staff

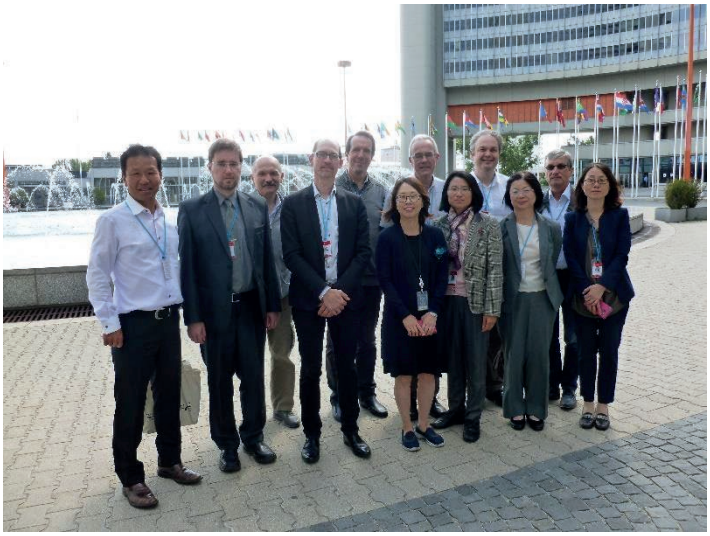
Participants of the Monte Carlo Workshop

The workshop constituted a unique opportunity for participants to gain extensive and up to-date training on the use and understanding of cutting edge techniques for radiation transport in (medical) physics. All main developers of the EGSnrc/BEAMnrc system lectured at the workshop. 59 participants from 35 Member States attended the event held at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. Seven external lecturers made presentations and tutored students at the laboratory sessions. This workshop ranges among the most popular after IAEA/NDS workshops. The IAEA/ICTP fully or partially supported about 25 students from developing countries. The Agenda and List of participants are available at the ICTP webpage at http://indico.ictp.it/event/7992/.

Technical Meeting of the International Atomic and Molecular Data Centre Network (DCN)

4-6 September 2017, Vienna, Austria
Scientific Secretary:
Hyun-Kyung Chung and Christian Hill
14 participants and IAEA staff

The 24th biennial DCN meeting was held in Vienna in September and attended by 12 participants from 11 data centres of seven Member States. Two invited experts, C. Ballance (Queen's University Belfast, UK) and R.O. Barrachina (Comisión Nacional de Energía Atómica, Argentina) represented data centres that are considered as new members of the DCN (to be formally accepted in 2019).



Participants of the TM of DCN

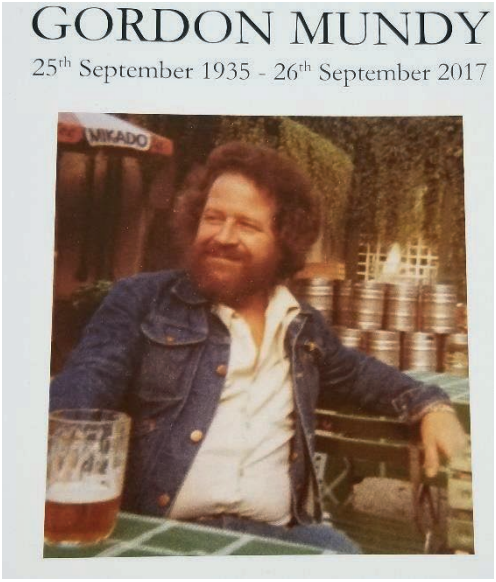
Participants presented reports on their institution's activities and engaged in technical discussions on the exchange, evaluation and curation of atomic and molecular data. Funding and priorities for data development and uncertainty quantification were also considered, and plans were made to improve the quality and reach of the AMD Unit's AMBDAS bibliographic database.

A special thanks is due to Hyun Kyung Chung for the organization of this meeting, her last after eight years in the Atomic and Molecular Data Unit.

The presentations can be found at https://www-amdis.iaea.org/DCN/Presentations/2017/.

In Memoriam

Gordon Mundy



Gordon Mundy passed away peacefully at home with his family around him on 26 September 2017. Gordon was a part of the NDS for many years and worked in Nuclear Data Services Unit as production programmer. He was loved both within the Section and throughout the IAEA at that time. He was a musician, a colleague, a friend, husband and father. He will be greatly missed but never forgotten.

Tsutomu Tamura

Dr. Tsutomu Tamura, a former leader of the ENSDF group in Japan, passed away on 24 October 2017. Dr. Tamura started the evaluation for ENSDF and led the Japan Nuclear Structure and Decay Data Centre since its establishment in 1977. Since then, he published 13 NDS, the last one of which appeared in 2007. He was 87 years old.

Selected Charts, Reports and Documents

Recent Release

APID/EP/1 - Atomic and Plasma-Material Interaction Data for Fusion, 2017

This publication on Atomic and Plasma-Material The present volume of Atomic and Plasma–Material Interaction Data for Fusion presents the results of a coordinated research project (CRP) on Atomic Data for Heavy Element Impurities in Fusion Reactors. In accordance with priorities in fusion energy research, data sets related to heavy element impurities are essential in plasma modelling. For example, such as data on the noble gases argon, krypton, and xenon, on the likely wall material tungsten, and on other possible impurities. Much of the work in this CRP focused on possible impurities such as chlorine, iron and silicon. The publication provides fundamental experimental and calculated data for radiative and collisional atomic processes as well as results of collisional-radiative (CR) models. The data are of interest for the interpretation of spectroscopic measurements on current and future fusion experiments, the modelling of tungsten in fusion plasma, and the design and optimization of fusion reactor experiments.

IAEA-TECDOC-1822 – Development of a Reference Database for Particle Induced Gamma Ray Emission (PIGE) Spectroscopy

Ion beam analysis techniques are non-destructive analytical techniques used to identify the composition and structure of surface layers of materials. The applications of these techniques span environmental control, cultural heritage and conservation, materials and fusion technologies. The particle-induced gamma-ray emission (PIGE) spectroscopy technique in particular, is a powerful tool for detecting light

elements in certain depths of surface layers. This publication describes the coordinated effort to measure and compile cross section data relevant to PIGE analysis and make these data available to the community of practice through a comprehensive online database.

INDC(AUS)-0021 Measurements of Angle-dependent Differential Cross Sections of $^{2}H(t,n)^{4}He$ with Triton Energies from 5.97 to 16.41 MeV, prepared by M. Drosg., September 2017.

INDC(BLG)-0002 Neutron Scattering Cross Section Measurements with a New Scintillator Array, Thesis, Elisa Pirovado, October 2017.

INDC(IND)-0050 Existing and Upcoming Particle Accelerators in India, prepared by B. Lalremruata, *et al.,* November 2017.

INDC(JPN)-0203 Proceedings of the 2016 Symposium on Nuclear Data, 17-18 November 2016, Tsukuba, Ibaraki, Japan, edited by T. Sanami, *et al*., January 2018.

INDC(MGL)-0001 Proceedings of the Eighth AASPP Workshop on Asian Nuclear Reaction Database Development, 11-13 October 2017, Ulaanbaatar, Mongolia, edited by M. Odsuren, G. Khuukhenkhuu, S. Davaa and N. Otuka, January 2018.

INDC(NDS)-0705 Evaluation of $^{23}Na(n,\gamma)^{24}Na$, $^{23}Na(n,2n)^{22}Na$ and $^{27}Al(n,2n)^{26}Al$ Reaction Cross Sections for the IRDFF library, K.I. Zolotarev, August 2017.

INDC(NDS)-0731 Summary Report from the Third Research Coordination Meeting on Testing and Improving the International Reactor Dosimetry and Fusion File (IRDFF), 20-24 March 2017, Vienna, prepared by L.R. Greenwood, M. Kostal, S.P. Simakov and A. Trkov, August 2017.

INDC(NDS)-0733 Summary Report from the Technical Meeting of the Coordination of the International Network of Nuclear Structure and Decay Data Evaluators, 22-26 May 2017, Berkeley, USA, prepared by A.L. Nichols, E.A. McCutchan and P. Dimitriou, November 2017.

INDC(NDS)-0734 Summary Report from the First Research Coordination Meeting on Recommended Input Parameter Library (RIPL) for Fission Cross Section Calculation, 6-9 June 2017, Vienna, prepared by R. Capote and S. Goriely, January 2018.

INDC(NDS)-0735 Summary Report from the Third Research Coordination Meeting on Development of a Reference Database for Beta-Delayed Neutron Emission, 12-16 June 2017, Vienna, prepared by I. Dillmann, P. Dimitriou and B. Singh, November 2017.

INDC(NDS)-0737 Summary Report from the Consultants' Meeting on R-Matrix Codes for Charged-Particle Induced Reactions in the Resolved Resonance Region (3), 28-30 June 2017, prepared by H. Leeb, P. Dimitriou and I. Thompson, September 2017.

INDC(NDS)-0738 Atlas of Average Resonance Capture Data (Starter File), prepared by J. Kopecky, August 2017.

INDC(NDS)-0741 Re-evaluation of the $^{238}U(n,2n)^{237}U$ Reaction Excitation Function from Threshold to 30 MeV, prepared by K.I. Zolotarev, August 2017.

INDC(NDS)-0742 Analysis of the U-238 Livermore Pulsed Sphere Experiments Benchmark Evaluations, prepared by T. Goricanec, A. Trkov and R. Capote Noy, November 2017.

INDC(NDS)-0743 Summary Report from the First Research Coordination Meeting on Data for Atomic Processes of Neutral Beams in Fusion Plasma, 19-21 June 2017, Vienna, prepared by H.K. Chung, September 2017.

INDC(NDS)-0744 Summary Report from the Third Research Coordination Meeting on Plasma-Wall Interaction for Irradiated Tungsten and Tungsten Alloys in Fusion Devices, 27-30 June 2017, Vienna, prepared by H.K. Chung, *et al*., September 2017.

INDC(NDS)-0745 Summary Report from the Second Research Coordination Meeting on Updating Photonuclear Data Library and Generating a Reference Database for Photon Strength Functions, 16-20 October 2017, Vienna, prepared by S. Goriely, M. Wiedeking and P. Dimitriou, January 2018.

INDC(NDS)-0746 Summary Report from the Consultants' Meeting on Integral Data in Nuclear Data Evaluation, 14-17 November 2017, Vienna, prepared by V. Radulovic and A. Trkov, January 2018.

INDC(NDS)-0748 Summary Report from the Technical Meeting on Nuclear Data Processing, 4-7 December 2017, Vienna, prepared by W. Haeck and A. Trkov, January 2018.

INDC(NDS)-0749 Summary Report from the Workshop on Compilation of Experimental Nuclear Reaction Data for EXFOR Database, 24-28 October 2016, Vienna, edited by V. Semkova and A. Bhattacharyya, January 2018.

INDC(NDS)-0750 Some Algorithms for Evaluating Nuclear Data and Generating Uncertainty Covariance Matrices, English translation from Voprosy Atomnoi Nauki i Tekhniki, Ser.: Yadernye konstanty 1-2 (2007) 56, E.V. Gai, January 2018.

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, 9th edition (2015).*

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).*

Karlsruher Nuklidkarte *Wall chart of the nuclides, 7th edition (2006).*

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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 **Christian Hill** who joined the Nuclear Data Section as the Head of the Atomic and Molecular Data Unit as of 1 October 2017. Christian works on development and maintenance of databases of atomic and molecular properties and processes for fusion research, including plasma-material interactions. He is also responsible for A+M Data Unit publications and websites, and coordinates meetings and research effort in atomic and molecular physics related to nuclear fusion. Research interests include high-temperature spectroscopy and the development of standards and database schemas for the description of physical processes.

Christian spent the last eight years at University College London, UK, where he was a lead developer for the Virtual Atomic and Molecular Data Centre (VAMDC) a large EU-funded project which connected a network of atomic and molecular databases through a common set of data standards. He was also a member of the ExoMol project, producing ab initio high-temperature molecular line lists for astrophysical applications and spent a sabbatical year at the Harvard-Smithsonian Center for Astrophysics developing database infrastructure for the HITRAN molecular spectroscopy database.

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:
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92100 Boulogne-Billancourt, 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:
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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.
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Email: varlamov@depni.sinp.msu.ru; Worldwide Web: http://cdfe.sinp.msu.ru/; contact: V.V. Varlamov.

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Tel. +1 865-574-6176; Fax +1 865-241-4046;
Email: pdc@ornl.gov

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Email: is Alice.DUFRESNE@oecd.org; contact: A. Dufresne, ext. 1008.

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