
Decay Data Evaluation Project (DDEP)
and
International Committee for Radionuclide Metrology (ICRM) Decay Data WG
Status of activities

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- The evaluation of data is time consuming
- An international working group has been formed in 1995 (DDEP):



LNHB (France), PTB (Germany), INEEL and LBNL (USA), KRI (Russia)

- With the objective of providing carefully recommended data in the field of nuclear and associated atomic data related to the nuclear disintegration for use in applied research and detector calibrations.

The current members of DDEP are :

Marie-Martine Bé (LNHB, France); *Editor-In-Chief*
Filip G. Kondev (ANL, United States); *Coordinator, Editor*
Valery P. Chechev (KRI, Russia)
Christophe Dulieu, Vanessa Chisté, Xavier Mougeot (LNHB, France)
Mark Kellett, Alan L. Nichols (IAEA, Austria)
Edgardo Browne (LBNL, United States)
Tibor Kibédi (ANU, Australia)
Aurelian Luca (IFIN, Romania)
Monica Galan (Ciemat, Spain)
Andy Pearce, Arzu Arinc (NPL, UK)
Huang Xiaolong (CIAE, China)

The goals of this group are :

- to define a methodology to be used in the evaluations,
- for specific data like Q-values or Internal Conversion Coefficients, to select a recommended set of values established by specialists in this field,
- to provide written documentation of all data used and all decisions and calculations done during the evaluation process,
- the reviewing of each new evaluation by several members of the group.

Then, the results of these DDEP evaluations are compiled and edited by the LNHB as a Monographie published under the auspice of the Bureau International des Poids et Mesures (BIPM).

(<http://www.bipm.org/fr/publications/monographie-ri-5.html>)

Moreover the *International Committee for Radionuclide Metrology* (ICRM) formally approved the recommendation made by the Nuclear Data Working Group of using the DDEP evaluated decay data in all future nuclear data studies.

- All published values are examined and analysed.
- Some values can be rejected or some unrealistic uncertainties increased.
 - For example, when reading a paper you may ask you :
 - - Did the authors search for impurities ?
 - - Did they take into account all necessary corrections ?
 - - Did they obtain an uncertainty compatible with the measurement technique they used ?
 - - etc.
- Then the averaging procedure can begin with the set of remaining values

²⁴³Am Alpha particle emission intensities

E _α (keV)	1955St98	1956Hu96	1964Ba26	1966Le13	1992Ga01	1998Ya17	1996Sa24 ^{##}	2002Da21 ^{\$}	I _α (avg) ^{&&}	χ ² /ν	Rec. I _α ^{&&&}
4695			0.0006	0.0017 (5) ^{***}				0.0038 (4) ^{^^}			0.0017 (5)
4919			0.000085								0.000085
4930			0.00018					0.0026 (3) ^{^^}			0.00018
4946			0.00034					0.0028 (3) ^{^^}			0.00034
4997			0.0016 [#]		0.0016 (5) [#]		0.0020 (4) [#]	0.0031 (4) ^{^^}	0.0018 (3)	0.39	0.0018 (4) [#]
5008								0.0052 (4) ^{^^}			
5029			0.0022 [^]		0.0033 (5) [^]		0.0044 (5) [^]	0.0082 (5) ^{^^}	0.0039 (4)	2.4	0.0039 (6) [^]
5035											
5088			0.004		0.0056 (7)		0.0055 (6)	0.0112 (6) ^{^^}	0.0055 (5)	0.01	0.0055 (6)
5113			0.0054		0.010 (1)		0.0101 (10)	0.019 (1) ^{^^}	0.0100 (7)	0	0.010 (1)
5181	1.1 (3) ^{&}	1.3 (2)	1.1		1.36 (1)	0.98 (2)	1.388 (8)	1.391 (7)	1.383 (5)	2.0	1.383 (7)
5233	11.5 (3) [*]	11.5 (3)	10.6 (2) ^{**}		11.46 (3)	11.04 (7)	11.37 (3)	11.52 (2)	11.46 (6)	7.1	11.46 (5) ^{\$\$}
5275	87.1 (4) [*]	86.9 (4)	87.9 (3) ^{**}		86.74 (6)	87.42 (8)	86.79 (3)	86.60 (7)	86.74 (4)	4.1	86.74 (5) ^{\$\$}
5321	0.16	0.16	0.12		0.190 (7)	0.270 (6)	0.194 (3)	0.190 (3)	0.192 (2)	0.48	0.192 (3)
5349	0.17	0.17	0.16		0.230 (7)	0.298 (8)	0.243 (3)	0.240 (3)	0.240 (2)	1.5	0.240 (3)

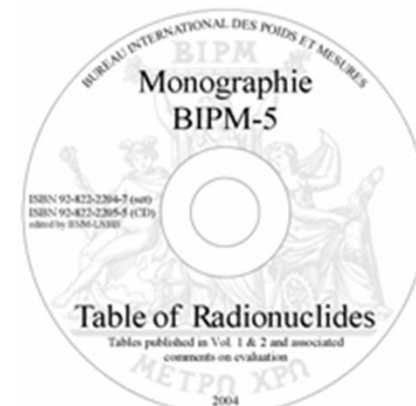
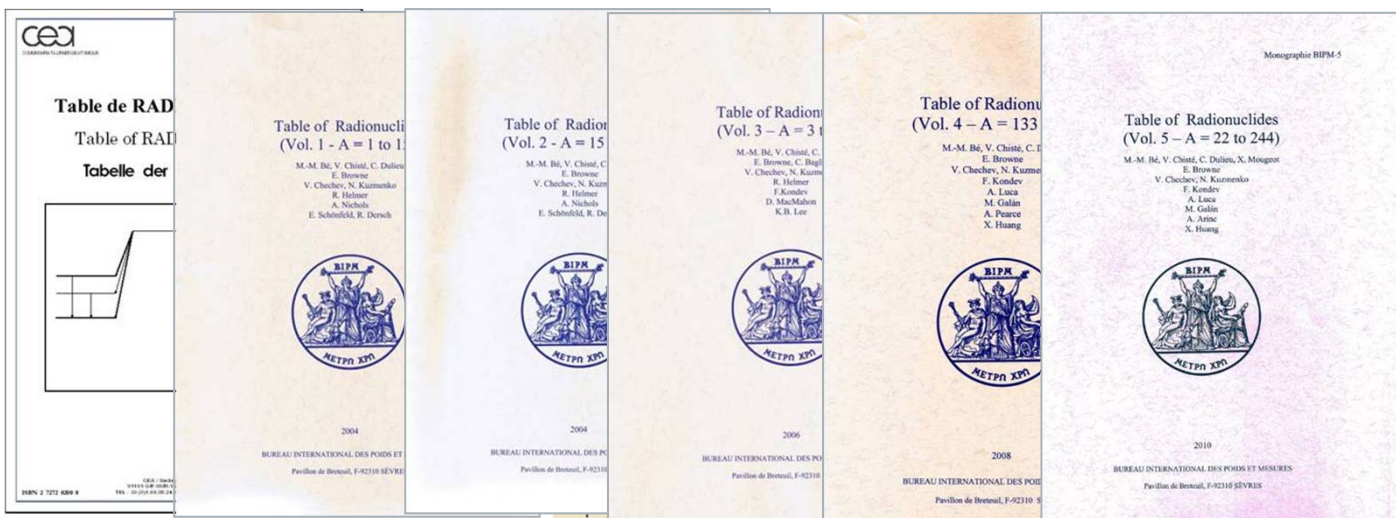
- $\chi^2/\nu > 1$, especially for the most intense emissions

&& Weighted average using the Limitation of Relative Statistical Weights method. Data from 1998Ya17 have not been included. *“In these averages the emission probabilities from 1998Ya17 are in disagreement and affected by a low uncertainty, moreover, in reading their paper, it appears that their uncertainties include a “non-statistical component.” Unfortunately, they did not give neither their values for these components nor the criteria used for estimating them. Therefore, data from 1998Ya17 have been omitted for averaging.”*

&&& Uncertainty is always greater than or equal to the smallest uncertainty in any of the experimental values used in the calculation.

*** Agrees well with I_α=0.00148 (3)% from γ transition probability balance.

- *, ^^, \$\$, ***, etc.



Tables of evaluated data and comments on evaluation
 Pages updated by the Laboratoire National Henri Becquerel
 All questions about the data must be sent to the authors. See chapter [Addresses](#)
 updated: 3rd March 2011
 latest entries: Bi-213, Pa-231, Ra-223, Rn-219
 latest updates: Cu-64, Po-216, Ra-224, Rn-220
 (181 nuclides in table, sorted by **alphabetical order** / [atomic number](#) / [mass number](#) / [edition date](#))

Web site :
www.nucleide.org

Subscribe to DDEP RSS feed

(Type of updates since last revision: 1 - update in comments only ; 2 - minor update in table ; 3 - major update in table)

Nuclide	Tables	Comments	ENSDF	UpDate	Type
Ac-225	table	comments	ensdf	26/08/2009	3
Ac-227	table	comments	ensdf	16/02/2009	2
Ac-228	table	comments	ensdf	22/01/2010	3
Ag-108	table	comments	ensdf	04/09/2006	2
Ag-108m	table	comments	ensdf	24/01/2008	1
Ag-110	table	comments	ensdf	12/03/2004	1
Ag-110m	table	comments	ensdf	24/03/2004	1

Nuclide	Tables	Comments	ENSDF	UpDate	Type
Np-236m	table	comments	ensdf	20/09/2006	3
Np-237	table	comments	ensdf	07/01/2010	2
Np-238	table	comments	ensdf	16/02/2009	2
Np-239	table	comments	ensdf	16/02/2009	2
O-15	table	comments	ensdf	01/06/2004	1
P-32	table	comments	ensdf	08/04/2004	1
P-33	table	comments	ensdf	08/04/2004	1



Non Neutron Nuclear Data Working Group (3NDWG)

3NDWG members are also involved in the evaluation efforts of the Decay Data Evaluation Project (DDEP) and in an IAEA Coordinated Research Project on “Updated decay data library for actinides” (2005-09).

The ICRM organizes a conference this year, Tsukuba, 19-23 September

<http://www.icrm2011.jp/>

Accepted papers in connection with Decay Data: 19

Gamma- and X-ray emission probabilities in decay of ^{177m}Lu	Measurements of the half-life of ^{214}Po and ^{218}Rn using digital electronics
Decay Data Evaluation Project (DDEP): Evaluation of the main ^{243}Cm and ^{245}Cm decay characteristics	Measurement of the ^{226}Th and ^{222}Ra half-lives
Measurements of ^{64}Cu and ^{68}Ga half-lives and gamma-rays emission intensities	Half life requirements for nuclear forensics measurements
Photon emission probabilities of ^{176}Lu	^{57}Co half-life determination
Unexpected uncertainty for NIST $4\pi\gamma$ ionization chamber	Assessment of actinide decay data: Findings of an IAEA coordinated research project
Standardization, decay data measurements and evaluation of ^{64}Cu	Half-life determination of ^{88}Kr and ^{138}Xe
Half life determination for short-lived radioisotopes V-52, Cr-55 and Al-28	A new measurement of the half-life of Ho-166m
Do radioactive half-lives vary with the earth-to-sun distance?	Study of alpha-particle emission probabilities in the U-230 decay series
Measurements of relative photon emission intensities and nuclear decay data evaluation of ^{113}Sn	
Measurement of the ^{230}U half-life	

The BetaShape program

- Analytical calculations of beta spectrum shapes (allowed, 1U, 2U, 3U) based on the Gove and Martin formalism
- Coulomb corrections which depend on the forbidding order of the transition
- Other corrections : finite nuclear size, screening, radiative
- C++ class: easy implementation in Monte-Carlo simulations or nuclear database programs

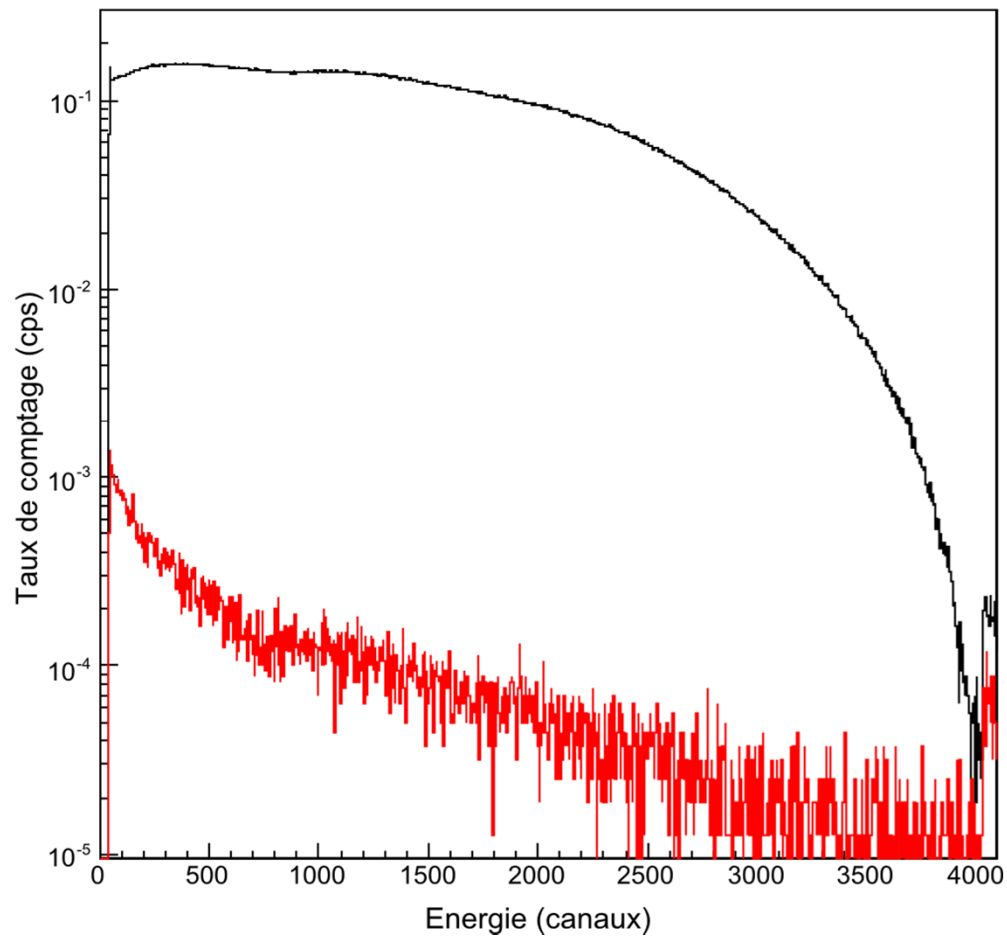
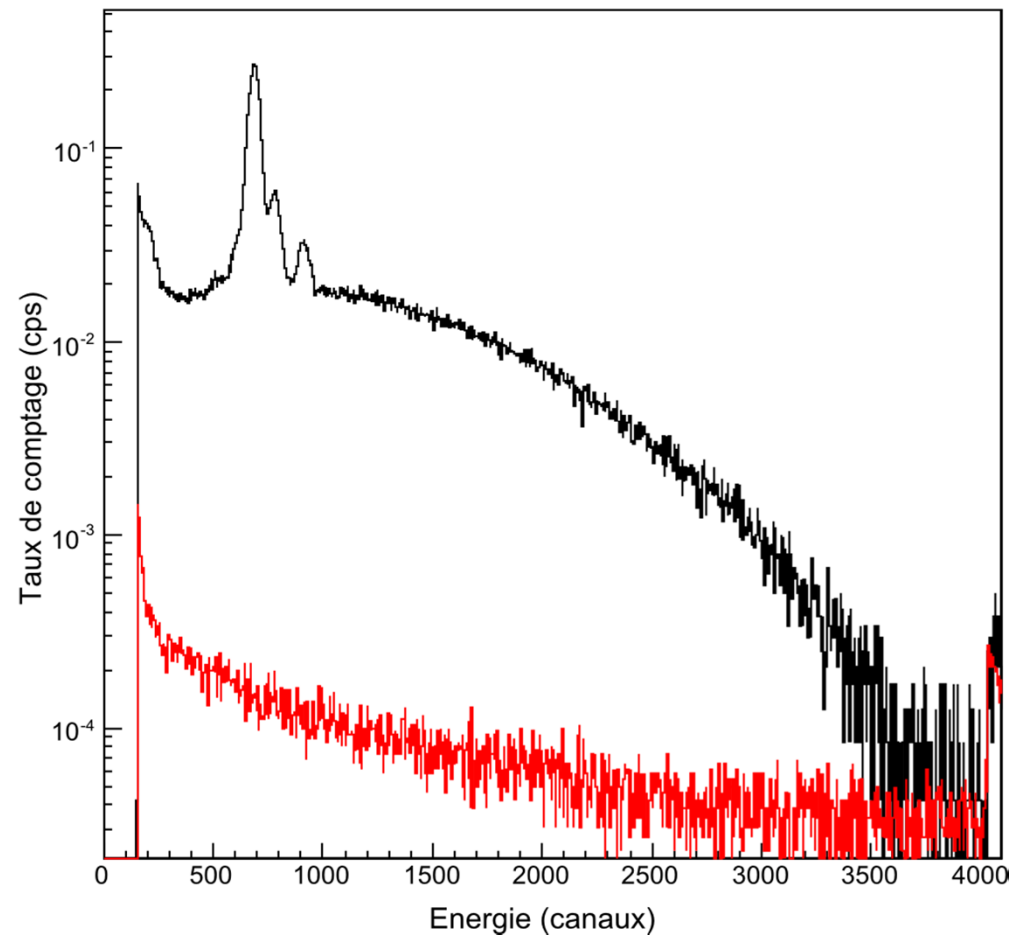


- Atomic corrections: exchange effect at low energy
- Screening correction: derive a smooth function from effective Z calculated with a HF model
- Nuclear matrix elements: specific treatment of the non-unique forbidden transitions



Experiments

- Measurements with a silicon detector (setup in progress)
- Shapes: to test and to validate theoretical predictions
- Models: to establish associated uncertainties

Spectre de ^{36}Cl Spectre de ^{129}I 

- ✓ DDEP evaluations is a permanent task, a certain number of nuclides are ready for publication and a new Monographie volume is planned this year.
- ✓ We plan to pursue the measurements and study of the beta spectra (LNHB)
- ✓ Due to European JRP, we will work on long half-life nuclides: Ho-166m, Sm-151 and I-129 (several European laboratories)
- ✓ We are involved in decay data measurements and evaluations of “radiopharmaceuticals” such as Cu-64, Cu-67, At-211, Sr-Rb/82, etc.