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Nuclear Data Newsletter

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Contents

From the Section Head

The Nuclear Reaction Data Centre (NRDC) meeting was held June in Beijing. The meeting principally revolves around the EXFOR database of experimental nuclear reaction data. For me, as a career-long EXFOR user, it was great to meet the people who are actually responsible for its maintenance and extension. The turnaround time between publication of experimental results and adoption of the numerical data in EXFOR is still decreasing thanks to smarter compilation methods.

The new Coordinated Research Project (CRP) on photon strength functions and photonuclear data started off with the meeting in April. For various reasons, the photonuclear data has always been a specialty in the Czech Republic and Slovakia, and it was very gratifying to see two "walking encyclopedia" of photon strength functions and photonuclear data present at the meeting, Pavel Oblozinsky and Jura Kopecky, giving the younger participants advice on how things work in this field.

The recent surge of interest in fission yield data was clearly visible at a Technical Meeting on the subject. Especially the combination of fission yield data and uncertainty quantification draws a lot of attention nowadays and this will be reflected in future activities of the IAEA in this field.

With modern, complete nuclear data libraries and processing codes it is now possible to predict Displacements Per Atom (DPA) and other quantities such as Primary Knock-on Atoms (PKA) spectra for radiation damage calculations, including uncertainty quantification. A special Technical Meeting (TM) was held for this, and our ex-colleague Stanislav Simakov assisted us through the meeting, which turned it into as success.

The first half year of 2016 was capped with the International Nuclear Data Committee (INDC) meeting. The INDC comes together to advise on our programme and to discuss whether we are on the right track. It was an enlightening meeting, which gave rise to many new ideas for the coming years. We will do our best to make that all visible on our website, and provide even more complete databases and data libraries.

At the end of this newsletter, you will find a few obituaries. One of them is for the former NDS Section Head Charlie Dunford. He taught me a lot about the essence of nuclear data libraries, and I will never forget his experience, determination, and humour. His impact on the international nuclear data world was large, and he will be missed.

Arjan Koning- Summer at the IAEA

Computer Codes and Data Libraries – News

Medical Portal

The Medical Portal provides a unified view of all nuclear data relevant for medical applications, databases, documents, libraries and ongoing CRP projects. Besides all the relevant documents from CRPs and technical meetings, data from evaluated reactions and the relevant decay data are accessible and constantly updated as new evaluations are submitted.

The graphical interface visualises all the reaction paths linking target and product (red lines correspond to charged particle, white - to neutron induced reactions), and evaluated data are visualised by clicking on a link or a nuclide. The portal can be accessed at https://www-nds.iaea.org/medportal/.

STANDARDS

The neutron cross section standards are used in measurement and evaluation of all other neutron reaction cross sections. The neutron fission cross sections were evaluated for ^{209}Bi and ^{nat}Pb and extended for ^{235}U, ^{238}U and ^{239}Pu up to 1 GeV. They were added to existing Standards as reference cross sections in June 2015: https://www-nds.iaea.org/standards/ .

SAFEGUARDS DATA

A set of recommended nuclear data for safeguards applications was assembled in January 2007. Responding to the requests from the IAEA Safeguards Department, the neutron yields from reactor fuels (U and Pu oxides) and from spontaneous fission of actinides (Th, U, Np, Pu, Am, Cm Bk and Cf) were assessed between March and October 2015 employing the latest evaluated decay and (α,xn) cross section data. New quantities are available from Safeguards Data portal https://www-nds.iaea.org/sgnucdat/.

DXS

This database provides atom displacement (NRT- and a thermal recombination-corrected-dpa) and gas production cross sections by neutrons and protons in the ENDF-6 format: https://www-nds.iaea.org/public/download-endf/DXS/. The database was updated in August 2015 with new data for Eurofer and SS-316 steels and Titanium.

STAYSL PNNL

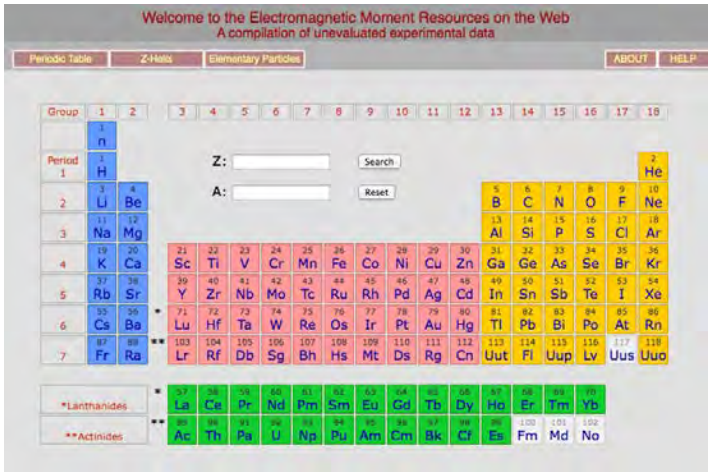
The software determines the neutron spectrum from measured activation rates: https://www-nds.iaea.org/irdf2002/codes/index.htmlx . The new version from August 2015 is based on the neutron cross sections in IRDFF V1.05 and extends to 60 MeV. It has passed the software verification and validation procedures.

Atomic Mass Data Center

The web page https://www-nds.iaea.org/amdc/ contains evaluated and experimental masses of atoms including covariances, and their ground and decay properties. The update from May 2015 included the latest available numerical data and reference publications. NDS acknowledges the Atomic Mass Data Center from Institute of Modern Physics of the Chinese Academy of Sciences for provision of data.

Nuclear Moments Database

An online database of magnetic dipole and electric quadrupole nuclear moments is available from the NDS server. The database comprises data found in print compilations (INDC(NDS)-0650,-0658), peer-reviewed journals and conference proceedings. The user can click on a built-in periodic table to choose an element and then the isotope of interest. Alternatively, the user can type in the atomic (Z) or mass (A) number in input form. The data are displayed in a concise tabulated form. Bibliographical information has been linked to the sources, i.e. the Nuclear Science References (NSR) key numbers are linked to the NSR database, and, in addition, Digital Object identifiers (DOI) have been added to all the publications featuring one. Further developments will include enhancement of retrieval capabilities and plotting tools. The database is available on Nuclear Moments and through LiveChart.

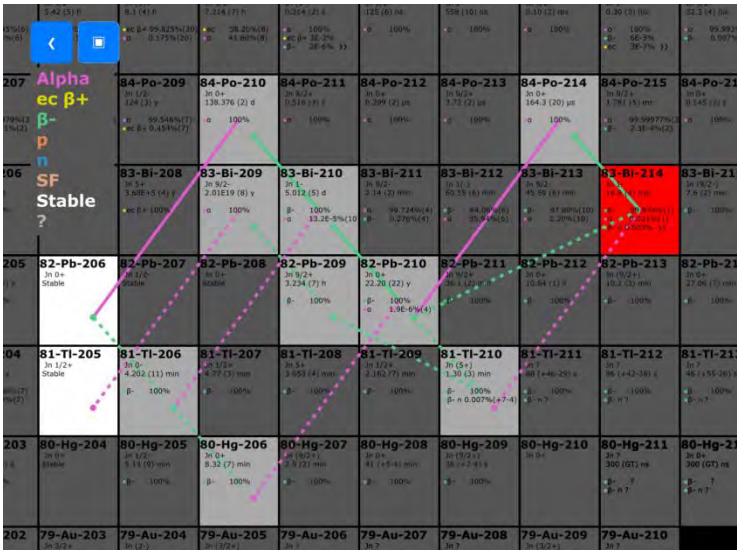


GRUCON – evaluated data processing package

(V.V. Sinitsa, NRC "Kurchatov Institute", Moscow, Russia)

This package (IPPE-NRCKI, 1980-2016) 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. The package has an original architecture and command language (see INDC-CCP-344). The package can be downloaded from our webpage: https://www-nds.iaea.org/grucon/.

Decay Chains on the Isotope Browser



The app for Android and Apple mobile devices – phones, tablets, and Kindle – has been updated with a 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 of the International Nuclear Data Committee (INDC)

27-30 June 2016, Vienna, Austria
Scientific Secretary: Arjan Koning
15 participants and IAEA staff

Participants of the TM of INDC

Every two years, the International Nuclear Data Committee meets in Vienna to advise the Nuclear Data Section on their programme. After one and a half day of presentations by staff from NDS, delegates of 16 Member States discussed our work for the remaining two days of the meeting. This resulted in a list of recommendations for NDS to use as guidelines in the coming two years. Some new ideas for CRPs on medical isotope production and nuclear data related to the CIELO project were endorsed, as well as further modernization of our methods for data dissemination.

Third Research Coordination Meeting on Data for Erosion and Tritium Retention in Beryllium Plasma-facing Materials

15-17 June 2016, Vienna, Austria
Scientific Secretary: Bastiaan Braams
7 participants and IAEA staff

Beryllium is planned to be used as the main wall material (away from the regions of highest heat load) on ITER and since 2011 it is used on the JET experiment too. For any plasma-facing material there are two key classes of plasma-material interaction processes: erosion, which limits the lifetime and which brings impurities into the plasma, and

hydrogen (tritium) retention, which removes tritium from the reactor. This CRP is reviewing and synthesizing data on these processes for beryllium surfaces. The summary report INDC(NDS)-0720 is in preparation. Presentations are available from the meeting web page under http://www-amdis.iaea.org/CRP/.

Participants of the RCM on Data for Erosion and Tritium Retention in Beryllium Plasma-facing Materials

Technical Meeting on Nuclear Reaction Data and Uncertainties for Radiation Damage

13-16 June 2016, Vienna, Austria
Scientific Secretary: Arjan Koning
16 participants and IAEA staff

This Meeting was organized to implement the Recommendation of RCM-2 of the IAEA CRP "Primary Radiation Damage Cross Sections" (see Report INDC(NDS)-0691) to analyse the accuracy and consistency of the reactions recoils energy spectra in the major evaluations with eventual goal to establish the most reliable data and provide quantitative uncertainty estimates.
Participants of TM have considered the status of recoils spectra in the latest releases of ENDF, JEFF, JENDL, FENDL, ROSFOND and TENDL, the ways of deriving the damage quantities such as KERMA, NRT/arc-dpa and gas production as well as the receipts for assessment of their uncertainties. Propagation of uncertainties of underlying nuclear data and radiation defects simulation to the dpa- and gas-rates in the representative nuclear facilities were also considered.
The TM objectives, agenda, individual presentations are collected on the Meeting web-page: https://www-nds.iaea.org/CRPdpa/TM-2016.htm. The detailed technical information and elaborated Summaries and Actions will be available as TM Summary Report INDC(NDS)-0719 (in preparation).

Participants of the TM on Nuclear Reaction Data and Uncertainties for Radiation Damage

Technical Meeting of the International Network of Nuclear Reaction Data Centres (NRDC)

7-10 June 2016, Beijing, China
Scientific Secretary: Naohiko Otsuka
21 participants and IAEA staff

Participants of the TM of NRDC

Thirteen cooperating data centres from China, Hungary, India, Japan, Korea, Russia, Ukraine, USA, OECD NEA and IAEA were represented at the meeting. Main topics of the present meeting were the EXFOR transmission statistics, EXFOR coverage and quality control, revision of coding rules and manuals, EXFOR/CINDA dictionaries as well as improved tools for compilation and dissemination. The needs of experimental data for various applications (*e.g.*, thermal neutron constants for standard evaluation, thermal neutron scattering data) were discussed. It was decided that the isomeric state assignment (*e.g.*, ground state or metastable state) will be done according to the latest nuclear decay and structure data knowledge rather than the knowledge when the source article was published. For example, the 4.9 hr state of ^{110}In was treated as a metastable state in some old articles, but it will be treated as the ground state even in EXFOR entries prepared from

the old articles). Naohiko Otsuka reported that the n_TOF Collaboration significantly improved data dissemination since June 2015 and submitted new valuable time-of-flight data from the CERN n_TOF facility. This was highly acknowledged by the participants, especially those managing neutron-induced reaction data libraries. A summary report of the meeting is available as INDC(NDS)-0718. All progress reports, working papers and slides are available on the meeting web page.

Third Research Coordination Meeting on Medical Applications

30 May-3 June 2016, Vienna, Austria
Scientific Secretary: Roberto Capote Noy
13 participants and IAEA staff

Participants of the RCM on Medical Applications

The 3rd RCM was convened to review and summarize on-going CRP activities, and define a detailed roadmap toward technical publications of the CRP results. Participants reviewed their commitments and progress with respect to specific cross-section and decay data agreed at the previous RCM. Debate focused on more than 100 pathways studied for production cross-section studies and charged-particle monitor reactions for a reasonably wide range of targets and projectiles, along with the relevant recommended decay data for specific radionuclides. Individual presentations and discussions will be described in the summary report of the meeting in preparation (INDC(NDS)-0717), along with tables summarizing the current status and planned outputs of individual work programmes. Presentations given at the meeting are available (see 3rd RCM CHARPAR).

Consultants' Meeting on Current Status and Open Issues of the U-235 Evaluation

24-27 May 2016, Vienna, Austria
Scientific Secretary: Andrej Trkov
7 participants and IAEA staff

Participants of the CM on Current Status and Open Issues of the U-235 Evaluation

The CIELO Project is an international collaboration aimed at improving the evaluated nuclear data files for the primary materials in nuclear reactor technology, namely ^{235}U, ^{238}U, ^{239}Pu, ^{16}O, ^{1}H and Fe-isotopes. ^{235}U and ^{239}Pu are the primary fissile materials in the fuel. Although the major evaluated nuclear data libraries individually perform reasonably well in criticality benchmarks, the performance is poor if a fissile material from one library is used with another library. This is an indication that good performance is achieved largely by error compensation.

Previous technical work and IAEA CM's have identified issues in the resonance region of ^{235}U, e.g., lack of fluctuations in the evaluated average number of neutrons per fission below 100 eV, disagreement of the integral of fission resonances with measured and evaluated data, discrepancies in the thermal constants calculated with and without considering integral data, etc.

A number of well-justified changes to the ^{235}U data were recommended recently, like the prompt-fission neutron spectra, fission cross section evaluation for Standards, etc. There are challenges to adopt these recommendations because many of them have significant impact on the reactor benchmarks.

The overall changes needed in the current ^{235}U evaluations were discussed, particularly in the resonance region, such that the overall good performance in integral benchmarks of the current libraries would be preserved. The meeting participants included the experimentalists from the Los Alamos National Laboratory and the n_TOF Collaboration, nuclear data evaluators, Members of the Standards Committee and specialists in benchmarking and data validation. The Meeting was attended by seven invited

participants, in addition to the IAEA Staff members. The summary report from the Meeting is in preparation.

Technical Meeting on Improving Fission Yield Data for Actinides

23-26 May 2016, Vienna, Austria
Scientific Secretary: Paraskevi Dimitriou
21 participants and IAEA staff

This TM was held to discuss the status of fission product yields and perspectives. Participants reviewed the progress in experimental techniques and achievements in terms of resolution and accuracy of Fission Yield data. They addressed developments in theoretical approaches and enhancement of predictive power of empirical models. They assessed the status of evaluated Fission Yield data in existing libraries, and discussed developments in evaluation methods including covariances. Finally, they recognized the need for a concerted and coordinated effort to address all the outstanding issues regarding Fission Product Yields and recommended that the IAEA takes appropriate action. The summary report INDC(NDS)-0713 is in preparation. Presentations and relevant material are available at the meeting web page at https://www-nds.iaea.org/index-meeting-crp/TM-Fission-Yields/.

Participants of the TM on Improving Fission Yields Data for Actinides

Technical Meeting of the International Fusion Research Council Subcommittee on Atomic and Molecular Data for Fusion

25-26 April 2016, Vienna, Austria
Scientific Secretary: Bastiaan Braams
14 participants and IAEA staff

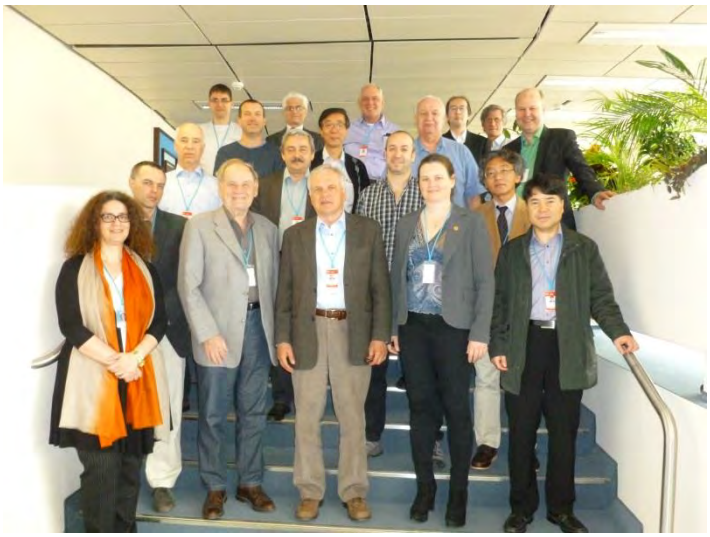
The IFRC Subcommittee on A+M Data meets every two years to review the activities of the Atomic and Molecular Data Unit and to recommend policies and programme priorities for this Agency activity. The Subcommittee also helps the A+M Data Unit and the International A+M Data Centres Network to maintain strong links with the international fusion programme. Topics of special interest at the meeting this year were Unit activities on uncertainty assessment and benchmark experiments for atomic data and possible coordinated research activities on neutral beam processes, liquid metal surfaces and vapour shielding. The summary report INDC(NDS)-0721 is in preparation and further information can be found under http://www-amdis.iaea.org/IFRC/

Participants of the TM the International Fusion Research Council Subcommittee on Atomic and Molecular Data for Fusion

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

4-8 April 2016, Vienna, Austria
Scientific Secretary: Dimitriou Paraskevi
16 participants and IAEA staff

All the groups participating in the CRP were represented at the meeting, and their work plans were presented and discussed. The technical discussions were split into two parts: the updating of the Photonuclear Data Library, and the new database for Photon Strength Functions. Participants reviewed the scope of the CRP, which covers i) measurements, ii) compilation and evaluation, iii) assessments, and iv) theoretical modelling for both parts mentioned above, and agreed on additional tasks that need to be carried out in order to achieve the goals of the CRP. Additional assignments with responsible persons and deadlines were assigned. All details are included in the summary report INDC(NDS)-0712 in preparation. The CRP web site can be found at http://www-nds.iaea.org/CRP_photonuclear/.



Participants of the RCM on Updating the Photonuclear Data Library and Generating Reference Database for Photon Strength Functions

Consultants' Meeting on Data Evaluation for Heavy Particle Collision Processes

17-18 March 2016, Vienna, Austria
Scientific Secretary: Hyun Kyun Chung
7 participants and IAEA staff

Participants of the CM on Data Evaluation for Heavy Particle Collision Processes

This Consultancy Meeting was held in order to advise about appropriate activities for the A+M Data Unit in the area of atomic data for neutral beams in fusion plasma. The outcome was a recommendation to initiate a CRP on Data for Atomic Processes of Neutral Beams in Fusion Plasma with the objective to provide evaluated and recommended data for the principal atomic processes relevant to heating and diagnostic neutral beams of hydrogen and its isotopes in fusion plasmas. Summary report INDC(NDS)-0714 is available. The agenda and presentation materials are available from: https://www-amdis.iaea.org/meetings/Heavy2016/.

Third Research Coordination Meeting on Atomic and Molecular Data for State-resolved Modelling of Hydrogen and Helium and Their Isotopes in Fusion Plasma

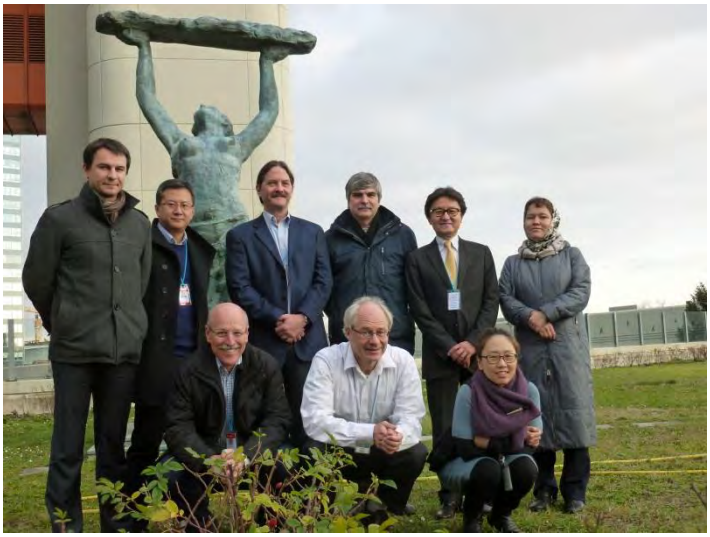
14-16 March 2016, Vienna, Austria
Scientific Secretary: Bastiaan Braams
12 participants and IAEA staff

The objective of the CRP on hydrogen and helium was to recommend an isotopically complete dataset for processes of hydrogen and helium in the low-temperature region of fusion plasma devices, where molecular processes are important. In the end the CRP provided valuable data for processes of hydrogen molecules and less so for processes involving helium too. The summary report INDC(NDS)-0723 is in preparation and further information is available at http://www-amdis.iaea.org/CRP/.

Participants of the RCM on Atomic and Molecular Data for State-resolved Modelling of Hydrogen and Helium and Their Isotopes in Fusion Plasma

First Research Coordination Meeting on Plasma-wall Interaction with Reduced-Activation Steel Surfaces in Fusion Devices

9-11 December 2015, Vienna, Austria
Scientific Secretary: Bastiaan Braams
8 participants and IAEA staff



Participants of the RCM on Plasma-wall Interaction with Reduced-Activation Steel Surfaces in Fusion Devices

The Steel Surfaces CRP is concerned with erosion, tritium deposition and tritium migration processes involving fusion relevant (reduced activation) steel surfaces. The plasma-wall interaction processes include sputtering by H and He and plasma impurities, trapping of hydrogen (H, D, T) in surfaces exposed to plasma, transport of hydrogen in the steel and means to extract trapped tritium. At the First meeting of this CRP plans were made for coordinated experiments and modelling. The summary report INDC(NDS)-0715 is in preparation and further information may be found under http://www-amdis.iaea.org/CRP.

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

7-9 December 2015, Vienna, Austria
Scientific Secretary: Paraskevi Dimitriou
4 participants and IAEA staff

The meeting discussed the capabilities and specific features of six different R-matrix codes, namely, SAMMY, AZURE2, FRESCO, AMUR, EDA, and HYRMA, that are currently used to perform R-matrix fits of charged-particle-induced reactions in the resolved resonance region. Participants agreed that a necessary condition to perform useful comparisons of R-matrix calculations was the interchangeability/translatability of R-matrix input and output parameters between the various codes. The development of a code to convert R-matrix fits between several formats, including ENDF, GND, and the various formats used for the input and output of the above-mentioned R-matrix codes was recommended. Once the translatability between the different codes is established, and the inter-comparison of the codes is completed, participants agreed to work together on the evaluation of the 28Si compound system. In the meantime, efforts will be made to make existing evaluations of charged-particle reactions in the resolved resonance region available to the user community. For purposes of preserving the expertise in R-matrix analyses participants recommended the organization of dedicated training workshops. The meeting web page is available at https://www-nds.iaea.org/index-meeting-crp/CM-R-matrix/.

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

In Memoriam

Koichi Okamoto

Koichi Okamoto passed away on 22 April 2016 in Tokyo at the age of 86. After his carrier at JAERI (Tokai, 1956-1974), IFA (Kjeller, 1956-1958) and CCDN (Saclay, now a part of the NEA Data Bank, 1970-1974), he worked at NDS from October 1974 to December 1989. Koichi was a successful organizer of CRP's. Especially he extended NDS's programme to nuclear and atomic data for medical application. His most well-known project was a "Handbook on Nuclear Activation Cross-Sections" in 1974 which was for many years a bestseller of the Agency. Koichi contributed much to incorporate the JAERI Nuclear Data Center (Tokai) and Japan Charged-Particle Nuclear Reaction Data Group (Sapporo) into the international network. He was also an expert of target and sample properties, and organized some relevant meetings. After his retirement he gave physics lectures to non-physics auditors in some universities in Tokyo for many years. Koichi was known not only for his dedication to his work and his enthusiasm for the mission of the Section, but also for his sense of humor and his interest in Austrian castles. He contributed much to the excellent friendly spirit in the Section and to social events. He invited the Section once a year to a party in his home with shrimps directly imported from Japan. Koichi leaves behind his wife Sanae and three children.

Charlie Dunford

Charlie peacefully passed away on 26 April 2016. He contributed essentially, that the US ENDF/B evaluated data libraries were released to the international community, that the ENDF/B format was adopted as an international format, and that the data could continue to be distributed cost free. He was a connoisseur in wine and liked the "Trockenbeerenauslese" from Gumpoldskirchen. He leaves behind his wife Eva, who had been a NDS staff member, and two children.

Helmut Paul

On December 21, 2015, Helmut Paul, professor emeritus at Johannes Kepler University of Linz (JKU), former head of the Institute of Experimental Physics there, passed away peacefully at the age of 86 years.

Helmut was born in 1929 in Vienna, Austria. He studied physics and mathematics at the University of Vienna and at the Purdue University in Lafayette, USA, where he received his Master and his PhD (1954), with a thesis on nuclear physics. Before becoming professor at the University of Linz, Helmut worked at the Institute for Radium Research, Vienna and at the nuclear research center in Seibersdorf near Vienna. In 1971, Helmut accepted a call to the young University of Social Sciences, Economics and Business in Linz (from 1975: Johannes Kepler University of Linz) for the newly established chair of Experimental Physics.

All his life, Helmut contributed scientifically to his fields of interest and was co-author of several reports of the International Commission on Radiation Units and Measurements (ICRU) and of a report of the International Atomic Energy Agency. To the broader community, Helmut is known for his collection of all published stopping power data for ions in matter, with many graphical displays, which he made accessible to all members of the community via the internet, and he kept it updated till his death. In 2015 he transferred his stopping power database to IAEA NDS. We are grateful for Helmut's contributions to our community and we will miss him!

Announcements

Forthcoming Events

Joint ICTP-IAEA Workshop on Nuclear Structure and Decay Data: Experiment, Theory and Evaluation
22 August – 2 September 2016, Miramare-Trieste, Italy

The aim of this workshop is to introduce both young and established nuclear scientists to the evaluation of nuclear structure and decay data, by providing them with basic training in the evaluation methodologies, procedures and formats that are involved in the assembly and maintenance of the Evaluated Nuclear Structure Data File (ENSDF). This workshop belongs to a series of well-defined ICTP workshops that have been crucial for attracting young nuclear scientists to nuclear structure and decay data evaluation and for providing them with the basic tools to pursue this activity. Detailed information is available at http://indico.ictp.it/event/7641/.

International Conference on Nuclear Science and Technology - ND2016, 11-16 September 2016, Bruges, Belgium - ND2016 is the primary conference for the advancement of nuclear data in the interest of both science and technology. It addresses all important active fields of investigation: fundamental nuclear physics, astrophysics, nuclear energy, nuclear medicine, nuclear non-proliferation, safeguards and arms control. The IAEA has awarded a limited number of grants to participants from Member States eligible to receive technical assistance under the IAEA's technical cooperation programme.

Selected Charts, Reports and Documents

Recent Release

IAEA-TECDOC-1780 – Development of a Reference Database for Ion Beam Analysis

Ion Beam analysis techniques are non-destructive analytical techniques used to identify the composition and provide elemental depth profiles in surface layers of materials. The applications of such techniques are diverse and include environmental control, cultural heritage and conservation and fusion technologies. Their reliability and accuracy depends strongly on our knowledge of the nuclear reaction cross sections, and this publication describes the coordinated effort to measure, compile and evaluate cross section data relevant to these techniques and make these data available to the user community through a comprehensive online database. It includes detailed assessments of experimental cross sections as well as attempts to benchmark these data against appropriate integral measurements. It is available on-line from https://www-nds.iaea.org/publications/tecdocs/iaea-tecdoc-1780/.

IAEA-NDS-222 Development of Java GAMUT (JGAMUT) – Adopted Levels, Gammas Evaluator Assistant Code, prepared by M. Birch, January 2016.

INDC(CCP)-0460 Neutron Activation Cross Sections Measured at KRI in Neutron Energy Region 13.4-14.9 MeV, prepared by A.A. Filatenkov, March 2016.

INDC(CZR)-0002 Validation of ^{59}Co and ^{93}Nb Activation Cross Sections in a Quasi-Mono Energetic Neutron Spectrum (<35MeV) Including Irradiation, Measurement and Computational Analysis, prepared by M. Majerle, *et al.*, April 2016.

INDC(JPN)-0200 Proceedings of the Sixth Workshop on Asian Nuclear Reaction Database Development, 15-17

September 2015, Sapporo, Japan, edited by A. Sarsembayeva, *et al*., January 2016.

INDC(JPN)-0201 Proceedings of the 2014 Symposium on Nuclear Data, 27-28 November 2015, Sapporo, Japan, edited by M. Aikawa, *et al*., March 2016.

INDC(NDS)-0690 Summary Report from the Technical Meeting on Benchmarking Experiments for Ion Beam Analysis, 26-29 May 2015, Vienna, prepared by M. Chiari and P. Dimitriou, May 2016.

INDC(NDS)-0691 Summary Report from the Second Research Coordination Meeting on Primary Radiation Damage, 29 June-2 July 2015, Vienna, prepared by R.E. Stoller, *et al*., December 2015.

INDC(NDS)-0695 Summary Report from Consultants' Meeting on The New Evaluated Nuclear Data File Processing Capabilities, 5-9 October 2015, prepared by D. Brown and A. Trkov, March 2015.

INDC(NDS)-0696 Summary Report from the Second Technical Meeting on Improvement of Analysis Codes for NSDD Evaluations, 5-8 October 2015, prepared by P. Dimitriou and T. Kibedi, November 2015.

INDC(NDS)-0697 Summary Report of the Consultants' Meeting on Compilation of Thermal Neutron Scattering Data for Experimental Nuclear Reaction Data Library (EXFOR), 2-4 November 2015,prepared by J.I. Marquez Damian and V. Semkova, April 2016.

INDC(NDS)-0698 Summary Report from the Consultants' Meeting on Uncertainty Assessment for Atomic and Molecular Data, 22-23 June 2015, prepared by H.K. Chung and B.J. Braams, October 2015.

INDC(NDS)-0699 Summary Report from the Consultants' Meeting on Evaluation and Uncertainty Assessment for Be, C and Ne Atomic Data, 13-15 July 2015, prepared by H.K. Chung, October 2015.

INDC(NDS)-0701 An alternative approach to creating ACE data files for use in Monte Carlo Codes, prepared by A. Trkov and R. Cullen, December 2015.

INDC(NDS)-0702 Update of RIPL Nuclear Levels Segment, prepared by M. Verpelli and R. Capote Noy, December 2015.

INDC(NDS)-0703 Summary Report from the Consultants' Meeting on R-Matrix Codes for Charged-particle Induced Reactions in the Resolved Resonance Region, 7-9 December 2015, prepared by P. Dimitriou, *et al*., March 2016.

INDC(NDS)-0704 Development ofa Dedicated Online database for Nuclear Moments Data, prepared by T.J. Mertzimekis, June 2016.

INDC(NDS)-0707 Summary Report from 23rd Technical Meeting on Technical Aspects of Atomic and Molecular Data Processing and Exchange, 2-4 November 2015, prepared by H.-K. Chung, February 2016.

INDC(NDS)-0708 Summary Report from a Joint IAEA-KAERI Consultants' Meeting on Recommended Data for Atomic Processes of Tungsten Ions, 14-16 September 2015, prepared by H.-K. Chung, February 2016.

INDC(NDS)-0709 A Study of UMC in One Dimension, prepared by D. Smith, D. Neudecker and R. Capote Noy, March 2016.

INDC(NDS)-0710 Summary Report from the 4th Biennial Technical Meeting of International Atomic and Molecular Code Centre Network on Simulation of Plasma-Material Interaction Experiments, 29-31 July 2015, prepared by H.-K. Chung, *et al*., March 2016.

INDC(NDS)-0711 URR-Pack: Calculating Self-Shielding in the Unresolved Resonance Energy Range, prepared by D.E. Cullen and A. Trkov, June 2016.

INDC(NDS)-0714 Summary Report from the Consultants' Meeting on Data Evaluation for Heavy Particle Collision Processes, 17-18 March 2016, prepared by H.-K. Chung and B.J. Braams, April 2016.

INDC(NDS)-0725 Report of the IAEA Nuclear Data Section to the International Nuclear Data Committee for the period January 2014 – December 2015 2016, prepared by A.J. Koning and R. Capote Noy, July 2016

NEW RELEASE:

Chart of the Nuclides 2014 JAEA Nuclear Data Centre.

Karlsruher Nuklidkarte *Wall chart of the nuclides and folding chart with booklet, 9th edition (2015).*

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.**

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