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International Atomic Energy Agency
Atoms for Peace and Development

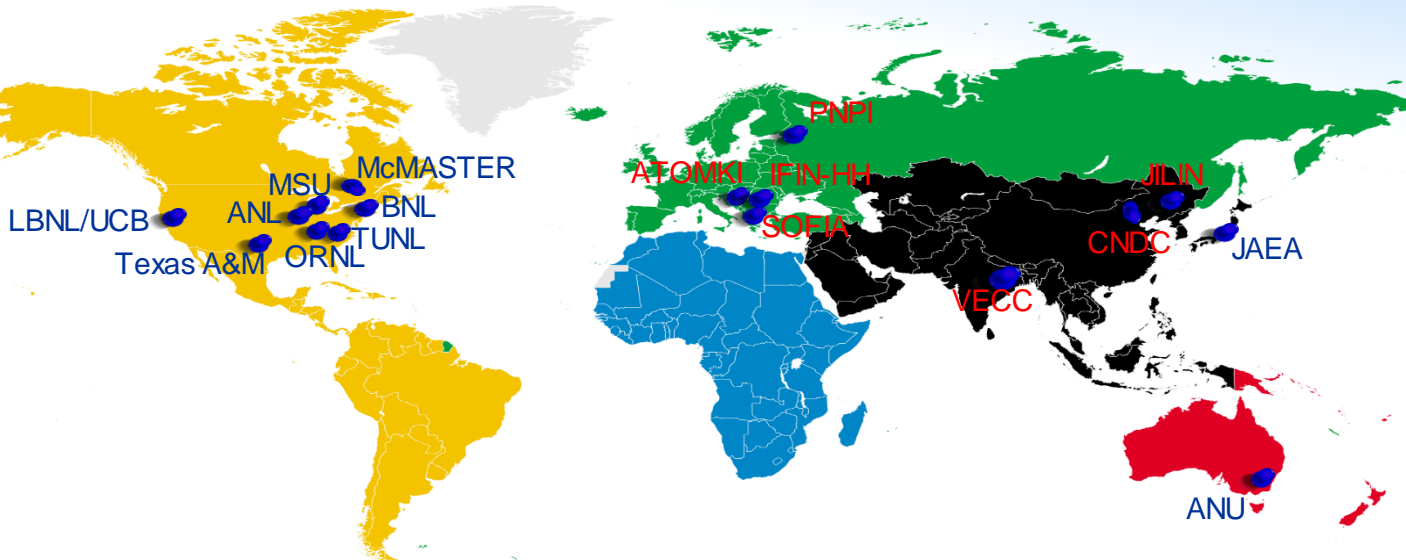
International Network of Nuclear Structure and Decay Data Evaluators (NSDD): 2018-2019

Scientific Secretary:

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NSDD Data Centres



- 17 NSDD data centres

ENSDF database and management resides at NNDC, BNL
NSDD coordination under auspices of IAEA since 1974

NSDD coordination



- Organisation of meetings (NSDD, Technical and Consultant Meetings)
- Represent NSDD at ND2019
- Training (ICTP Workshops: see R. Capote)
- Technical support: codes, editors, web tools (Myensdf)
- DDP on Improvement of ENSDF Analysis Codes
- Horizontal evaluation: Nuclear Moments
- Financial support
- Dissemination tools: Live Chart, Isotope Browser (see M. Verpelli), Decay Data Portal, ENSDF Codes

First paper on NSDD authored by whole network: EPJ Web Conference 239, 15004



EPJ Web of Conferences **239**, 15004 (2020)
ND2019

<https://doi.org/10.1051/epjconf/202023915004>

International network of nuclear structure and decay data evaluators

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23rd NSDD meeting, 8-12 April 2019



- All (17) Data Centres attended
- Expansion effort (Japan)
- Relocation of India DC (from IIT Roorkee to VECC, Kolkata)
- Technical discussions:
 - Evaluators' session: discuss open issues with ongoing evaluations
 - New formats for continuous data presented
 - New ENSDF analysis and checking codes demonstrated (Jun Chen)
- Meeting report: [INDC\(NDS\)-783](#)
- [Next meeting: Canberra, Australia \(Australian National University\)](#)

17 DC - 26 participants



Expansion effort



- Japan DC (JAEA):
 - currently 0.2 FTE
 - ENSDF evaluator to retire
- Japanese Nuclear Data Symposium (Nov. 2018):
 - “The importance of nuclear structure and decay data for nuclear science and applications”, in Proc: INDC(JPN)-205.
- Discussions
 - Identified replacement
 - Invited to ICTP 2018 and NSDD TM 2019
- Discussions with RIKEN for contribution to XUNDL/ENSDF

Financial support

- Contracts for mass chain evaluations:
 - Pascu (ROM): renewed in 2018-2019

- Contracts for horizontal evaluations:
 - Stone (2018-2019): Tables of Evaluated Nuclear Moments
Evaluation of Magnetic Dipole Moments for Long-lived states:
[INDC\(NDS\)-0794](#)
Evaluation of Magnetic Dipole Moments for Short-Lived State:
[INDC\(NDS\)-0816](#)
Uploaded on online Nuclear Moments database

 - Ashok K. Jain (2019): Atlas of isomers, to be published in ADNDT

- Consultant visits:
 - Kondev (2018; 2019): LiveChart, atomic masses, atomic radiation data

Nuclear Moments Database

<http://www-nds.iaea.org/nuclearmoments>



NUCLEAR ELECTROMAGNETIC MOMENTS

The present compilation includes experimental information on nuclear magnetic dipole and electric quadrupole moments found in print compilations (such as INDC(NDS)-0650, INDC(NDS)-0658 etc), journals, international conferences and other resources. The online interface was created by Theo J. Mertzimekis under the IAEA auspices.

New: The recommended magnetic dipole moments for long-lived states INDC(NDS)-0794 and short-lived states INDC(NDS)-0816 by N. Stone are available on the database.



Periodic Table

Z-Helix

Elementary Particles

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1 n																	
Period 1	H																	2 He
2	Li	Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	Na	Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	K	Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	Rb	Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	Cs	Ba	* Lu	* Hf	* Ta	* W	* Re	* Os	* Ir	* Pt	* Au	* Hg	* Tl	* Pb	* Bi	* Po	* At	* Rn
7	Fr	Ra	** Lr	** Rf	** Db	** Sg	** Bh	** Hs	** Mt	** Ds	** Rg	** Cn	** Nh	** Fl	** Mc	** Lv	** Ts	** Og
			* 57 La	* 58 Ce	* 59 Pr	* 60 Nd	* 61 Pm	* 62 Sm	* 63 Eu	* 64 Gd	* 65 Tb	* 66 Dy	* 67 Ho	* 68 Er	* 69 Tm	* 70 Yb		
			** 89 Ac	** 90 Th	** 91 Pa	** 92 U	** 93 Np	** 94 Pu	** 95 Am	** 96 Cm	** 97 Bk	** 98 Cf	** 99 Es	** 100 Fm	** 101 Md	** 102 No		

Nuclear Moments Database

<http://www-nds.iaea.org/nuclearmoments>



Periodic Table

Z-Helix

Elementary Particles

Chromium (Z=24)

⁴⁹Cr

⁵⁰Cr

⁵¹Cr

⁵²Cr

⁵³Cr

⁵⁴Cr

Recommended

Isotope	Energy [keV]	t _{1/2}	Spin/Parity	μ [nm]	Method	Recommended Tables
⁵⁰ Cr	783	9.67 ps	2+	+1.24(18)	TF	INDC(NDS)-0816
	1881	2.2 ps	4+	+3.1(8)	TF	INDC(NDS)-0816
	3164	0.69 ps	6+	+4(1)	TF	INDC(NDS)-0816
	4743	0.28 ps	8+	+4.8(12)	TF	INDC(NDS)-0816

Compiled

Isotope	Energy [keV]	t _{1/2}	Spin/Parity	μ [nm]	Q [b]	Ref. Std	Method	NSR keyword	doi
⁵⁰ Cr	783.	9.2 ps	2 ⁺	+1.24(6)			TF	2000ER06	10.1103/PhysRevC.62.024305
				+1.3(2)			TF	1994PA34	10.1103/PhysRevC.50.2608
				+1.2(2)			IMPAC	1977FA07	10.1016/0375-9474(92)90388-Z
				+0.9(3)			TF	1987PA28	10.1016/0375-9474(92)90388-Z
					-0.36(7) Rec		CER	1975TO06 2013STZZ	10.1016/0375-9474(92)90388-Z
	1881.	2.2 ps	4 ⁺	+3.1(5)			TF	2000ER06	10.1103/PhysRevC.62.024305
				+1.7(4)			TF	1994PA34	10.1103/PhysRevC.50.2608
	3164.	1.2 ps	6 ⁺	+3(1)			TF	1994PA34	10.1103/PhysRevC.50.2608
	4743.	<2.7 ps	8 ⁺	+4.3(7)			TF	1994PA34	10.1103/PhysRevC.50.2608

Technical Support



- ENSDF codes, editor, web tools
 - Public dissemination: http://www-nds.iaea.org/public/ensdf_pgm
 - Maintain local repository (M. Verpelli)
 - ensure all codes are running on all platforms
 - Send notifications of updates
 - MyEnsdf Web tool: all codes run online through a user-friendly interface (V. Zerkin)
 - Editor: ensdf+ browser editor that incorporates codes and evaluation procedures (by V. Zerkin)

DDP on Improvement of Analysis Codes for NSDD evaluations

TM on 3-7 December 2018, IAEA

- **NEW:** ALPHAD_new (ALPHAD+RadD) was developed and new r0 parameters compiled with financial support from IAEA (Dhindsa, Singh)
- BetaShape (LHNB, Saclay): new formats for beta-/ec/beta+ and anti-neutrino spectra were proposed (Mougeot)
- Treatment of uncertainties: probability distribution function was proposed (Kibedi)
- Progress in ensdf+ editor (Zerkin)
- Meeting report: INDC(NDS)-0774



Dissemination tools

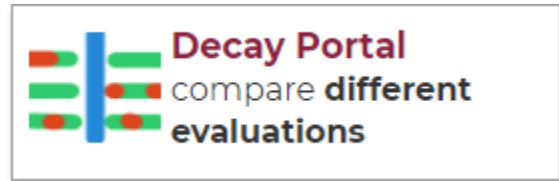
- Decay Data Portal:

Collects all decay data –ENSDF, DDEP, CRP data–in one place:
allows comparison of currently available information in tables



we are now including ENDF/B, JEFF, JENDL

How to find it: via LiveChart



Decay Data Portal

Example

Automated comparison of the main evaluated quantities

• ^{137}Cs β -decay to ^{137}Ba

Half-life		Level energy		Branching ratio		Q value		Authors		Cut-off date	
ENSDF	DDEP	ENSDF	DDEP	ENSDF	DDEP	ENSDF	DDEP	ENSDF	DDEP	ENSDF	DDEP
30.08 9 Y	30.05 8 Y	0.0	0.0	1 0	1 0	1175.63 77	1175.63 77	E. BROWNE, J. K. TULLI	M.M. BO, V.Chechev, R.G.Helmer	1-Oct-2006	01-JUN-1998

γ

E_γ		$I_\gamma(\text{abs})$		δ		a_T	
ENSDF	DDEP	ENSDF	DDEP	ENSDF	DDEP	ENSDF	DDEP
283.5 7	283.5 7	5.8E-4 8	0.00058 8				0.0557 13
661.657 3	661.657 3	85.1 2	84.99 20			0.1124	0.1102 79

β -

$\langle E_\beta \rangle$		$I_\beta(\text{abs})$		$\log ft$		Transition type	
ENSDF	DDEP	ENSDF	DDEP	ENSDF	DDEP	ENSDF	DDEP
174.32 6	174.32 6	94.7 2	94.36 28	9.625 2	9.63	1U	
334.65 8	300.57 8	0.00058 8	0.00061 8	16.61 6	15.64	2U	
416.26 8	416.26 8	5.3 2	5.64 28	12.079 17	12.06	2NU	

Future

- 24th TM: Canberra, Australia, 2022 (ANU)
- Enhance Decay Data Portal
- TM on Improvement of Analysis Codes
- ENSDF Codes dissemination
- Joint IAEA-ICTP Workshop on NSDD (extremely successful)
- Funding ENSDF and horizontal evaluations
- Organize training/outreach workshops/webinars together with data centres in Japan, India, Europe to promote NSDD evaluation among international research community



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Thank you!

