International Atomic Energy Agency

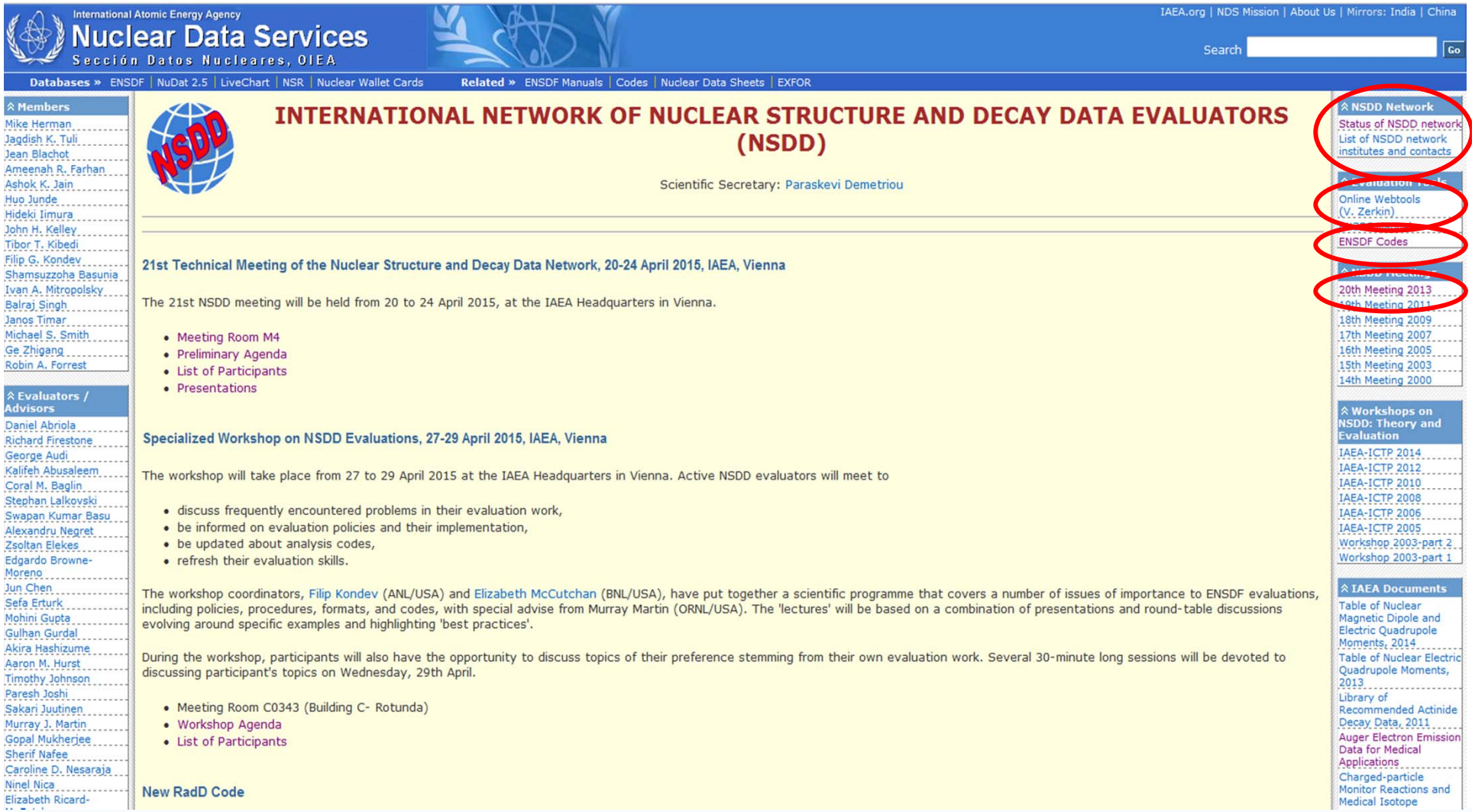
IAEA-Nuclear Data Section Status Report

NSDD Scientific Secretary:
Paraskevi (Vivian) Dimitriou: April 2013 - present

2013-2015

NSDD Network Coordination	• NSDD Website http://www-nds.iaea.org/nsdd/ • Contracts for Mass-chain and Horizontal Evaluations • European NSDD Effort *(Balabanski)* • NSDD Meetings
Training	• Joint ICTP-IAEA Workshop on NSDD: Theory and Evaluation, 24-28 March 2014 (Trieste) • *NEW:* Specialized Workshop on NSDD Evaluation, 27-29 April 2015
CRPs	• Reference Database for Beta-Delayed Neutron Emission • Charged-Particle Monitor Reactions and Medical Isotope Production *(Roberto Capote Noy)* • International Reactor Dosimetry File (IRDFF) *(Stanislav Simakov)*
Codes	• Improvement of Analysis Codes for NSDD evaluations (Project began in 2014) • MyENSDF We Tool *(Zerkin)*
Meetings	• Workshop on Improved Decay Data, 2013, Antwerp • 2nd North-America Workshop on Beta-Delayed Neutron Emission, 2013 (Skype) • 4th Oslo Workshop on Level densities and Strength Functions, 2013, Oslo • USNDP/CSEWG 2013, BNL • NS 2014, Vancouver BC • CGS15, Dresden, 2014 • 5th DDEP Workshop, Bucharest 2014 • USNDP, BNL, 2014
Dissemination	• LiveChart *(Verpelli)* • Isotope Browser Android & iOS Application *(Verpelli)*

NSDD website: www-nds.iaea.org/nsdd/



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Databases » ENSDF | NuDat 2.5 | LiveChart | NSR | Nuclear Wallet Cards Related » ENSDF Manuals | Codes | Nuclear Data Sheets | EXFOR

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- Ameenah R. Farhan
- Ashok K. Jain
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INTERNATIONAL NETWORK OF NUCLEAR STRUCTURE AND DECAY DATA EVALUATORS (NSDD)

Scientific Secretary: P. Demetriou

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20th Meeting of the NSDD Network

The 20th IAEA meeting of the NSDD network was hosted by the Kuwait Foundation for the Advancement of Sciences (KFAS) and Physics Department-Kuwait University, in Kuwait, from 27-31 January 2013.

We gratefully acknowledge KFAS generous contribution towards the expenses of the meeting and the warm hospitality of the hosts during the meeting.

Adopted Agenda Participants Presentations Photos Actions

Summary Report - INDC (NDS)-0635

NSDD Network
- Status of NSDD network
- List of NSDD network institutes and contacts

Evaluation Tools
- Online Webtools (V. Zerkin)
- ENSDF Manuals
- ENSDF Codes

NSDD Meetings
- 20th Meeting 2013
- 19th Meeting 2011
- 18th Meeting 2009
- 17th Meeting 2007
- 16th Meeting 2005
- 15th Meeting 2003
- 14th Meeting 2000

Workshops on NSDD: Theory and Evaluation
- IAEA-ICTP 2014
- IAEA-ICTP 2012
- IAEA-ICTP 2010
- IAEA-ICTP 2008
- IAEA-ICTP 2006
- IAEA-ICTP 2005

INDC(NDS)-421
Revision 1
Distr. EL

Nuclear Structure and Decay Data (NSDD) Evaluators' Network

Prepared by

V.G. Pronyaev, A.L. Nichols and J. Tuli[1]

IAEA Nuclear Data Section
Vienna, Austria

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Abstract

The structure, principal activities and products of the Nuclear Structure and Decay Data (NSDD) Evaluators' Network are described. This revision supersedes the special issue of the Nuclear Data Newsletter No. 20 published in November 1994, and defines the status of the NSDD Network as of November 2003.

March 2004

Nuclear Data Section
International Atomic Energy Agency

Coordination of the NSDD Network

Data Dissemination

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MYENSDF WebTool *(V. Zerkin)*

ENSDF Analysis and Utility Programs

The Brookhaven National Nuclear Data Center maintains and distributes various programs in support of the International Atomic Energy Agency sponsored Nuclear Structure and Decay Data Network. These programs generally use as input files in the Evaluated Nuclear Structure Data File (ENSDF) format.[1]
For further information about the status and revision history please visit the **NNDC dedicated web pages.**
List of modifications:

- 2015-04-02 **GABS new version**
  In some cases the uncertainty of the normalised gamma intensity was incorrectly reported in the output ENSDF file: '**' was given instead of a numerical value.
  Warning is given if no gamma transition is marked to be used for normalisation by inserting 'X' or 'Y' in column 79.
  Old comment gamma records with the calculated normalised intensities are removed/replaced with new ones.
- 2015-03-10 **RadD program added** - Deduces radius parameters

Please address any issue regarding this page to nds.contact-point@iaea.org Last updating: 2 Apr 2015.

Analysis | Utility | NSDFLIB | SETMDC

ENSDF Analysis Programs
When present, documentation is included in the compressed files

#	Program	Last Changed	ANSI	Linux	Windows	MacOS
1	**ALPHAD** Calculates alpha HF's and theoretical half-lives.	2014-10-15 Added MacOS files	Source code Compressed file	Source code Executable Compressed file	Source code Executable Compressed file	Compressed file with other codes*
2	**BrIcc** Calculates the conversion electron, electron-positron pair conversion coeffcients and the E0 electronic factors	2015-01-20 New Windows executables correcting runtime problems		Compressed file	Self-extracting archive	Compressed file
3	**BrIccMixing** Calculates the multipole mixing ratio - Requires BrIcc	2015-01-20 New Windows executables correcting runtime problems		Compressed file	Self-extracting archive	Compressed file
8	**LOGFT** Calculates log ft values for beta and electron-capture decay, average beta energies, and capture fractions	2014-10-15 Added MacOS files	Source code Compressed file	Source code Executable Compressed file	Source code Executable Compressed file	Compressed file with other codes*
9	**PANDORA** APerforms a least-squares fit to the gamma-energies to obtain level energies and calculates the net feedings to levels.	2014-10-15 Added MacOS files	Source code Compressed file	Source code Executable Compressed file	Source code Executable Compressed file	Compressed file with other codes*
10	***NEW*** **RadD** Deduces the radius parameter for odd-odd and odd-A nuclei using the even-even radii as input parameters	2015-03-10 Added to the list	Source code	Compressed file With source and exec for all platforms. For Linux and MAC OS exec compiled with gfortran.	Compressed file With source and exec for all platforms.	Compressed file With source and exec for all platforms. For Linux and MAC OS exec compiled with gfortran.
11	**RadList** Calculates atomic & nuclear radiations. Checks energy balance	2014-10-15 Added MacOS files	Source code Compressed file	Source code Executable	Source code Executable Compressed file	Compressed file with other codes*
12	**RULER** Calculates reduced transition probabilities	2014-10-15 Added MacOS files	Source code Compressed file	Source code Executable Compressed file	Source code Executable	Compressed file with other codes*

Financial Support

Mass chains: 2013-2015

- Abusaleem (JOR): completed 2 years - 1 left
- Lalkovski (BUL): completed in 2014
- Erturk (TUR): ended in 2014
- Dhindsa (IND) : completed 2 years - 1 left
- Timar (HUN): completed in 2014
- Negret (ROM): completed in 2013

Horizontal Evaluations: 2013-2015

- Wang (AME 2012): completed in 2013
- Stone: 1 year contract 2012-2013: Nuclear Moments Tables INDC(NDS)-0648, INDC(NDS)-0650
- Mertzimekis: 1 year contract 2014-2015: Nuclear Moments Database

Future of individual contracts

Training (ICTP Workshop)

Mentoring (work with experienced evaluators on a mass chain): we are trying to find a framework for funding mentoring scheme

Specialized training (IAEA Workshop)

Individual contract (if candidate has demonstrated consistency and commitment and after recommendation from mentor)

Training

Joint ICTP-IAEA Workshop on NSDD: Theory and Evaluation, 24-28 March 2014, Trieste, Italy

- 1-week workshop: acting evaluators encouraged to attend
- Directors: Tuli, Dimitriou
- 5 lecturers :Tuli, Singh, McCutchan, Kondev, Van Isacker
- 21 participants from 10 countries
- Practical work: Evaluation of mass chain A=227 (work in progress)

Specialized Workshop on NSDD Evaluation, 27-29 April 2015, Vienna

- IAEA PO: Dimitriou
- Program Coordinators: E. McCutchan, F. Kondev
- Lecturers: Martin, Singh, Tuli, Kibedi, McCutchan, Kondev
- For active evaluators
- Informal structure, based on discussions
- Participant's sessions: feedback from active evaluators
- Output: technical discussions including examples and recommendations will be published in an INDC(NDS) report

NSDD Evaluations

Mass chain A=211

- Group evaluation that commenced at ICTP-IAEA NSDD Workshop 2012)
- Contributors: D. Abriola, P. Dimitriou
- Published in Nuclear Data Sheets 114, 661 (2013)

Mass chain A=215

- Group evaluation that commenced at ENSDD Kolkata Workshop 2012
- Contributors: D. Abriola, P. Dimitriou
- Published in Nuclear Data Sheets 114, 2023 (2013)

Coordinated Research Projects

CRP: Reference Database for Beta-Delayed Neutron Emission 2013-2017
(P. Dimitriou, M. Verpelli)

- 1st RCM from 26-30 August 2013: Summary Report INDC(NDS)-0643
- 2nd RCM from 23-27 March 2015
- Objective: generate a Reference Database for beta-delayed neutron emission data, both microscopic (individual precursors) and macroscopic (integral data)
  - Measurements (Tain, Algora, Fallot, Rykaczewski, Grzywacz, Garrett, Dillmann, Lorusso)
  - Compilation and evaluation of experimental data (Singh, Birch, Dillmann, Sonzogni, McCutchan, Abriola, Huang, Banerjee-Mukherjee) with reviewing support from Algora, Lorusso
  - Benchmarking of microscopic data against integral measurements – re-evaluate group decay parameters (Piksaikin, Mills, Sonzogni, Cano-Ott, Chiba)
  - Theoretical support (Borzov, Marketin, Minato)

Database for Z=2-28

≤ Z ≤ ≤ N ≤ Nucid 18n ≤ Half-life [ms] ≤ ≤ P(1n)% ≤ ≤ P(2n)% ≤ ≤ P(3n)% ≤

Search | Nuclides found:1 | Clear | Chart | Show/Hide Compilations | Show/Hide Comments | Show/Hide Q values

EXFOR Link

Recommended values and compiled values

Nucid	Half-life	%P(1n)	%P(2n)	%P(3n)	Avg n	Reference	Method	Spec	Half-life comments
Z 7 N 11 **18N**	**619 ms (2)**	**10.9 (9)**			**0.109**				From 2005Li60, most precise, all other measurements agree v within uncertainty.
	630 ms (30)					1964Ch19	β-γ coin	no	Fit to beta-gamma coin decay curve. Result is weighted avera of "many similar curves". Approximately 5 half lives measured
	624 ms (12)					1982Ol01	β-γ coin	no	Fit to beta-gamma coin decay curve using the three strongest gamma rays from 18O. "The results of individual fits to the 3 sets of data...are in good agreement, and we illustrate the combined fit using the best value for the 18N half-life." Approximately 3 half lives measured, only 24 points used in fi
	790 ms (210)	14.3 (20)			0.143	1991Re02	delayed-coin (ion, β-/n)	no	Superseded by 2008ReZZ
	630 ms (20)	2.2 (4)			0.022	1994Sc01	β-n coin	yes	Fit to beta-neutron coin time spectrum. Approximately 3 half lives measured.
	619 ms (2)	6.98 (146)			0.07	2005Li60	β-γ coin, β-n coin	yes	Fit to beta decay curve with single exponential and constant background. Approximately 3 half lives measured
									echnique ne of a specific ion as the start time and the arrival time of subsequer betas or neutrons as the stop time...Half-lives reported here a based on a weighted average of the half-lives obtained from beta, neutron, and beta-neutron-coincidence time-interval histograms"

In Progress: Add Systematics,Theory & Plotting Capabilities

CRP: Charged-particle Monitor reactions and medical isotope production 2012-2016 (R. Capote)

- Objective: Update beam monitor data, include data for emerging diagnostic and therapeutic radionuclides, re-evaluation of decay data, measurement of new decay and cross-section data
- 1st RCM: 3-7 December 2012; Summary Report INDC-NDS-0630
- 2nd RCM: 8-12 December 2014

Decay Data

- ^{61}Cu, ^{62,63}Zn (evaluate decay schemes)
- ^{67}Cu (measurement+evaluation of decay scheme+Auger data)
- ^{99}Mo/^{99m}Tc, ^{111}In (Auger data)
- ^{52}Fe, ^{52m,g}Mn,^{64}Cu, ^{72}As, ^{73}Se, ^{76}Br, ^{89}Zr, ^{94m}Tc, ^{120}I (evaluation of decay scheme)
- ^{86}Y, ^{66}Ga (measurement+evaluation of decay scheme)
- ^{44}Ti (evaluation of half-life)
- ^{230}U, ^{226}Th, ^{222}Ra, ^{218}Rn, ^{214,210}Po, ^{210}Pb, ^{210}Bi, (decay chain+update)
- ^{178}Ta, ^{103}Pd, ^{125}I, ^{131}Cs (evaluation of decay scheme + Auger data)

CRP: International Reactor Dosimetry and Fusion File (IRDFF) 2013-2017 (S. Simakov)

- Objective: Update IRDFF and validate new data files through benchmarking
- 1st RCM: 1-5 July 2013 Summary Report INDC-NDS-0639
- 2nd RCM in 2015

IRDFF Decay Data Sub-library

- To renormalize cross section data to reference decay data
- Use same decay data consistently in IRDFF evaluations and applications
- https://www-nds.iaea.org/IRDFFtest/irdffnuclideslist.htm

https://www-nds.iaea.org/IRDFFtest/irdffnuclideslist.htm

List of Isotopes and Isomers produced by reactions included in IRDFF: version 1.00 (Oct 2012) - 82; version 1.05 (Mar 2015) - additional 8

(NB: Half-lifes and Intensities are given only for orientation, exact values with uncertainties see in linked files)

#	Isotope	Half-Life	Decay Mode (Isomer level)	Radiation used for detection	Producing reaction[1]	Source on Oct 2012	ENDF Mat	Latest ENSDF[2] (Oct 2014)	IRDFF new evaluations (DDEP) which replace ENSDF Comments
				Whole Decay Library	**in ENDF format:**	irdf2012.endf		IRDFF2014.ENDF	
1	1-H-3	12.32 y	β-	β- 18.594 keV 100%	6Li(n,t)4He	EVAL-JUL00	131	EVAL-JUL00	EVAL DEC 14 and pdf
2	9-F-18	109.77 m	β+	γ 511. keV 96.73%	19F(n,2n)18F	EVAL-NOV96	922	EVAL-NOV96	EVAL JUN 14 and pdf
3	11-Na-22	2.6027 y	β+,ε	γ 511. keV 90.326% γ 1274.5 keV 99.941%	23Na(n,2n)22Na	EVAL-DEC05	1122	EVAL-DEC05	EVAL DEC 14 and pdf
4	11-Na-24	14.997 h	β-	γ 1368.6 keV 99.994%	23Na(n,γ)24Na 24Mg(n,p)24Na 27Al(n,α)24Na	EVAL-OCT07	1128	EVAL-OCT07	EVAL MAR 14 and pdf
5	12-Mg-27	9.458 m	β-	γ 843.76 keV 70.94% γ 1014.44 keV 29.06%	27Al(n,p)27Mg	EVAL-AUG11	1234	EVAL-AUG11	
6	13-Al-28	2.245 m	β-	γ 1778.9 keV 100%	28Si(n,p)28Al 29Si(n,d)28Al	NOT included	1328	EVAL-MAY12	EVAL JAN 15 and pdf
7	14-Si-31	157.36 m	β-	β- 1491 keV 99.98% γ 1266.2 keV 5.54%	31P(n,p)31Si	EVAL-MAR01	1434	**EVAL-MAR13**	
8	15-P-32	14.268 d	β-	β- 1710.66 keV	32S(n,p)32P	EVAL-SEP11	1528	EVAL-SEP11	
9	21-Sc-46	83.79 d	β-	γ 889.3 keV γ 1120.5 keV	45Sc(n,γ)46Sc 46Ti(n,p)46Sc 47Ti(n,x)46Sc	EVAL-FEB01	2128	EVAL-FEB01	EVAL JUN 14 and pdf
10	21-Sc-46M	142.528 m	IT (143keV)	γ 142.53 keV		EVAL-NOV00	2129	**EVAL-FEB01**	
11	21-Sc-47	3.3492 d	β-	γ 159.38 keV	47Ti(n,p)47Sc 48Ti(n,x)47Sc	EVAL-MAY07	2131	EVAL-MAY07	EVAL NOV 13 and pdf
12	21-Sc-48	43.67 h	β-	γ1312.120 keV	48Ti(n,p)48Sc 49Ti(n,x)48Sc 51V(n,α)48Sc	EVAL-JUL06	2134	EVAL-JUL06	EVAL DEC 14 and pdf
13	22-Ti-45	184.8 m	β+,ε		46Ti(n,2n)45Ti	EVAL-FEB08	2222	EVAL-FEB08	
14	24-Cr-51	27.701 d	ε	γ 320.1 keV	52Cr(n,2n)51Cr 54Fe(n,α)51Cr	EVAL-AUG06	2428	EVAL-AUG06	EVAL DEC 14 and pdf
15	25-Mn-54	312.05 d	β+	γ 834.848 keV	55Mn(n,2n)54Mn 54Fe(n,p)54Mn	EVAL-JUN06	2522	EVAL-JUN06	EVAL MAR 14 and pdf
16	25-Mn-56	2.5789 h	β-	γ 846.764 keV 99%	55Mn(n,γ)56Mn 56Fe(n,p)56Mn 59Co(n,α)56Mn	EVAL-MAY11	2528	EVAL-MAY11	
17	26-Fe-53	8.51 m	β+,ε	γ 377.9 keV 42%	54Fe(n,2n)53Fe	EVAL-OCT09	2622	EVAL-OCT09	

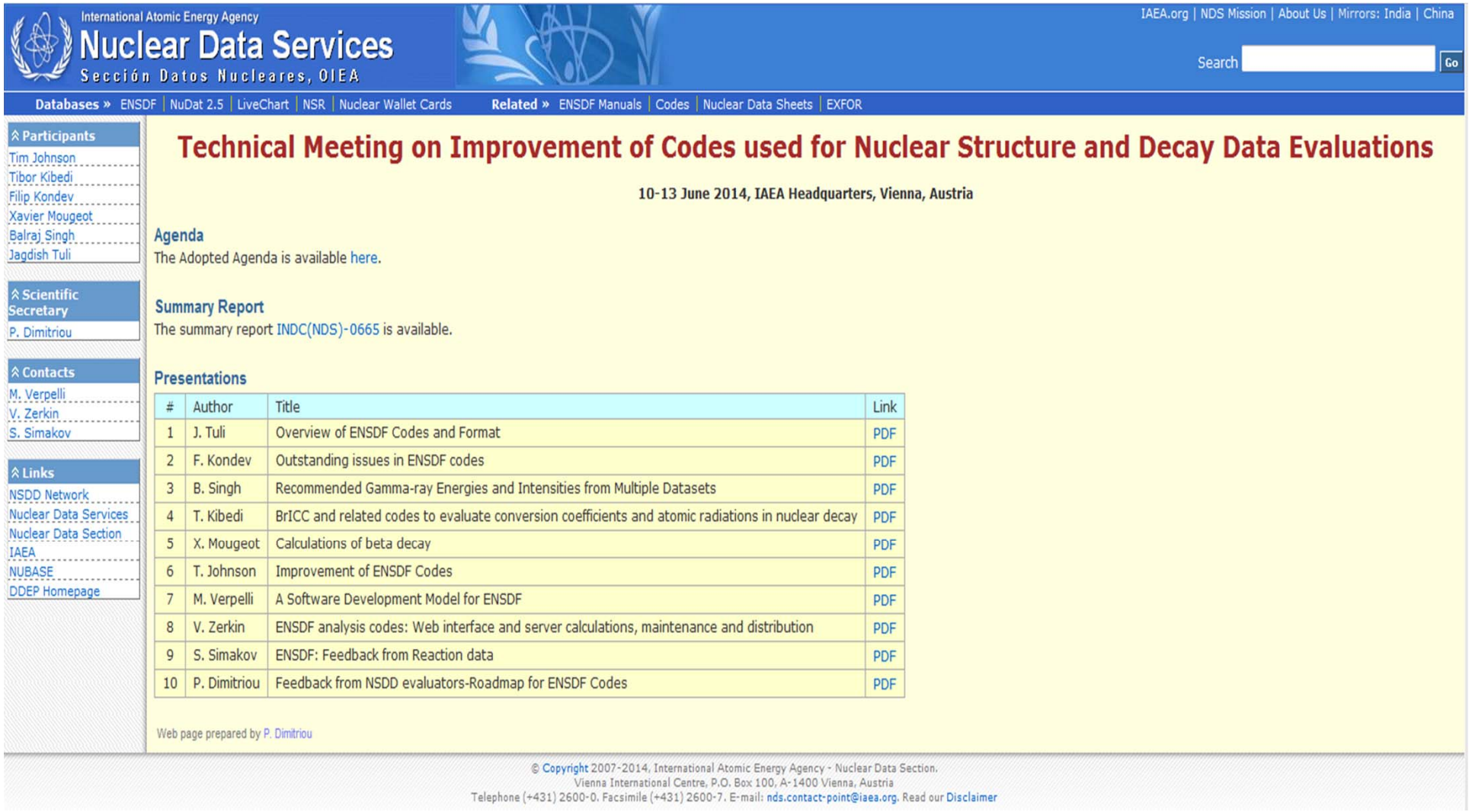
Data Development Project: Improvement of Analysis Codes for NSDD Evaluations (Wednesday session)

- 1st meeting: 10-13 June 2014
- Summary Report: INDC(NDS)-0665

Objectives

- Assess current status of codes
- Update physics models/error treatment
- Re-write in modern programming language
- Comprehensive manuals incl. test cases
- Develop EvaluationToolkit (based on evp editor)

https://www-nds.iaea.org/nds-technical-meetings/TM-Codes-2014/



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DDEP Homepage

Technical Meeting on Improvement of Codes used for Nuclear Structure and Decay Data Evaluations

10-13 June 2014, IAEA Headquarters, Vienna, Austria

Agenda
The Adopted Agenda is available here.

Summary Report
The summary report INDC(NDS)-0665 is available.

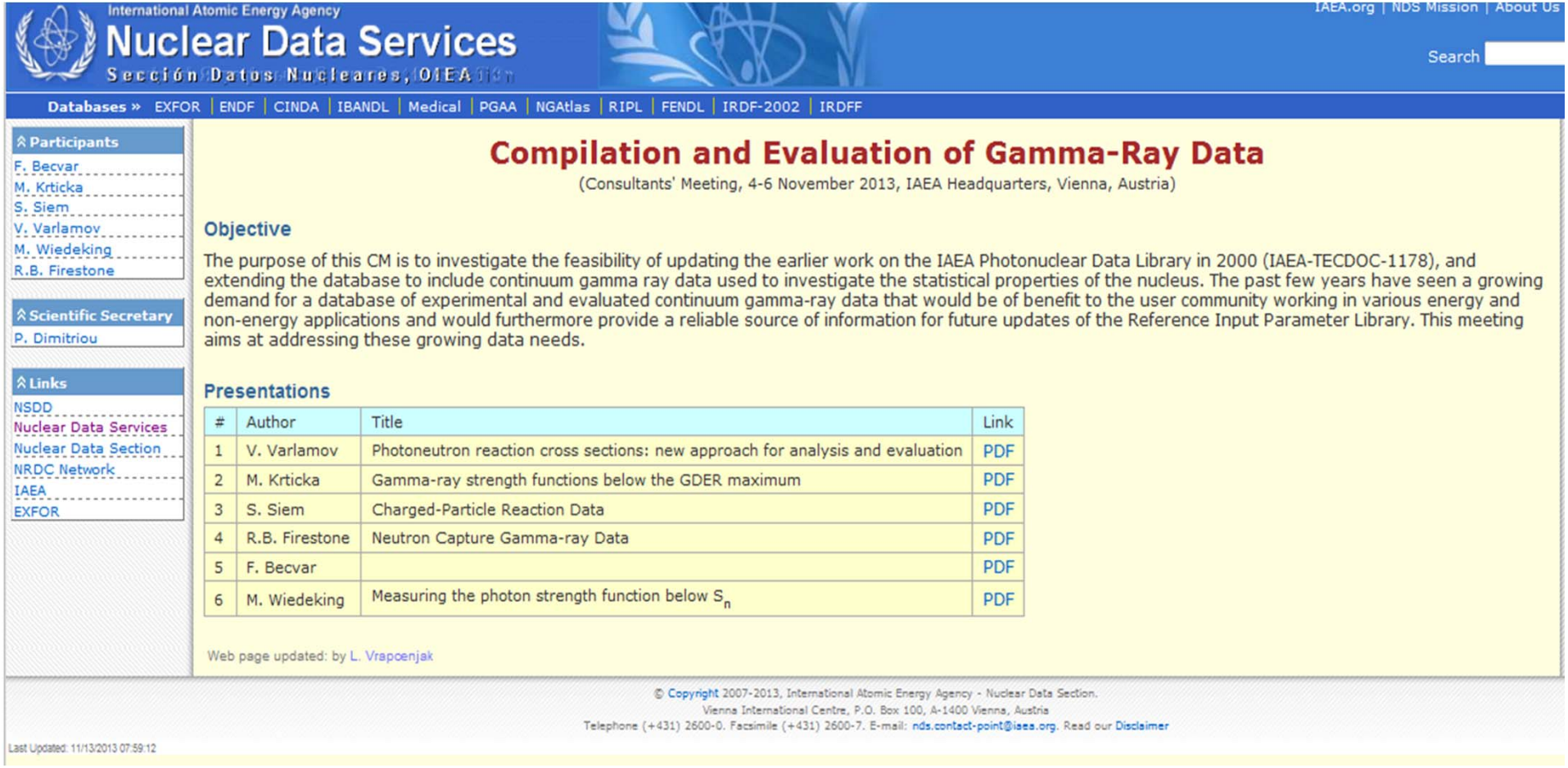
Presentations

#	Author	Title	Link
1	J. Tuli	Overview of ENSDF Codes and Format	PDF
2	F. Kondev	Outstanding issues in ENSDF codes	PDF
3	B. Singh	Recommended Gamma-ray Energies and Intensities from Multiple Datasets	PDF
4	T. Kibedi	BrICC and related codes to evaluate conversion coefficients and atomic radiations in nuclear decay	PDF
5	X. Mougeot	Calculations of beta decay	PDF
6	T. Johnson	Improvement of ENSDF Codes	PDF
7	M. Verpelli	A Software Development Model for ENSDF	PDF
8	V. Zerkin	ENSDF analysis codes: Web interface and server calculations, maintenance and distribution	PDF
9	S. Simakov	ENSDF: Feedback from Reaction data	PDF
10	P. Dimitriou	Feedback from NSDD evaluators-Roadmap for ENSDF Codes	PDF

Web page prepared by P. Dimitriou

Action from 20th NSDD: R. Firestone, S. Siem and NDS-IAEA to hold a CM to discuss the generation of a database for reaction γ-ray data

CRP endorsed by INDC 2014 - To begin in 2016



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Databases » EXFOR | ENDF | CINDA | IBANDL | Medical | PGAA | NGAtlas | RIPL | FENDL | IRDF-2002 | IRDFF

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R.B. Firestone

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Compilation and Evaluation of Gamma-Ray Data

(Consultants' Meeting, 4-6 November 2013, IAEA Headquarters, Vienna, Austria)

Objective

The purpose of this CM is to investigate the feasibility of updating the earlier work on the IAEA Photonuclear Data Library in 2000 (IAEA-TECDOC-1178), and extending the database to include continuum gamma ray data used to investigate the statistical properties of the nucleus. The past few years have seen a growing demand for a database of experimental and evaluated continuum gamma-ray data that would be of benefit to the user community working in various energy and non-energy applications and would furthermore provide a reliable source of information for future updates of the Reference Input Parameter Library. This meeting aims at addressing these growing data needs.

Presentations

#	Author	Title	Link
1	V. Varlamov	Photoneutron reaction cross sections: new approach for analysis and evaluation	PDF
2	M. Krticka	Gamma-ray strength functions below the GDER maximum	PDF
3	S. Siem	Charged-Particle Reaction Data	PDF
4	R.B. Firestone	Neutron Capture Gamma-ray Data	PDF
5	F. Becvar		PDF
6	M. Wiedeking	Measuring the photon strength function below S_n	PDF

Web page updated: by L. Vrapcenjak

Last Updated: 11/13/2013 07:59:12

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Marek Karny
Alan Nichols
Jose-Luis Tain
Alejandro Sonzogni
Jean-Christophe Sublet
Tadashi Yoshida

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Links

Nuclear Data Services
Nuclear Data Section
IAEA

Consultant's Meeting on Total Absorption Gamma-ray Spectroscopy (TAGS)

15-17 December 2014, IAEA Headquarters, Vienna, Austria

Objective

The objective of the meeting was to review the current status of TAGS measurements and re-assess the data needs for decay heat calculations, beta-delayed neutrons and anti-neutrino spectra.

Agenda

The Adopted Agenda is available here.

Summary Report

The summary report INDC(NDS)-0676 is now available.

Presentations

#	Author	Title	Link
1	A. Algora	TAGS measurements by Valencia group (I)	PDF
2	M. Karny	TAGS measurements by ORNL-Warsaw group	PDF
3	M. Fallot	TAGS measurements for anti-neutrino spectra-recent anti-neutrino measurements	PDF
4	J.-L. Tain	TAGS measurements by Valencia group (II)	PPT
5	T. Yoshida	Part I: Analysis of reactor beta- and anti-neutrino energy spectra on the basis of the gross theory	PPT
6	T. Yoshida	Part II: Contributions of Jyvaskyla and Idaho TAGS to FP Decay-Heat Calculations: Their Complementarity and Problems Left	PPT
7	A. Sonzogni	TAGS data in ENDF/B VII.1	PPT
8	J.-Ch. Sublet	Verification and Validation: EASY=II & TENDL-2013, ENDF/B-VII.1, JENDL-4.0u or JEFF-3.2	PDF
9	A. Algora	Testing Nuclear Models with TAGS Data	PDF
10	P. Dimitriou	Connection with IAEA Database on beta-delayed neutrons	PDF

Consultants' Meeting on Auger Electron Emission from Nuclear Decay: Data Needs for Medical Applications

9-10 May 2013, IAEA Headquarters, Vienna, Austria

Summary Report
INDC(NDS)-0638

Presentations

#	Author	Title	Link
1	K. Bartschat	Atomic Structure Calculations (and More) Using the B-Spline R-Matrix Approach	PDF
2	H.K. Chung	Studies Of Inner Shell Excitation And Ionization And The Resulting Cascades By X-ray Free Electron Lasers	PDF
3	C. Dong	Calculations of Auger Electron Spectrum	PDF
4	T. Kibedi	Data needs for Auger electron cascade simulations	PDF
5	H. Nikjoo	Auger electron transport calculations in biological matter	PDF
6	A. Palffy	Theoretical uncertainties for Auger electron cascades	PDF

Web page prepared by L. Vrapcenjak

FUTURE PLANS

DDP on Improvement of Analysis Codes: 2nd TM from 5-8 October 2015

- Monitor progress
- Discuss new codes – agree on validation procedure
- Revise assignments and actions

Training

- ICTP-IAEA NSDD workshop in 2016
- Specialized Workshop for ENSDF evaluators: depending on success of first workshop will be proposed as a workshop series

Coordination

- Revise Status Document INDC(NDS)-0421

Dissemination

- Live Chart & Isotope Browser *(Verpelli)*
- MyENSDF Web Tool *(Zerkin)*

New Project

- *Magnetic Moments Evaluation*

Thank you