



STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ETUDE DE L'ENERGIE NUCLEAIRE

Genie2K Library creator

Genie2K Library Creator

NKS GammaSpec 2017 workshop
19-20 september 2017

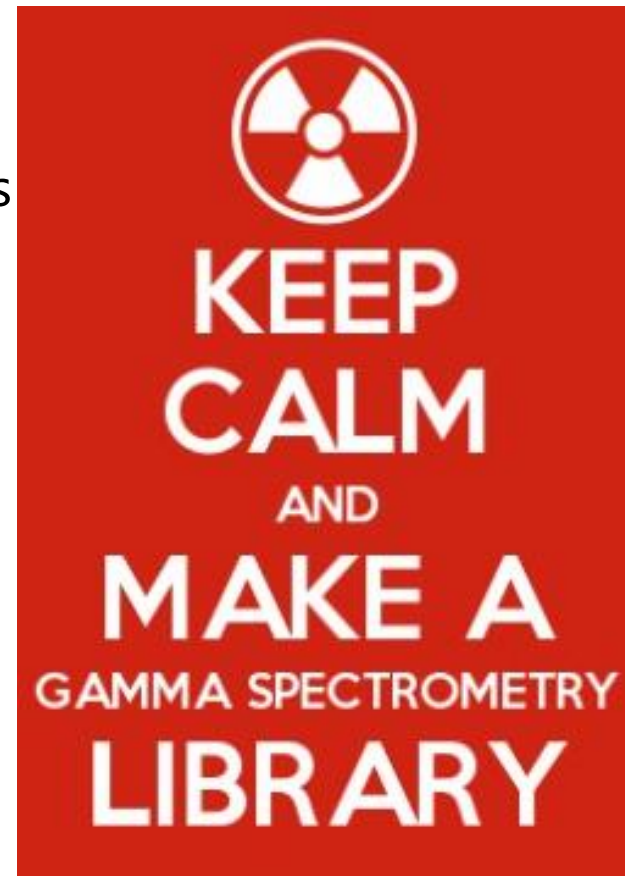
Leen Verheyen / Michel Bruggeman
Low-Level Radioactivity Measurements

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STUDIECENTRUM VOOR KERNENERGIE
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- Contents
 - Sources, use and management of nuclear data
 - Nuclide Library editor in Genie2000
 - Nuclear data management integrated in γ -lims
 - How to make a library?
 - Master nuclear data
 - Library creator
 - Management of data/Installation
 - Demonstration



Sources of nuclear data

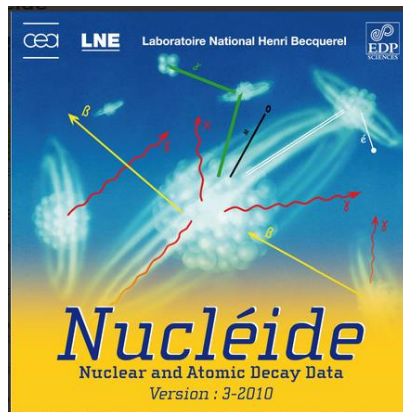
ENSDF

- Nuclear Data Sheets
- Table of Isotopes
- Nubase
- NuDat
-

Nuclear Data Services: nds.iaea.org
overview



Nucléide (DDEP) → CD-Rom

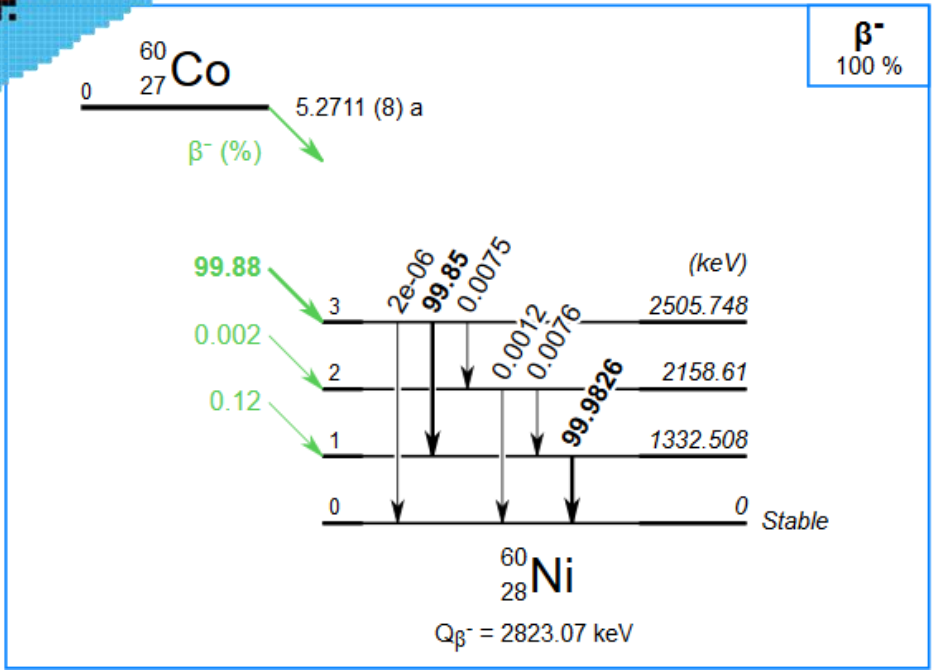
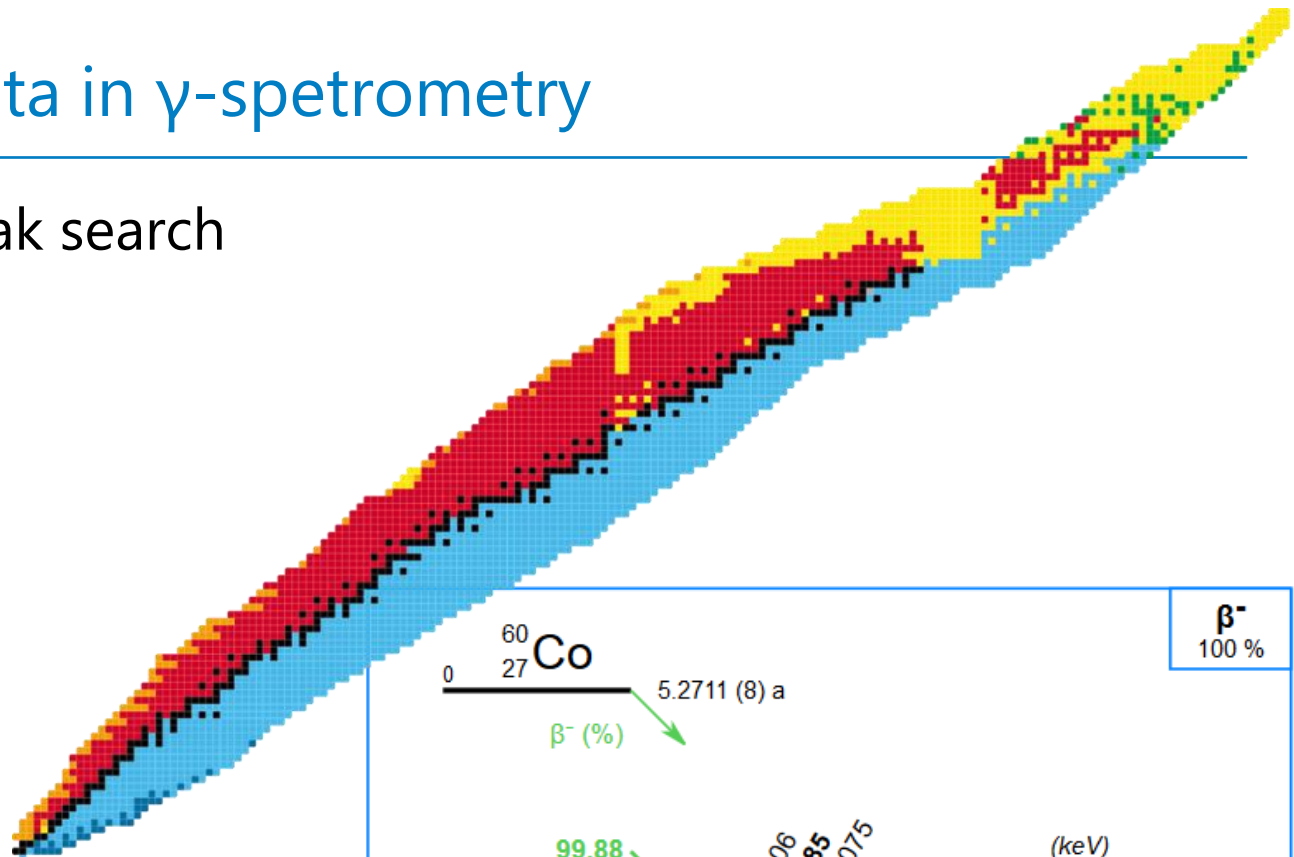


Monographie BIPM – 5 (2004-2017...)
CEA report – Table de Radionucléides 1999

www.nucleide.org

Use of nuclear data in γ -spectrometry

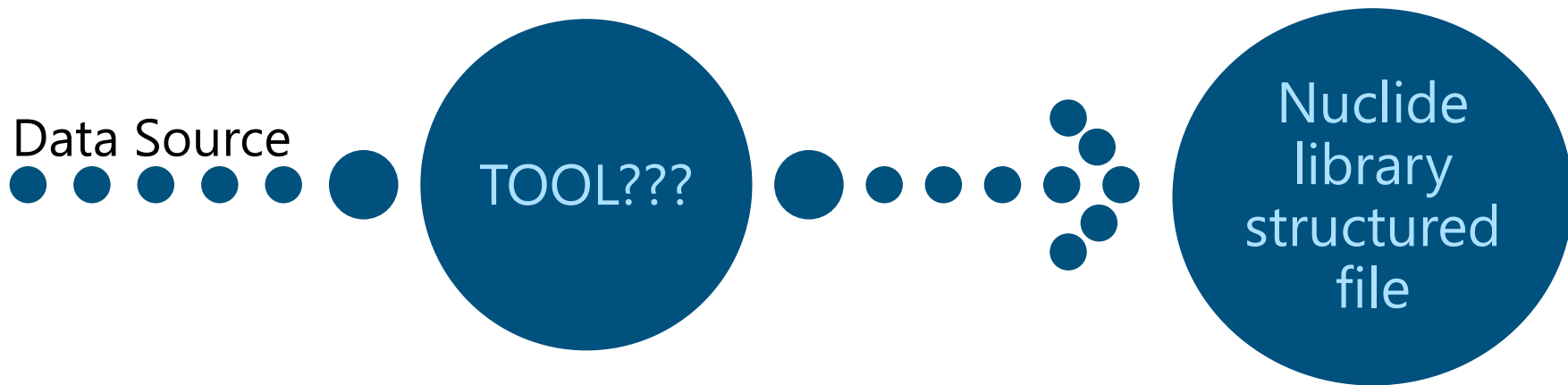
- Library driven peak search and nuclide ID
 - E_γ
- Gamma emission probabilities
 - $A = \frac{N}{I_\gamma \cdot \epsilon \cdot t \cdot C}$
- Decay correction
 - $T_{1/2}$
 - Decay series
- True summing correction
 - Decay scheme



β^-
100 %

Management of nuclear data

- ISO17025
 - Traceable
 - Data source
 - History of data
 - Procedure for data upgrading
- Data transfer



Nuclide Library Editor: NORM.NLB

File Search Options Help

Nuclide
 Name: U-235
 Full Name:
 Type: natural

Half-Life: 7.04e+08
 Uncertainty: ± 1e+07

Y
 D
 H
 M
 S

Clear

Energy Lines
 Energy: 143.764 keV
 Abundance: 10.94 %
 Uncertainty: ± 0.003000 keV
 Uncertainty: ± 0.06 Abs

Key Line
 No Wt Mean

Clear

Name	Type	Half Life	Energy - keV	Abundance - %
Pa-234m	natural	4.468e+09Y	766.36	0.3230
			1001.02	0.8470
Th-234		4.468e+09Y	* 63.29	3.7660
			92.60	4.3300
U-234	natural	2.455e+05Y	* 53.20	0.1253
U-235	natural	7.040e+08Y	@ 109.19	1.6600
			@ 140.76	0.2000
			* 143.76	10.9400
			@ 163.35	5.0800
			@ 182.62	0.3900
			@ 185.72	57.0000
			@ 202.12	1.0800
			205.31	5.0200
			@ 221.38	0.1180
Am-241		432.600Y	@ 43.42	0.0669
			@ 55.56	0.0181
			* 59.54	35.9200
			@ 98.97	0.0203
			@ 102.98	0.0195

Add Nuclide Add Line Change Delete More...

Nuclide library editor

- Typing error
- No Wt Mean
- Key Line



Nuclide library editor

- $T_{1/2}$

Nuclide Library Editor: (Untitled)

File Search Options Help

Nuclide

Name: Am-241

Half-Life: 432.6

Full Name:

Uncertainty: ± 0

Type:

Y D

H M

S

Clear

Nuclide Library Editor: (Untitled)

File Search Options Help

Nuclide

Name: Am-241

Half-Life: 0.0493511

Full Name:

Uncertainty: ± 0

Type:

Y D

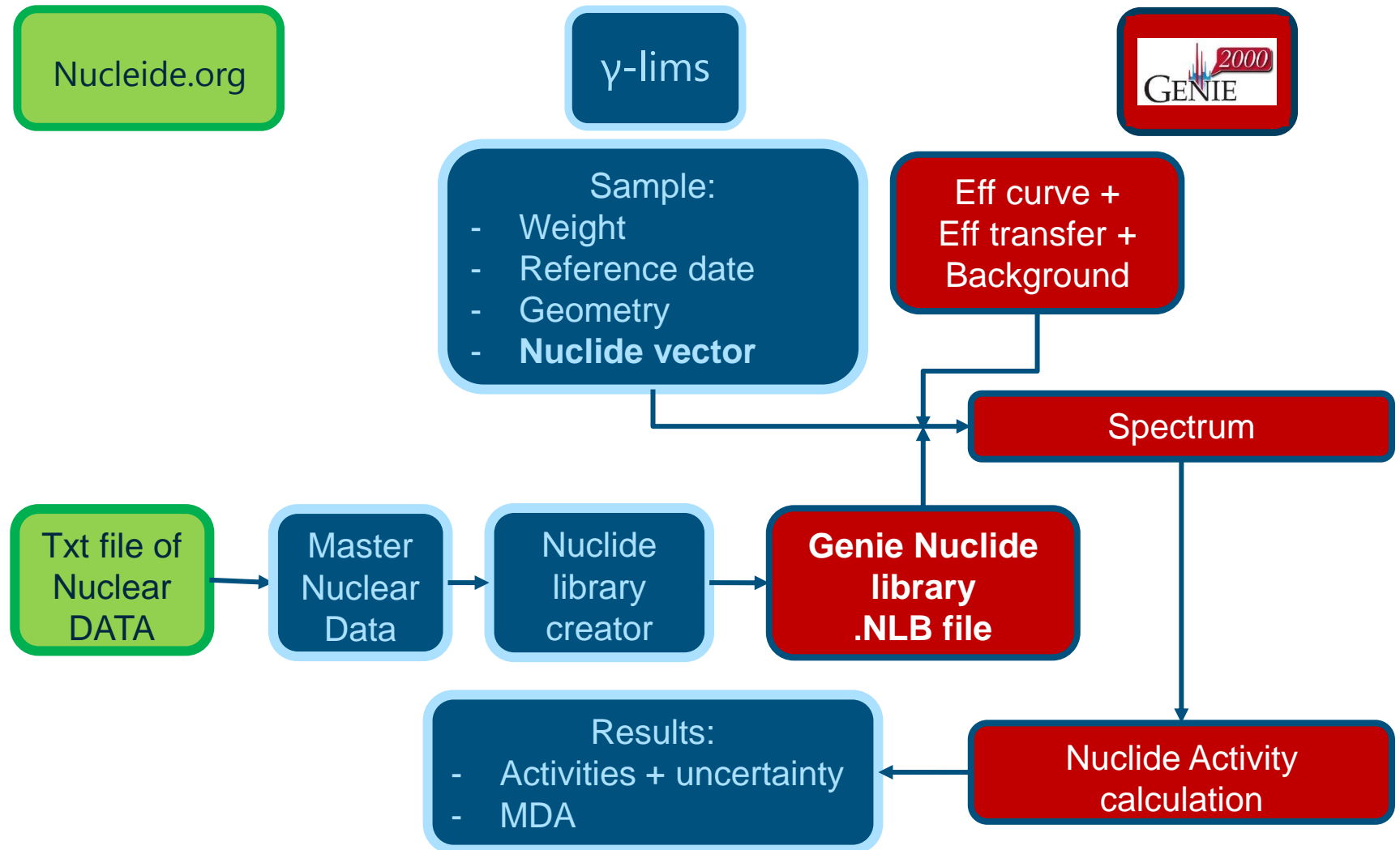
H M

S

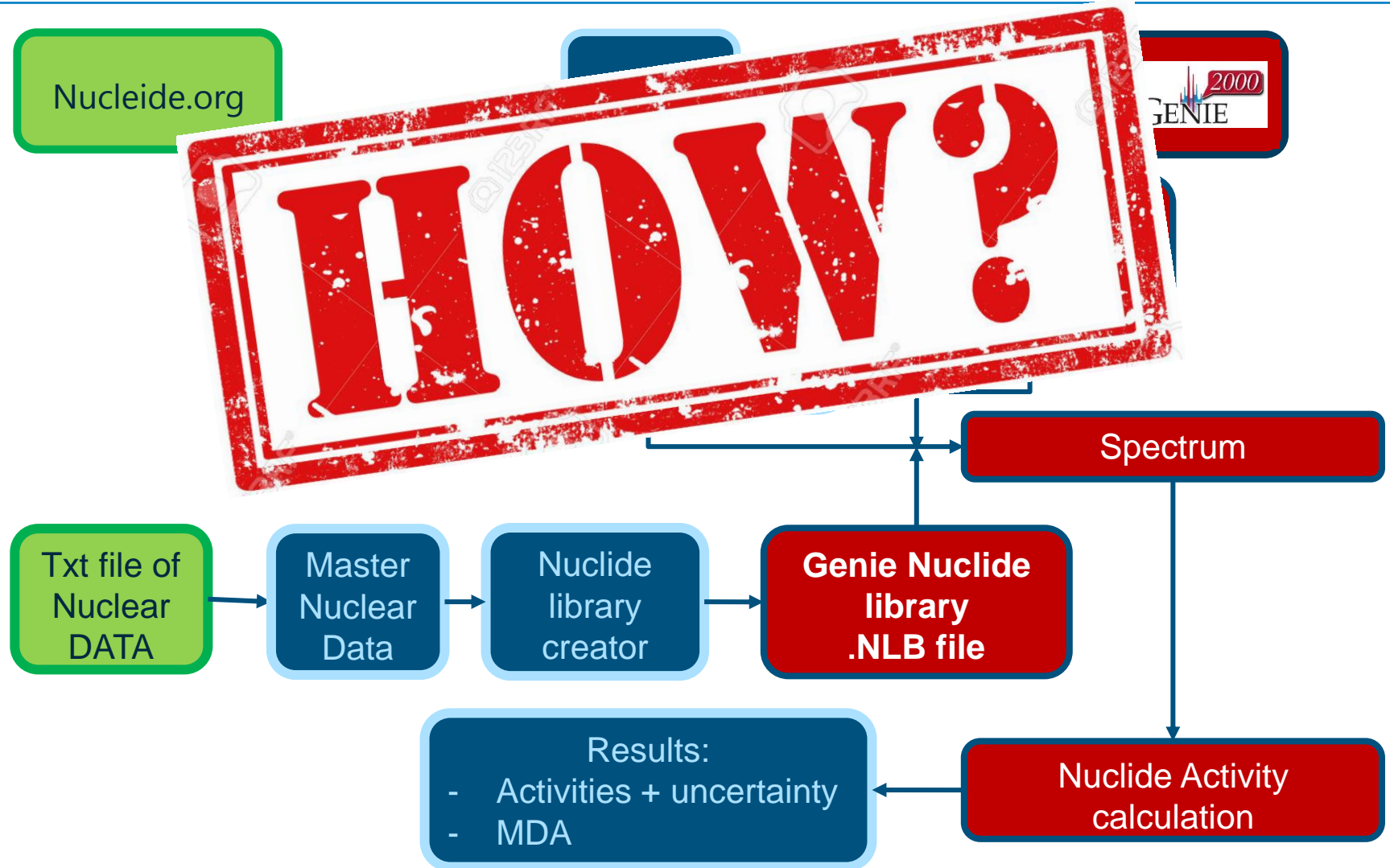
Clear



Nuclear data management integrated in γ -lims



Nuclear data management integrated in γ -lims



Creating a library: Download txt file

www.nucleide.org

(New)
Nuclear
Data

Update @
Nucleide.org

Updated
ASCII Files

Accueil LNHB | Remonter | Sommaire LNHB | Dosimétrie | Radioactivité

Laboratoire National Henri Becquerel
Recommended data

This [introduction](#) presents a brief description of the radioactivity physical processes, the enumeration of the evaluation rules leading to the recommended values, and a summary of the symbols and terms used in all the publications.

Explanation on recommended data and their evaluation (in various languages):

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 2017
newly added: Pt-142
recently updated: Co-57, Xe-133m
ASCII files updated on: 24/06/2016
(221 nuclides in table, sorted by [alphabetical order](#) / [atomic number](#) / [mass number](#) / [edition date](#))

([History of older evaluations](#), sorted by [alphabetical order](#))

Subscribe to DDEP RSS feed

Please cite our evaluations using the following references:

Vol.	Publication	Year	ISBN	NSR	BibTeX
09	CEA Report - Table de Radionucléides	1999	2-7272-0200-8	1999BaZn	TabRad_v0.bib
1	Monographie BIPM-6 - Table of Radionuclides, vol. 1	2004	92-822-2209-3	2004BeZn	TabRad_v1.bib
2	Monographie BIPM-6 - Table of Radionuclides, vol. 2	2004	92-822-2207-1	2004BeZn	TabRad_v2.bib
3	Monographie BIPM-6 - Table of Radionuclides, vol. 3	2006	92-822-2218-7	2006BeZn	TabRad_v3.bib
4	Monographie BIPM-6 - Table of Radionuclides, vol. 4	2008	92-822-2231-4	2008BeZn	TabRad_v4.bib
5	Monographie BIPM-6 - Table of Radionuclides, vol. 5	2010	978-92-822-2244-3	2010BeZn	TabRad_v5.bib
6	Monographie BIPM-6 - Table of Radionuclides, vol. 6	2011	978-92-822-2242-5	2011BeZn	TabRad_v6.bib
7	Monographie BIPM-6 - Table of Radionuclides, vol. 7	2013	978-92-822-2248-4	2013BeZn	TabRad_v7.bib
8	Monographie BIPM-6 - Table of Radionuclides, vol. 8	2016	978-92-822-2264-4	2016BeZn	TabRad_v8.bib

(Type of updates: N - new evaluation; 1 - update in comments only; 2 - minor update in table; 3 - major update in table)

Nuclide	Tables	Comments	ASCII files			Vol.	UpDate	Type*
			ENSDF	PenNuc	Lara			
Ac-225	table	comments	ensdf	pennuc	txt	5	26/08/2009	3
Ac-227	table	comments	ensdf	pennuc	txt	4	16/02/2009	2
Ac-228	table	comments	ensdf	pennuc	txt	6	22/01/2010	3
Ag-108	table	comments	ensdf	pennuc	txt	3	4/09/2006	2
Ag-108m	table	comments	ensdf	pennuc	txt	3	17/01/2012	2
Ag-110	table	comments	ensdf	pennuc	txt	1	12/03/2004	1
Ag-110m	table	comments	ensdf	pennuc	txt	1	24/03/2004	1
Al-26	table	comments	ensdf	pennuc	txt	99	24/07/2003	1
Am-241	table	comments	ensdf	pennuc	txt	5	20/08/2010	2
Am-242	table	comments	ensdf	pennuc	txt	5	18/01/2011	2
Am-242m	table	comments	ensdf	pennuc	txt	6	18/01/2011	2
Am-243	table	comments	ensdf	pennuc	txt	5	26/02/2010	2

Creating a library: Download txt file

I-131.txt

```
I-131.txt - Notepad
File Edit Format View Help
Nuclide ; I-131
Element ; Iodine
Z ; 53
Daughter(s) ; (B-) ; Xe-131 ; 100
Q- ; 970.8
Possible parent(s) ; (B-) ; Te-131 ; 100 ; ; (B-) ; Te-131m ; 79
Half-life (d) ; 8.0233 ; 0.0019
Half-life (s) ; 693.21E3 ; 0.16E3
Decay constant (1/s) ; 999.90E-9 ; 0.24E-9
Specific activity (Bq/g) ; 4.5966E15 ; 0.0011E15
Reference ; CEA/LNE-LNHB - 2014
Emissions (24 lines) sorted by increasing energy
-----
Energy (keV) ; Ener. unc. (keV) ; Intensity (%) ; Int. unc. (%) ; Type ; Origin ; Lvl. start ; Lvl. end
4.47 ; ; 0.631 ; 0.013 ; XL ; Xe-131 ; ;
29.459 ; ; 1.52 ; 0.04 ; XKa2 ; Xe-131 ; ;
29.779 ; ; 2.81 ; 0.06 ; XKa1 ; Xe-131 ; ;
33.6893 ; ; 0.816 ; 0.019 ; XK'b1 ; Xe-131 ; ;
34.4877 ; ; 0.193 ; 0.006 ; XK'b2 ; Xe-131 ; ;
80.185 ; 0.002 ; 2.607 ; 0.035 ; g ; Xe-131 ; 1 ; 0
85.9 ; 0.2 ; 0.0051 ; 0.0007 ; g ; Xe-131 ; 8 ; 6
163.930 ; 0.008 ; 0.0211 ; 0.0003 ; g ; Xe-131 ; 2 ; 0
177.214 ; 0.020 ; 0.277 ; 0.007 ; g ; Xe-131 ; 3 ; 2
232.18 ; 0.15 ; 0.0023 ; 0.0009 ; g ; Xe-131 ; 6 ; 5
272.498 ; 0.017 ; 0.0581 ; 0.0015 ; g ; Xe-131 ; 6 ; 4
284.305 ; 0.005 ; 6.14 ; 0.06 ; g ; Xe-131 ; 4 ; 1
295.8 ; 0.2 ; 0.0012 ; 0.0006 ; g ; Xe-131 ; 6 ; 3
302.4 ; 0.2 ; 0.0046 ; 0.0007 ; g ; Xe-131 ; 7 ; 4
318.088 ; 0.016 ; 0.0807 ; 0.0020 ; g ; Xe-131 ; 8 ; 5
324.651 ; 0.025 ; 0.0244 ; 0.0025 ; g ; Xe-131 ; 5 ; 1
325.789 ; 0.004 ; 0.274 ; 0.008 ; g ; Xe-131 ; 7 ; 3
358.4 ; 0.2 ; 0.017 ; 0.008 ; g ; Xe-131 ; 8 ; 4
364.489 ; 0.005 ; 81.2 ; 0.5 ; g ; Xe-131 ; 4 ; 0
404.814 ; 0.004 ; 0.0552 ; 0.0017 ; g ; Xe-131 ; 5 ; 0
503.004 ; 0.004 ; 0.3540 ; 0.0046 ; g ; Xe-131 ; 7 ; 2
636.989 ; 0.004 ; 7.12 ; 0.07 ; g ; Xe-131 ; 6 ; 0
642.719 ; 0.005 ; 0.2183 ; 0.0026 ; g ; Xe-131 ; 8 ; 1
```

Creating a library: opening the program NUCDAT_Manager.accdb

NUCDAT_Manager : Database- C:\LIMS\Nuclide_library_editor\NUCDAT_Manager.accdb (Access 2007 - 2016 file format) - Access

File Home Create External Data Database Tools Tell me what you want to do... Verheyen Leen

Nuclide Data and Genie2K Library Editor

Master Nuclear Data GENIE 2000 Library Creator Nuclide Search Archive

Th-227
Th-228
Th-230
Th-234
Tl-201
Tl-208
U-234
U-235
U-237
U-238
W-187
W-188
Xe-133
Xe-135
Xe-135m
Y-88
Zr-89

Zr-89 (B+, EC) Y-89

T1/2 78.4200 0.1300 H

Data in this box are copied to the library

Zr-89 78.4200 0.1300 H

XX* <-> XX Parent/Daughter Decay Ratio

Unc. Decay Ratio:

Nuclide Type:

Abundance Limit:

MDA to be met:

Mass Factor:

Equivalence Factor:

Average Gamma:

Average Beta:

Parent Nuclide:

Data Reference: Surrey Univ. - 2014

E (keV)	unc E (keV)	I (%)	unc I (abs)	Key Line	nwmean	ray_type	updated_on
2.0165	0	2.36	0.05	<input type="checkbox"/>	<input type="checkbox"/>	XL	29/08/17 22:30:07
14.8829	0	14.08	0.13	<input type="checkbox"/>	<input type="checkbox"/>	XKa2	29/08/17 22:30:07
14.9585	0	27.01	0.2	<input type="checkbox"/>	<input type="checkbox"/>	XKa1	29/08/17 22:30:07
16.7813	0	6.78	0.08	<input type="checkbox"/>	<input type="checkbox"/>	XK'b1	29/08/17 22:30:07
17.0259	0	0.94	0.04	<input type="checkbox"/>	<input type="checkbox"/>	XK'b2	29/08/17 22:30:07
511	0	45.6	0.6	<input type="checkbox"/>	<input type="checkbox"/>	g511	29/08/17 22:30:07
908.97	0.03	99.03	0.02	<input checked="" type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07
1620.81	0.2	0.074	0.005	<input type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07
1657.56	0.15	0.106	0.005	<input type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07
1713.1	0.3	0.745	0.01	<input type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07
1744.72	0.18	0.123	0.004	<input type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07
*				<input type="checkbox"/>	<input type="checkbox"/>		

Form View Num Lock

Creating a library: Load Nuclide data

Nuclide Data Editor

Nuclide Data and Genie2K Library Editor

Master Nuclear Data | GENIE 2000 Library Creator | Nuclide Search | Archive

Ac-227

Ac-228

Ag-108m

Ag-110m

Am-241

Ar-41

Au-198

Ba-133

Ba-140

Be-7

Bi-212

Bi-214

Cd-109

Cd-115

Cd-117

Cd-117m

Ce-139

Ce-141

Ce-144

Co-56

Zr-89 (B+, EC) Y-89

T1/2 78.4200 0.1300 H

Data in this box are copied to the library

Zr-89 78.4200 0.1300 H

XX* <-> XX Parent/Daughter Decay Ratio

Unc. Decay Ratio:

Nuclide Type:

Abundance Limit:

MDA to be met:

Mass Factor:

Equivalence Factor:

Average Gamma:

Average Beta:

Parent Nuclide:

Data Reference: Surrey Univ. - 2014

Last Updated: 29/08/17 22:30:07

updated By: mbruggem

Reason for update:

E (keV)	unc E (keV)	I (%)	unc I (abs)	Key Line	nwmean	ray_type	updated_on	updated
2.0165	0	2.36	0.05	<input type="checkbox"/>	<input type="checkbox"/>	XL	29/08/17 22:30:07	mbrugge
14.8829	0	14.08	0.13	<input type="checkbox"/>	<input type="checkbox"/>	XKa2	29/08/17 22:30:07	mbrugge
14.9585	0	27.01	0.2	<input type="checkbox"/>	<input type="checkbox"/>	XKa1	29/08/17 22:30:07	mbrugge
16.7813	0	6.78	0.08	<input type="checkbox"/>	<input type="checkbox"/>	XK'b1	29/08/17 22:30:07	mbrugge
17.0259	0	0.94	0.04	<input type="checkbox"/>	<input type="checkbox"/>	XK'b2	29/08/17 22:30:07	mbrugge
511	0	45.6	0.6	<input type="checkbox"/>	<input type="checkbox"/>	g511	29/08/17 22:30:07	mbrugge
908.97	0.03	99.03	0.02	<input checked="" type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07	mbrugge
1620.81	0.2	0.074	0.005	<input type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07	mbrugge
1657.56	0.15	0.106	0.005	<input type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07	mbrugge
1713.1	0.3	0.745	0.01	<input type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07	mbrugge
1744.72	0.18	0.123	0.004	<input type="checkbox"/>	<input type="checkbox"/>	g	29/08/17 22:30:07	mbrugge
*				<input type="checkbox"/>	<input type="checkbox"/>			

Record: 1 of 11 | No Filter | Search

Intensity Cutoff (%)

0.01

Max Energy Cutoff (keV)

3022

Import New Nuclide data

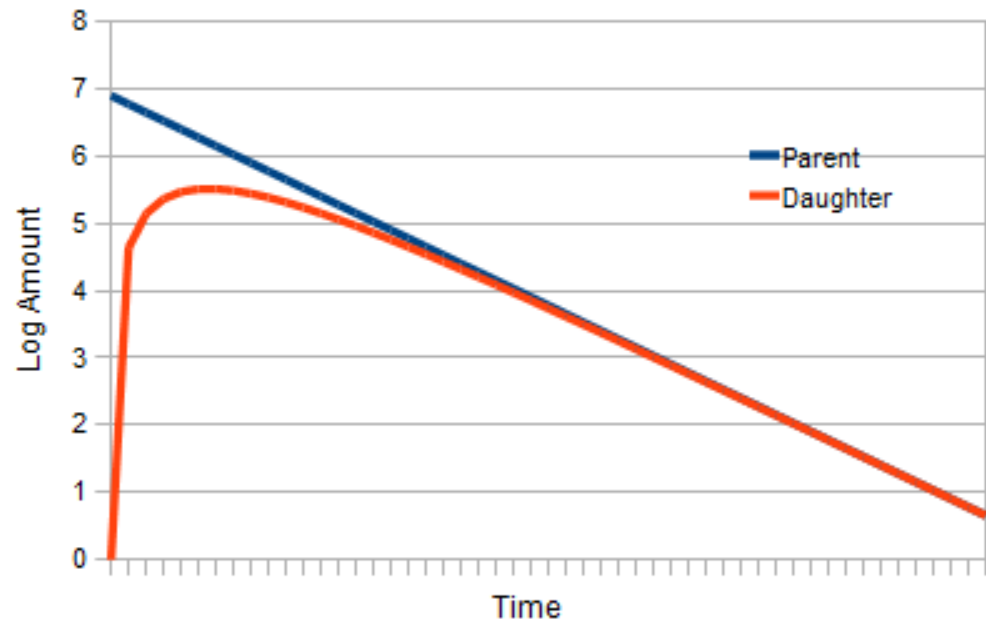
Print Nuclide

Show Nuclide Chart

Creating a library: Adjusting nuclear data

$T_{1/2}$ Mother \gg $T_{1/2}$ Daughter

- Daughter nuclides \gg proper half live
- Additional fields can store a different $T_{1/2}$
 - Daughter with half live of mother \gg Name changes \gg *
- Emission probabilities may be modified
 - Clone of the original dataset



Creating a library: Adjusting nuclear data

Bi-214	(B-)	Po-214		
	99.979	(alpha)		
T1/2		19.8000 0.1000 M		
Data in this box are copied to the library	<input type="text" value="Bi-214"/>	<input type="text" value="19.8000"/>	<input type="text" value="0.1000"/>	<input type="text" value="M"/>
	<input type="text" value="XX* <-> XX"/>	Parent/Daughter Decay Ratio: <input type="text"/>		
		Unc. Decay Ratio: <input type="text"/>		
Nuclide Type:	<input type="text"/>			
Abundance Limit:	<input type="text"/>			
MDA to be met:	<input type="text"/>			
Mass Factor:	<input type="text"/>			
Equivalence Factor:	<input type="text"/>			
Average Gamma:	<input type="text"/>			
Average Beta:	<input type="text"/>			
Parent Nuclide:	<input type="text"/>			
Data Reference:	<input type="text" value="CEA NE 1148 2007"/>			

Creating a library: Adjusting nuclear data

Bi-214	(B-)	Po-214		
	99.979	(alpha)		
T1/2		19.8000 0.1000 M		
Data in this box are copied to the library	Bi-214*	1600.0000	7.0000	Y
	XX* <-> XX	Parent/Daughter Decay Ratio:		
		Unc. Decay Ratio:		
Nuclide Type:	<input type="text"/>			
Abundance Limit:	<input type="text"/>			
MDA to be met:	<input type="text"/>			
Mass Factor:	<input type="text"/>			
Equivalence Factor:	<input type="text"/>			
Average Gamma:	<input type="text"/>			
Average Beta:	<input type="text"/>			
Parent Nuclide:	Ra-226			

Library Creator

Import radionuclides

Master Nuclear Data **GENIE 2000** Library Creator Nuclide Search Archive

Intensity Threshold (%)
 Min Energy (keV)
 Max Energy (keV)

Select Nuclides to Copy Nuclides in List Energy Lines in temporary List

Nuclide	Nuclide_Name_ir	Nuclide	E (keV)	Unc. E	I (%)	Unc. I	Type	Key L	nwmean	Nuclr	E_follo
*		*						<input type="checkbox"/>	<input type="checkbox"/>		

Intensity Threshold (%)
 Min Energy (keV)
 Max Energy (keV)

$EI = \sqrt{E_0 + E_1} \cdot \text{SQRT}(E_1)$

Record: 1 of 2

Library Creator

Import radionuclides



Master Nuclear Data



Library Creator



Nuclide Search



Archive

Add To List

Intensity Threshold (%)

0.5

Min Energy (keV)

25

Max Energy (keV)

2000

Select Nuclides to Copy

Nuclides in List

Energy Lines in temporary List

	Nuclide	Nuclide_Name_ir	Nuclide	E (keV)	Unc. E	I (%)	Unc. I	Type	Key L	nwmean	Nucllr	E_follo
Hg-197m	Co-60	Co-60	Co-60	1173.228	0.003	99.85	0.03	g	<input type="checkbox"/>	<input type="checkbox"/>	1	
Hg-203	Cs-134	Cs-134	Co-60	1332.492	0.004	99.9826	0.0006	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	
Ho-166m	Cs-137	Cs-137	Cs-134	475.365	0.002	1.479	0.007	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
I-123			Cs-134	563.246	0.003	8.342	0.015	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
I-125	*		Cs-134	569.33	0.002	15.368	0.021	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
I-129			Cs-134	604.72	0.003	97.63	0.08	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	
I-132			Cs-134	795.86	0.01	85.47	0.09	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
I-133			Cs-134	801.95	0.006	8.694	0.016	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
I-134			Cs-134	1038.605	0.008	0.9909	0.0033	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
I-135			Cs-134	1167.967	0.004	1.791	0.005	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
In-115m			Cs-134	1365.194	0.004	3.019	0.008	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
In-116m			Cs-137	31.8174	0	1.95	0.04	XKa2	<input type="checkbox"/>	<input type="checkbox"/>	3	
Ir-192			Cs-137	32.1939	0	3.59	0.07	XKa1	<input type="checkbox"/>	<input type="checkbox"/>	3	
K-40			Cs-137	36.4457	0	1.055	0.022	XKb1	<input type="checkbox"/>	<input type="checkbox"/>	3	
Kr-85	Cs-137		Cs-137	661.657	0.003	84.99	0.2	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3	
Kr-85m			*						<input type="checkbox"/>	<input type="checkbox"/>		
Kr-87												
Kr-88												
La-140												
Mn-54												
Mn-56												
Mo-101												
Mo-93m												
Mo-99												
Na-22												
Na-24												
Nb-94												

Clear Whole List

Remove Selection From List

Remove nuclide filter

Update

Export to Library

$$E = X*(E0 + E1*\text{SQRT}(E1))$$

E0= 0.001

E1= 0.001

X 1

Record: 1 of 2

Cmd_find_interferences

Merge Selected Lines


Library creator

Options Key Line and nwmean

Nuclide ▾	E (keV) ▾	Unc. E ▾	I (%) ▾	Unc. I ▾	Type ▾	Key L ▾	nwmean ▾
Co-60	1173.228	0.003	99.85	0.03	g	<input type="checkbox"/>	<input type="checkbox"/>
Co-60	1332.492	0.004	99.9826	0.0006	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Cs-134	475.365	0.002	1.479	0.007	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-134	563.246	0.003	8.342	0.015	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-134	569.33	0.002	15.368	0.021	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-134	604.72	0.003	97.63	0.08	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Cs-134	795.86	0.01	85.47	0.09	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-134	801.95	0.006	8.694	0.016	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-134	1038.605	0.008	0.9909	0.0033	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-134	1167.967	0.004	1.791	0.005	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-134	1365.194	0.004	3.019	0.008	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-137	32.061	0	5.54	0.081	XKa2	<input type="checkbox"/>	<input type="checkbox"/>
Cs-137	36.4457	0	1.055	0.022	XKb1	<input type="checkbox"/>	<input type="checkbox"/>
Cs-137	661.657	0.003	84.99	0.2	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>

Library creator

Options Key Line and nwmean

↙ Nuclide ↘	E (keV) ↘	Unc. E ↘	I (%) ↘	Unc. I ↘	Type ↘	Key L ↘	nwmean ↘
Co-60	1173.228	0.003	99.85	0.03	g	<input type="checkbox"/>	<input type="checkbox"/>
Co-60	1332.492	0.004	99.9826	0.0006	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Cs-134	475.365	0.002	1.479	0.007	g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cs-134	563.246	0.003	8.342	0.015	g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cs-134	569.33	0.002	15.368	0.021	g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cs-134	604.72	0.003	97.63	0.08	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Cs-134	795.86	0.01	85.47	0.09	g	<input type="checkbox"/>	<input type="checkbox"/>
Cs-134	801.95	0.006	8.694	0.016	g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cs-134	1038.605	0.008	0.9909	0.0033	g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cs-134	1167.967	0.004	1.791	0.005	g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cs-134	1365.194	0.004	3.019	0.008	g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cs-137	32.061	0	5.54	0.081	XKa2	<input type="checkbox"/>	<input checked="" type="checkbox"/>
 Cs-137	36.4457	0	1.055	0.022	XKb1	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cs-137	661.657	0.003	84.99	0.2	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
*						<input type="checkbox"/>	<input type="checkbox"/>

Library Creator

Combine energy lines

Nuclide	E (keV)	Unc. E	I (%)	Unc. I	Type	Key L	nwmean	Nucllr	E_follo
Co-60	1173.228	0.003	99.85	0.03	g	<input type="checkbox"/>	<input type="checkbox"/>	1	
Co-60	1332.492	0.004	99.9826	0.0006	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	
Cs-134	475.365	0.002	1.479	0.007	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
Cs-134	563.246	0.003	8.342	0.015	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
Cs-134	569.33	0.002	15.368	0.021	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
Cs-134	604.72	0.003	97.63	0.08	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	
Cs-134	795.86	0.01	85.47	0.09	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
Cs-134	801.95	0.006	8.694	0.016	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
Cs-134	1038.605	0.008	0.9909	0.0033	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
Cs-134	1167.967	0.004	1.791	0.005	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
Cs-134	1365.194	0.004	3.019	0.008	g	<input type="checkbox"/>	<input type="checkbox"/>	2	
Cs-137	31.8174	0	1.95	0.04	XKa2	<input type="checkbox"/>	<input type="checkbox"/>	3	
Cs-137	32.1939	0	3.59	0.07	XKa1	<input type="checkbox"/>	<input type="checkbox"/>	3	
Cs-137	36.4457	0	1.055	0.022	XKb1	<input type="checkbox"/>	<input type="checkbox"/>	3	
Cs-137	661.657	0.003	84.99	0.2	g	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3	

$E = X * (E0 + E1 * \text{SQRT}(E1))$

E0=

E1=

X

Record:

Library Creator

Combine energy lines

$\Delta E = X * (E0 + E1 * \text{SQR}(E))$

E0=

E1=

X

Record: 1 of 2

Cmd_find_interferences

Merge Selected Lines

$\Delta E = X * (E0 + E1 \sqrt{E})$

Nuclide	E (keV)	Unc. E
Co-60	1173.228	0.003
Co-60	1332.492	0.004
Cs-134	475.365	0.002
Cs-134	563.246	0.003
Cs-134	569.33	0.002
Cs-134	604.72	0.003
Cs-134	795.86	0.01
Cs-134	801.95	0.006
Cs-134	1038.605	0.008
Cs-134	1167.967	0.004
Cs-134	1365.194	0.004
Cs-137	31.8174	0
Cs-137	32.1939	0
Cs-137	36.4457	0
Cs-137	661.657	0.003
*		

Merge selected Lines

Cs-134	1167.967	0.004	1.791	0.005
Cs-134	1365.194	0.004	3.019	0.008
Cs-137	32.061	0	5.54	0.081
Cs-137	36.4457	0	1.055	0.022
Cs-137	661.657	0.003	84.99	0.2

Library creator functions

Master Nuclear Data GENIE 2000 Library Creator Nuclide Search Archive

Intensity Threshold (%) Min Energy (keV) Max Energy (keV)

Select Nuclides to Copy Nuclides in List Energy Lines in temporary List

Nuclide	Nuclide_Name_ir	Nuclide	E (keV)	Unc. E	I (%)	Unc. I	Type	Key L
Hg-197m								
Hg-203								
Ho-166m								
I-123	Co-60	Co-60	1173.228	0.003	99.85	0.03	g	<input type="checkbox"/>
I-125	Cs-134	Co-60	1332.492	0.004	99.9826	0.0006	g	<input checked="" type="checkbox"/>
I-129	Cs-137	Cs-134	475.365	0.002	1.479	0.007	g	<input type="checkbox"/>
I-132	*	Cs-134	563.246	0.003	8.342	0.015	g	<input type="checkbox"/>
I-133		Cs-134	569.33	0.002	15.368	0.021	g	<input type="checkbox"/>
I-134		Cs-134	604.72	0.003	97.63	0.08	g	<input checked="" type="checkbox"/>
I-135		Cs-134	795.86	0.01	85.47	0.09	g	<input type="checkbox"/>
In-115m		Cs-134	801.95	0.006	8.694	0.016	g	<input type="checkbox"/>
In-116m		Cs-134	1038.605	0.008	0.9909	0.0033	g	<input type="checkbox"/>
Ir-192		Cs-134	1167.967	0.004	1.791	0.005	g	<input type="checkbox"/>
K-40		Cs-134	1365.194	0.004	3.019	0.008	g	<input type="checkbox"/>
Kr-85		Cs-137	31.8174	0	1.95	0.04	XKa2	<input type="checkbox"/>
Kr-85m		Cs-137	32.1939	0	3.59	0.07	XKa1	<input type="checkbox"/>
Kr-87		Cs-137	36.4457	0	1.055	0.022	XKb1	<input type="checkbox"/>
Kr-88		Cs-137	661.657	0.003	84.99	0.2	g	<input checked="" type="checkbox"/>
La-140	*	*						<input type="checkbox"/>
Mn-54								
Mn-56								
Mo-101								
Mo-93m								
Mo-99								
Na-22								
Na-24								
Nb-94								

Clear Whole List

Remove Selection From List

Remove nuclide filter

Update

Export to Library

$\Delta E = X*(E0 + E1*SQR(E))$

E0=

E1=

X

Record: 1 of 2

Cmd_find_interferences

Merge Selected Lines

Library creator Export to Library

Master Nuclear Data GENIE 2000 Library Creator Nuclide Search Archive

Intensity Threshold (%) 0.5 Min Energy (keV) 25 Max Energy (keV) 2000

Select Nuclides to Copy Nuclides in List Energy Lines in temporary List

Nuclide	Nuclide_Name_ir	Nuclide	E (keV)	Unc. E	I (%)	Unc. I	Type	Key L	nwmean	Nucllr	E_follo
Co-60	Co-60	Co-60	1173.228	0.003	99.85	0.03 g	<input type="checkbox"/>	<input type="checkbox"/>		1	
Cs-134	Cs-134	Co-60	1332.492	0.004	99.9826	0.0006 g	<input checked="" type="checkbox"/>	<input type="checkbox"/>		1	
Cs-137	Cs-137	Cs-134	475.365	0.002	1.479	0.007 g	<input type="checkbox"/>	<input type="checkbox"/>		2	
*		Cs-134	563.246	0.003	8.342	0.015 g	<input type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-134	569.33	0.002	15.368	0.021 g	<input type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-134					<input checked="" type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-134					<input type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-134					<input type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-134					<input type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-134					<input type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-134					<input type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-134					<input type="checkbox"/>	<input type="checkbox"/>		2	
		Cs-137					<input type="checkbox"/>	<input type="checkbox"/>		3	
		Cs-137					<input type="checkbox"/>	<input type="checkbox"/>		3	
		Cs-137					<input checked="" type="checkbox"/>	<input type="checkbox"/>		3	
		*					<input type="checkbox"/>	<input type="checkbox"/>			

ENTER LIBRARY NAME

Enter a name for the nuclide library
Do not add an extension!
The library will automatically be stored on the server computer

OK Cancel

Clear Whole List
Remove Selection From List
Remove nuclide filter
Update
Export to Library

$E = X * (E0 + E1 * \text{SQRT}(E1))$
E0= 0.1
E1= 0.1
X= 0.8
Record: 1 of 2
Cmd_find_interferences
Merge Selected Lines

Type a library name **CoCs**

- C:\GENIE2K\CAMFILES
- CoCs.nlb is created

Library creator GENIE2K

Nuclide Library Editor: CoCs.nlb

File Search Options Help

Nuclide

Name: Half-Life: Y D

Full Name: H M

Type: Uncertainty: \pm S

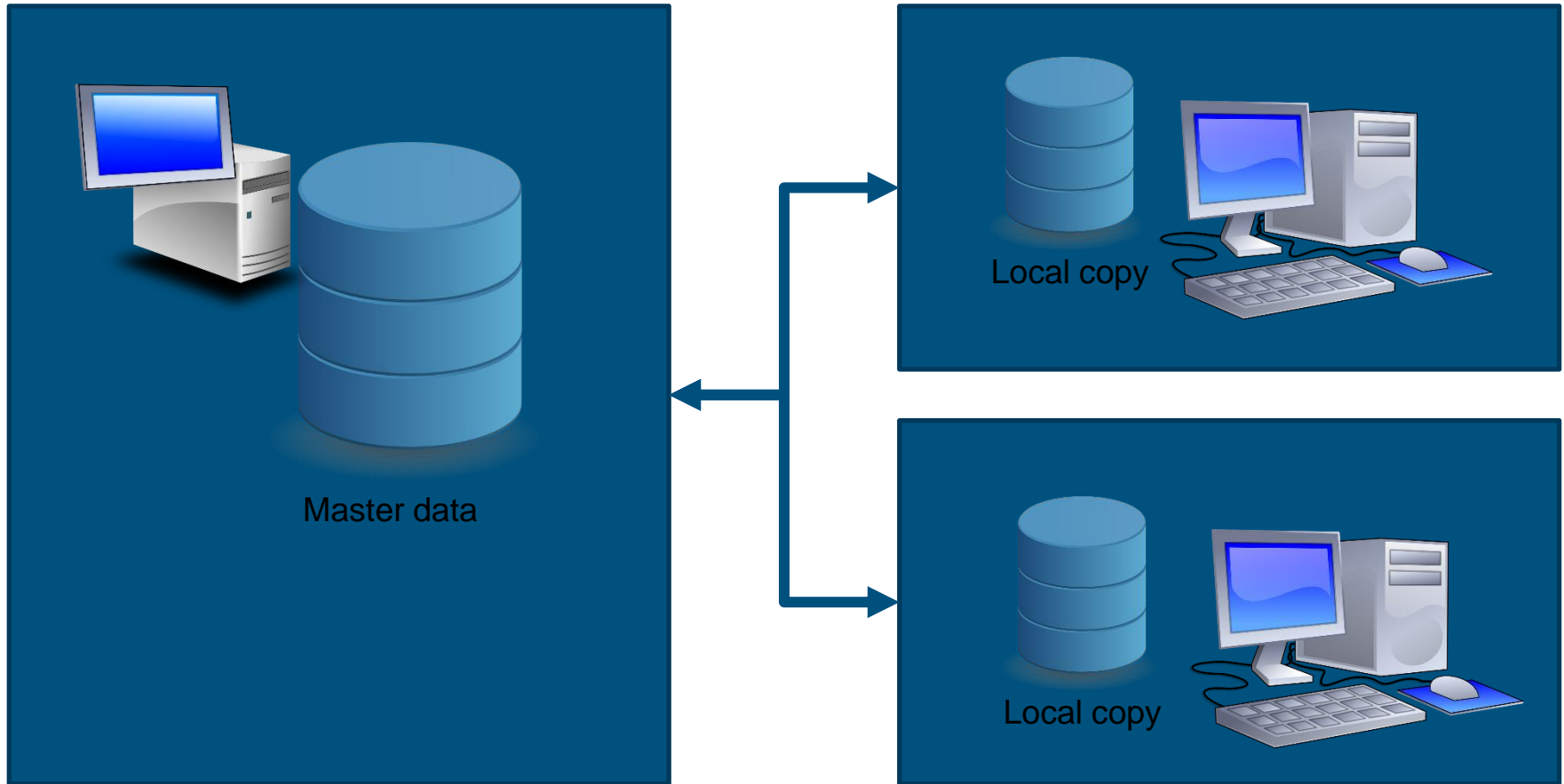
Energy Lines

Energy: keV Abundance: % Key Line

Uncertainty: \pm keV Uncertainty: \pm Abs No Wt Mean

Name	Type	Half Life	Energy - keV	Abundance - %
Co-60	type	6.000Y		
			1173.22	99.8500
			+ 1332.49	99.9826
Cs-134	type	2.065Y		
			@ 475.36	1.4790
			@ 563.24	8.3420
			@ 569.33	15.3680
			+ 604.72	97.6300
			795.86	85.4700
			@ 801.95	8.6940
			@ 1038.60	0.9909
			@ 1167.96	1.7910
			@ 1365.19	3.0190
Cs-137	type	30.050Y		
			@ 32.06	5.5400
			@ 36.44	1.0550
			+ 661.65	84.9900

Central management: masterdata on server



- Active data and Archive data

The screenshot shows the GENIE 2000 Library Creator interface. The top menu bar includes 'Master Nuclear Data', 'GENIE 2000 Library Creator', 'Nuclide Search', and 'Archive'. Below the menu is a table with columns: Nuclide_Name, Nuclide_Name_in_LIB, Nuclide_typ, Half-life_SE, Half-life, Half_life_ur, Half_life_ur, Half_life_ur, Half_life_in, Half_life_ur, Half_life_ur, Ab. The table contains data for Co-60 and Bi-214. Below the table is a search bar and a 'Record: 1 of 5' indicator. At the bottom, there is another table with columns: Nuclide, Energy, Uncertainty, Abundance, Uncertainty, ray_type, Key_line, No_weight, updated_on, updated_by, Nuclide_Enr.

Nuclide_Name	Nuclide_Name_in_LIB	Nuclide_typ	Half-life_SE	Half-life	Half_life_ur	Half_life_ur	Half_life_ur	Half_life_in	Half_life_ur	Half_life_ur	Ab
Co-60	Co-60		166340000	6	25000	0.0008 Y		6	0.0008 Y		
Co-60	Co-60		166340000	6	25000	0.0008 Y		6	0.0008 Y		
Co-60	Co-60		166340000	6	25000	0.0008 Y		6	0.0008 Y		
Bi-214	Bi-214*		1188	19.8	6	0.1 M		1600	7 Y		

Nuclide	Energy	Uncertainty	Abundance	Uncertainty	ray_type	Key_line	No_weight	updated_on	updated_by	Nuclide_Enr
Co-60	1173.228	0.003	99.85	0.03 g		<input type="checkbox"/>	<input type="checkbox"/>	29/08/17 22:48:42	mbruggem	<input checked="" type="checkbox"/>

- Importing new data

- Archiving the old data

- Archived data can be consulted separately

- Importing new radionuclide

- Creates the new nuclide in the database

- Post treatment of data is always on cloned data

- Genie2K: new or old version
- Regional settings: POINT

- C:\GENIE2K\CAMFILES >>>



template.NLB

- C:\LIMS

- Nuclide_library_editor

Name	Date modified	Type	Size
radionuclides	5/09/17 9:41	File folder	
NUCDAT_Manager.accdb	5/09/17 10:41	Microsoft Access ...	3 372 KB
nuclide_chart.pdf	8/12/12 18:07	Adobe Acrobat D...	333 KB

- Data: Master data >>> link table manager

Name	Date modified	Type	Size
Nuclear_data.accdb	5/09/17 9:30	Microsoft Access ...	920 KB

- Downloading a nuclide file: www.nucleide.org
- Importing nuclide data
- Adjusting the T1/2 of daughter
- Selecting nuclides for library
- Post treatment of lines
- Create a library
- Open library in Genie2K





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Belgian Nuclear Research Centre

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Fondation d'Utilité Publique
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