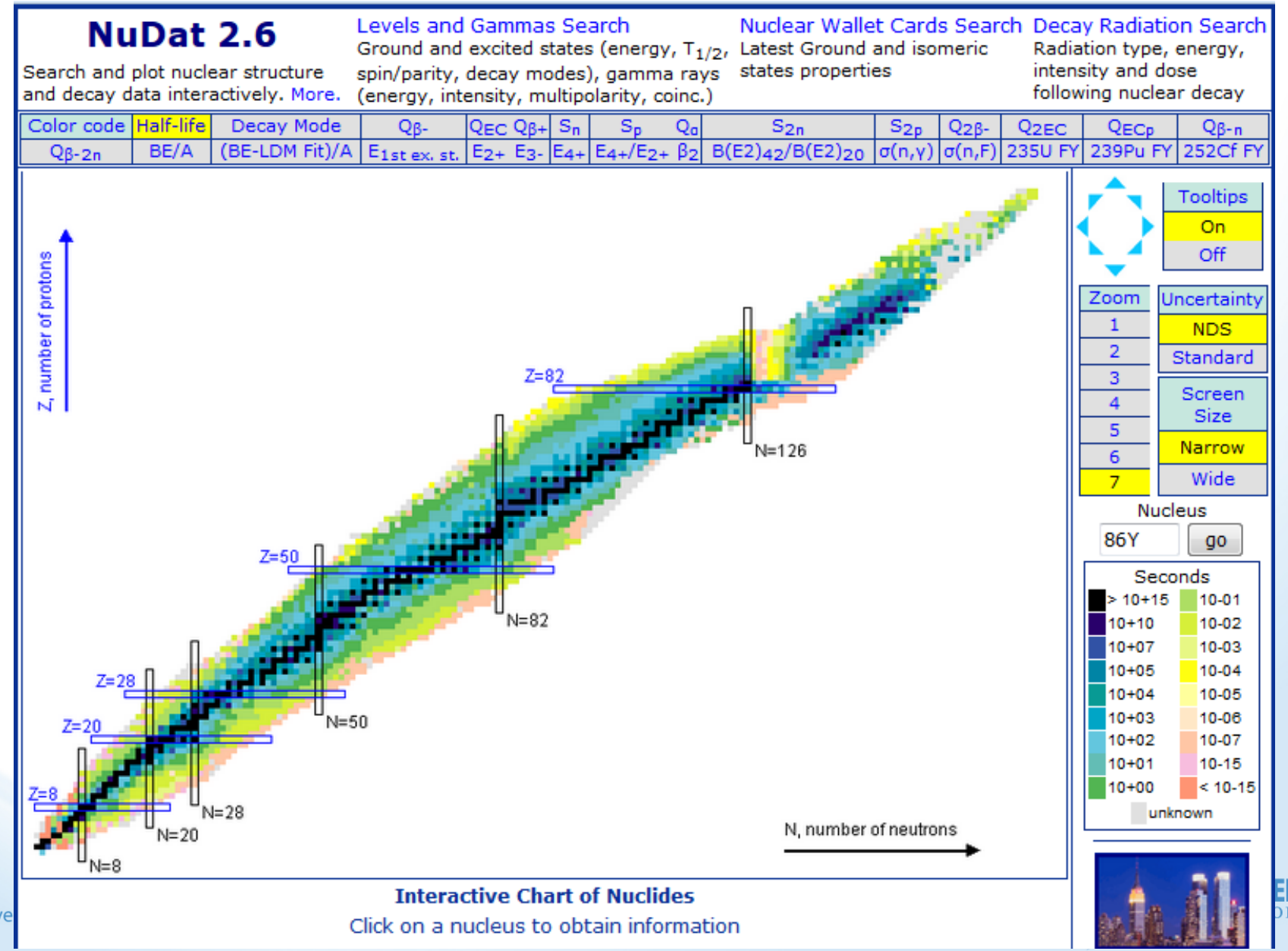
NuDat

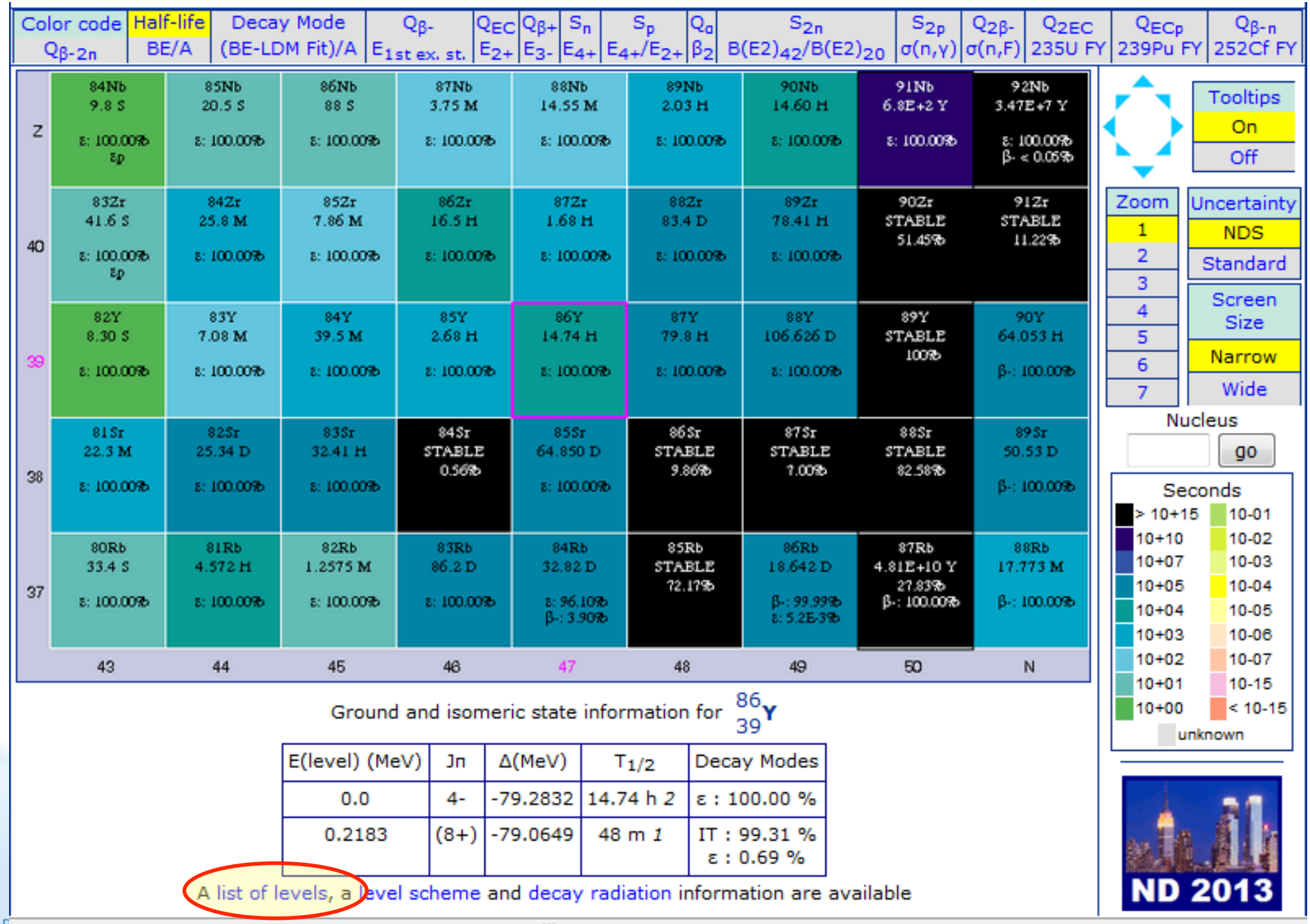
Developed by Alejandro Sonzogni
National Nuclear Data Center
Brookhaven National Laboratory, NY USA

BROOKHAVEN NATIONAL LABORATORY
a passion for discovery

U.S. DEPARTMENT OF ENERGY | Office of Science

The friendly face of ENSDF





Ground and isomeric state information for $^{86}_{39}Y$

E(level) (MeV)	Jπ	Δ(MeV)	$T_{1/2}$	Decay Modes
0.0	4-	-79.2832	14.74 h *2*	ε : 100.00 %
0.2183	(8+)	-79.0649	48 m *1*	IT : 99.31 % ε : 0.69 %

A list of levels, a level scheme and decay radiation information are available

ADOPTED LEVELS, GAMMAS for ^{86}Y

Authors: Alexandru Negret, Balraj Singh Citation: Nucl. Data Sheets 124, 1 (2015) Cutoff date: 30-Nov-2014

Full ENSDF file

Q(β-)=-1315 keV *15* S(n)= 9512 keV *24* S(p)= 5469 keV *14* Q(α)= -5520 keV *14* Reference: 2012WA38

References:

A ^{86}Zr ε DECAY (16.5 H)
B ^{86}Y IT DECAY (47.4 M)
C ^{52}Cr(^{37}Cl,2pnγ)
D ^{76}Ge(^{14}N,4nγ),^{73}Ge(^{16}O,P2N)
E ^{76}Ge(^{14}N,4nγ),^{86}Sr(d,2nγ)
F ^{85}Rb(α,3nγ)
G ^{86}Sr(^{3}He,t)

E(level) (keV)	XREF	Jπ(level)	$T_{1/2}$(level)	E(γ) (keV)	I(γ)	M(γ)	Final level	
0.0	ABCDEFG	4-	14.74 h *2* % ε = 100					
208.04 *7*	BCDEFG	(5)-	70 ns *7*	208.06 *7*	100	E2(+M1)	0.0	4-
218.21 *9*	ABCDE G	(8+)	47.4 m *4* % IT = 99.31 *4* % ε = 0.69 *4*	10.22 *8*	100	(E3)	208.04	(5)-
242.80 *10*	A D	2-	28.6 ns *21*	242.80 *10*	100	E2	0.0	4-
271.90 *13*	A G	1+	< 10 ns	29.1 *1*	100	E1	242.80	2-
302.18 *9*	CDEFG	(6+)	127 ns *4*	84.0 *1* 94.11 *7*	17 *8* 100 *17*	[E2] (E1)	218.21 208.04	(8+) (5)-
303.13 *11*	CD	(7+)		85.00 *7*	100	D	218.21	(8+)
353 *20*	G	(3+,4+)						
465 *20*	G	(5+,6+)&(LE2)						
469.44 *21*	D			261.4 *2*	100		208.04	(5)-
475.98 *22*	D			173.8 *2*	100		302.18	(6+)
536 *20*	G	(3+,4+)						
620.68 *22*	D			318.5 *2*	100		302.18	(6+)
643 *20*	G							
662.11 *11*	CD			359.82 *16* 662.00 *17*	100 *25* 44 *17*		302.18 0.0	(6+) 4-
671 *20*	G	(4-,5-)						
741.98 *22*	D G	(4:7)		439.8 *2*	100		302.18	(6+)
850.33 *11*	CD			642.30 *9*	100		208.04	(5)-
883.90 *13*	A	1+		612.00 *10* 641.10 *10*	100		271.90 242.80	1+ 2-
886.20 *12*	CDE G	(9+)		668.00 *9*	100	D	218.21	(8+)
900.35 *11*	CD			238.20 *7* 597.9 *2* 692.20 *14*	100 *16* 40 *22* 78 *16*		662.11 303.13 208.04	 (7+) (5)-
978 *20*	G	(1+,2+)						
1058 *20*	G	(1+,2+)						

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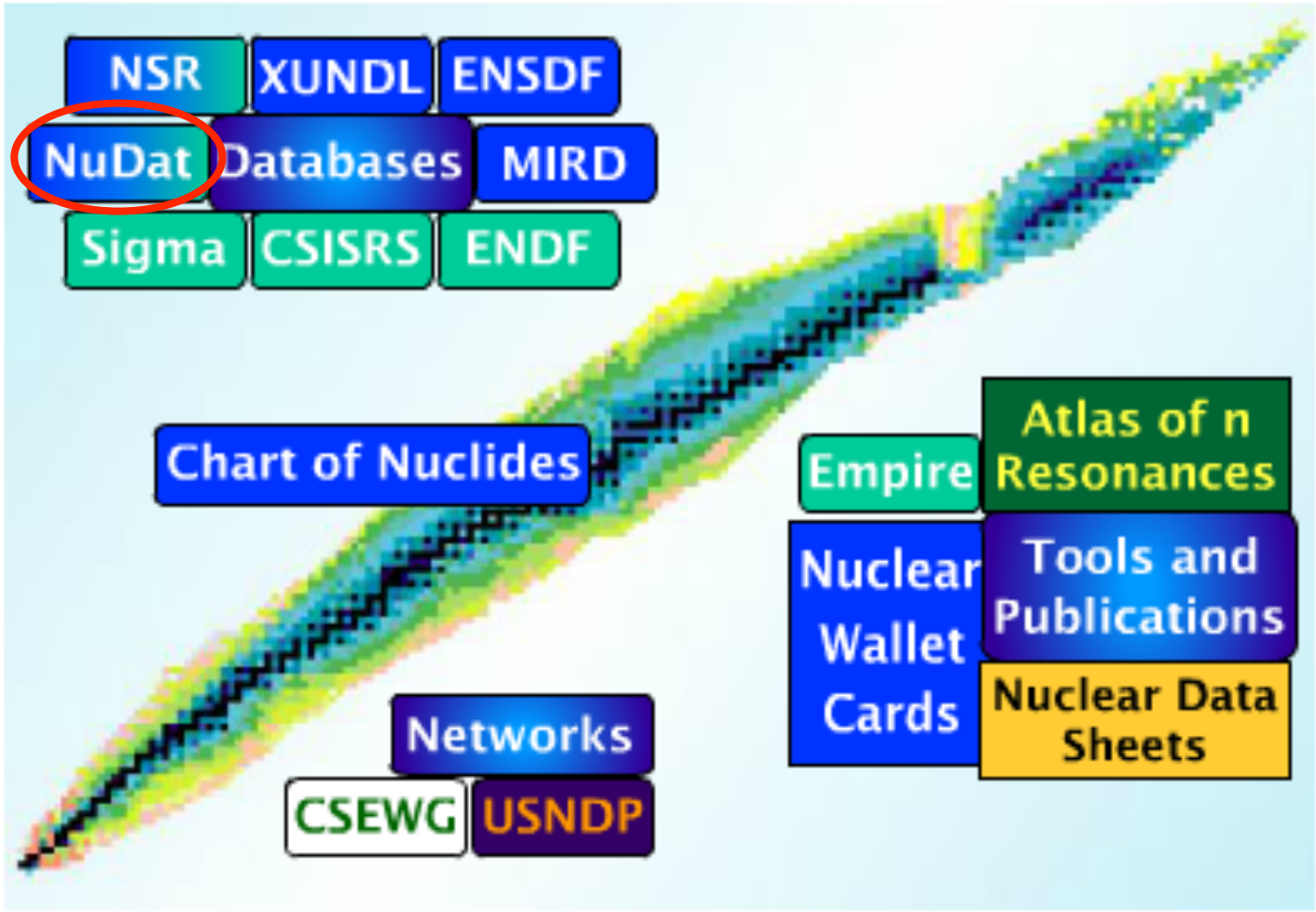
Decay Data Searches



NuDat 2.6

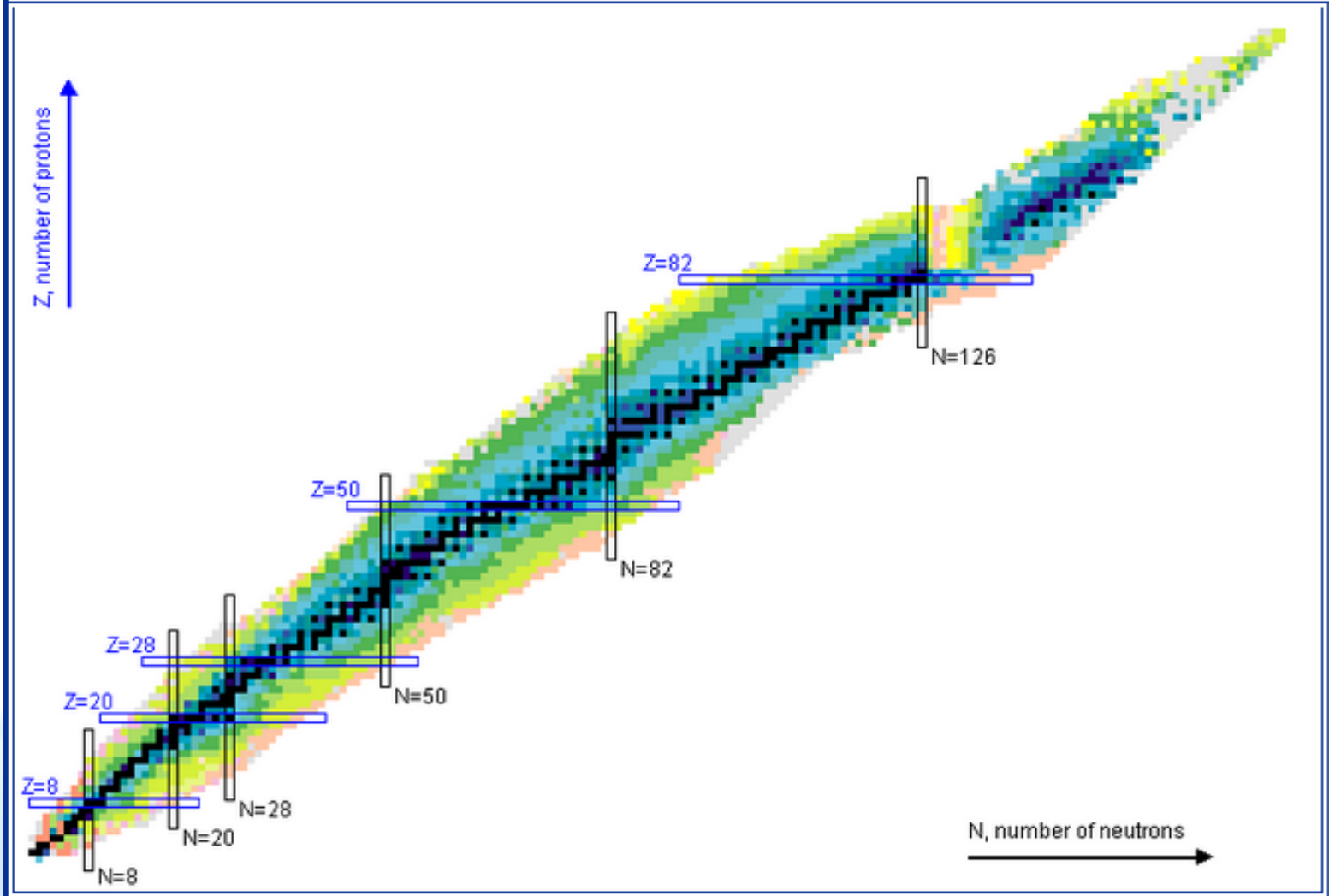
Search and plot nuclear structure and decay data interactively. More.

Levels and Gammas Search
Ground and excited states (energy, $T_{1/2}$, spin/parity, decay modes), gamma rays (energy, intensity, multipolarity, coinc.)

Nuclear Wallet Cards Search
Latest Ground and isomeric states properties

Decay Radiation Search
Radiation type, energy, intensity and dose following nuclear decay

Color code	Half-life	Decay Mode	Qβ-	QEC Qβ+	Sn	Sp Qα	S2n	S2p	Q2β-	Q2EC	QECp	Qβ-n
Qβ-2n	BE/A	(BE-LDM Fit)/A	E1st ex. st.	E2+ E3-	E4+	E4+/E2+ β2	B(E2)42/B(E2)20	σ(n,γ)	σ(n,F)	235U FY	239Pu FY	252Cf FY



Tooltips: On / Off

Zoom: 1 2 3 4 5 6 7

Uncertainty: NDS / Standard

Screen Size: Narrow / Wide

Nucleus: 86Y go

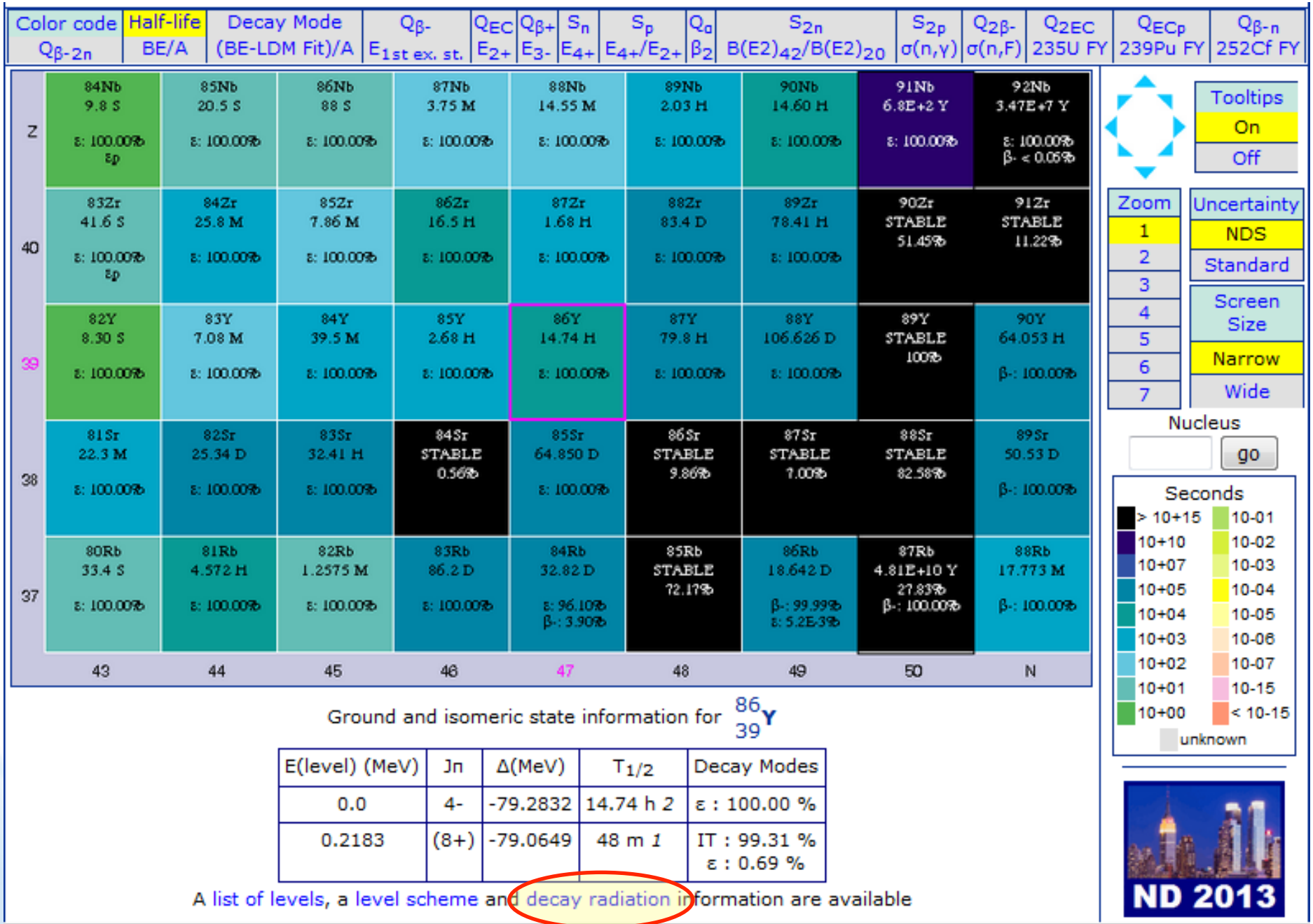
Seconds

> 10+15	10-01
10+10	10-02
10+07	10-03
10+05	10-04
10+04	10-05
10+03	10-06
10+02	10-07
10+01	10-15
10+00	< 10-15

unknown

Interactive Chart of Nuclides

Click on a nucleus to obtain information



Ground and isomeric state information for $^{86}_{39}Y$

E(level) (MeV)	Jπ	Δ(MeV)	$T_{1/2}$	Decay Modes
0.0	4-	-79.2832	14.74 h *2*	ε : 100.00 %
0.2183	(8+)	-79.0649	48 m *1*	IT : 99.31 % ε : 0.69 %

A list of levels, a level scheme and decay radiation information are available

Search results

Authors: Alexandru Negret, Balraj Singh Citation:Nuclear Data Sheets 124, 1 (2015)

Parent Nucleus	Parent E(level)	Parent Jπ	Parent $T_{1/2}$	Decay Mode	GS-GS Q-value (keV)	Daughter Nucleus	Decay Scheme	ENSDF file
$^{86}_{39}Y$	0.0	4-	14.74 h *2*	ε: 100 %	5240 *14*	$^{86}_{38}Sr$		

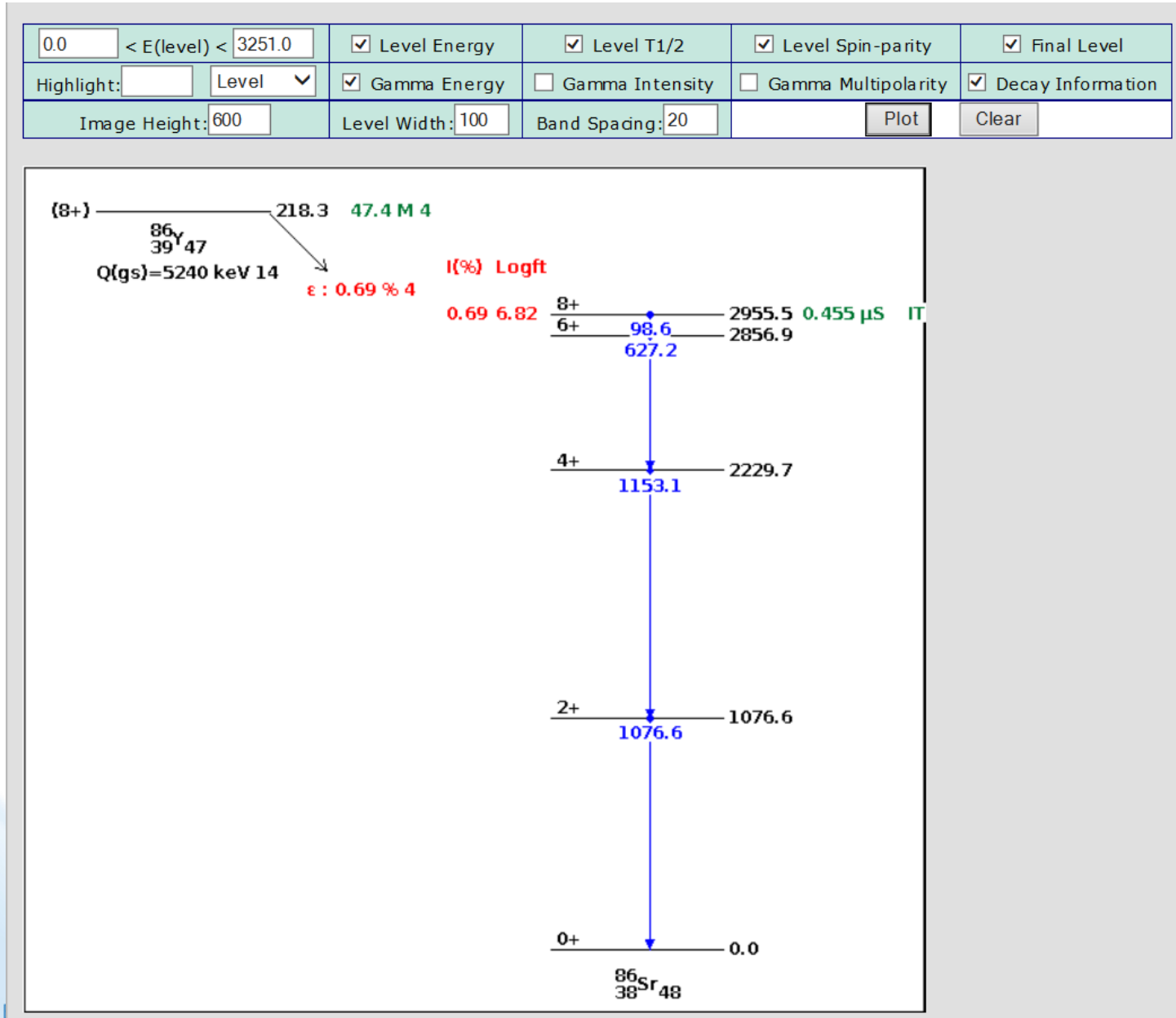
Beta+:

Energy (keV)	End-point energy (keV)	Intensity (%)	Dose (MeV/Bq-s)
114.3 *60*	249 *14*	0.0038 % *10*	4.3E-6 *12*
125.5 *60*	275 *14*	0.0029 % *7*	3.6E-6 *9*
132.6 *60*	292 *14*	0.035 % *7*	4.6E-5 *10*
155.8 *60*	346 *14*	0.0035 % *6*	5.5E-6 *10*
173.0 *60*	387 *14*	0.22 % *4*	3.8E-4 *7*
196.9 *60* ?	443 *14*	0.0110 % *20*	2.2E-5 *4*
200.8 *6*			
234.6 *6*			
252.4 *6*			
374.7 *6*			
394.1 *6*			
405.6 *6*			
452.2 *6*			
509.4 *6*			
535.4 *6*			
588.6 *6*			
628.9 *6*			

Gamma and X-ray radiation:

	Energy (keV)	Intensity (%)	Dose (MeV/Bq-s)
XR 1	1.81	1.91 % *7*	3.47E-5 *12*
XR kα2	14.098	12.2 % *5*	0.00171 *7*
XR kα1	14.165	23.4 % *10*	0.00332 *15*
XR kβ3	15.825	1.74 % *7*	2.76E-4 *12*
XR kβ1	15.836	3.37 % *15*	5.34E-4 *23*
XR kβ2	16.085	0.60 % *3*	9.6E-5 *5*
	132.34 *10*	0.165 % *8*	2.18E-4 *11*
	144.5 *3*	0.031 % *3*	4.5E-5 *5*
	182.34 *20* ?	0.11 % *3*	2.0E-4 *6*
	187.87 *13*	1.26 % *4*	0.00237 *8*
	190.80 *13*	1.01 % *3*	0.00194 *6*
	209.80 *23* ?	0.396 % *17*	8.3E-4 *3*
	235.37 *23*	0.396 % *17*	9.3E-4 *4*
	237.9 *3*	0.132 % *25*	3.1E-4 *6*
	252.05 *13*	0.371 % *17*	9.4E-4 *4*
	256.4 *4* ?	0.074 % *25*	1.9E-4 *6*
	264.53 *13*	0.536 % *25*	0.00142 *7*
	307.00 *10*	3.47 % *8*	0.0106 *3*
	331.08 *23*	0.83 % *3*	0.00276 *8*
	355.07 *26*	0.099 % *25*	3.5E-4 *9*
	370.28 *17*	0.83 % *4*	0.00305 *15*
	380.4 *3*	0.45 % *3*	0.00173 *13*
	382.86 *23*	3.63 % *12*	0.0139 *4*
	425.97 *23*	0.305 % *17*	0.00130 *7*

Decay scheme plotting capabilities



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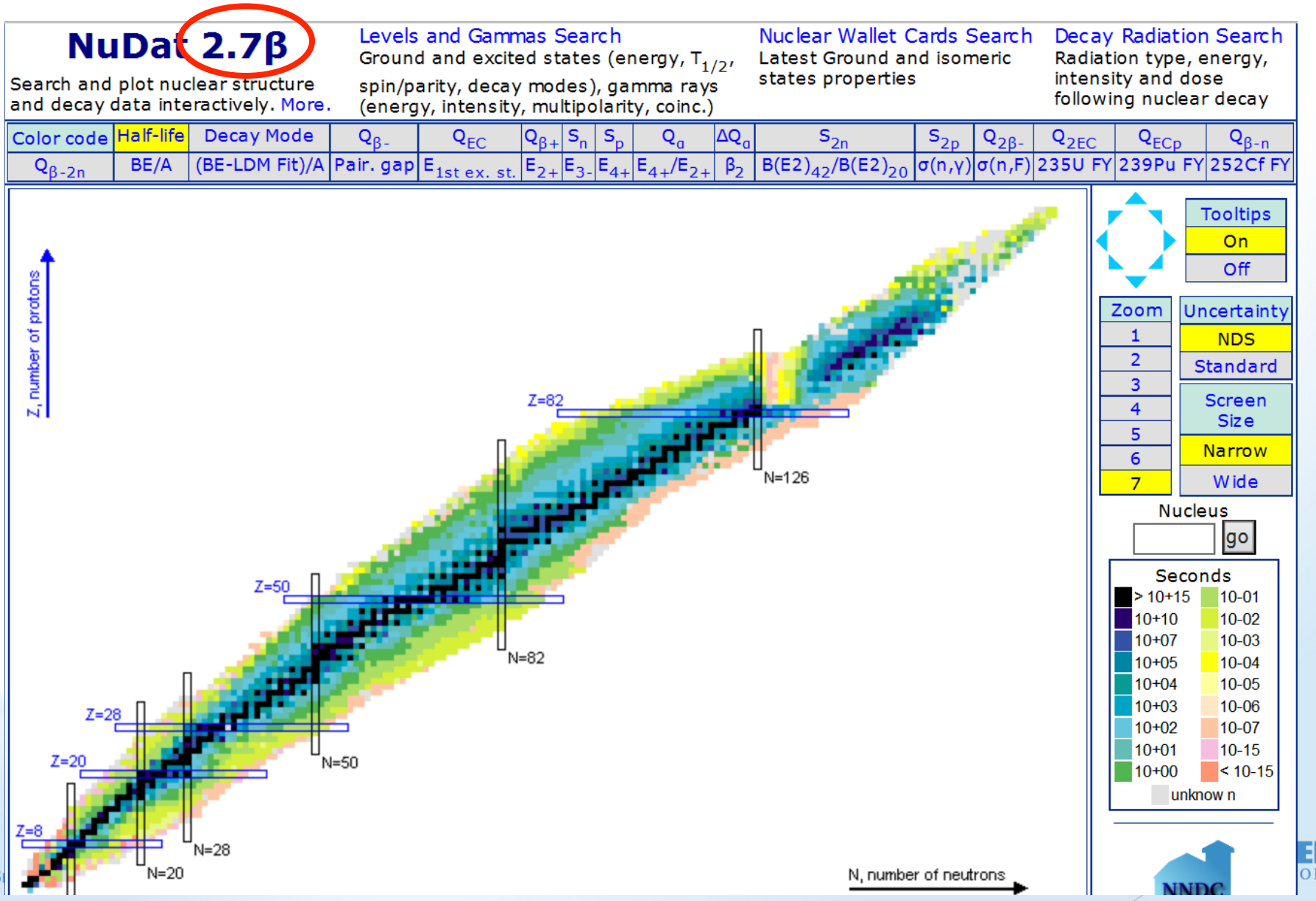
Recent Additions to NuDat

Enhanced features in NuDat



NuDat 2.7β

Search and plot nuclear structure and decay data interactively. More.

Levels and Gammas Search
Ground and excited states (energy, $T_{1/2}$, spin/parity, decay modes), gamma rays (energy, intensity, multipolarity, coinc.)

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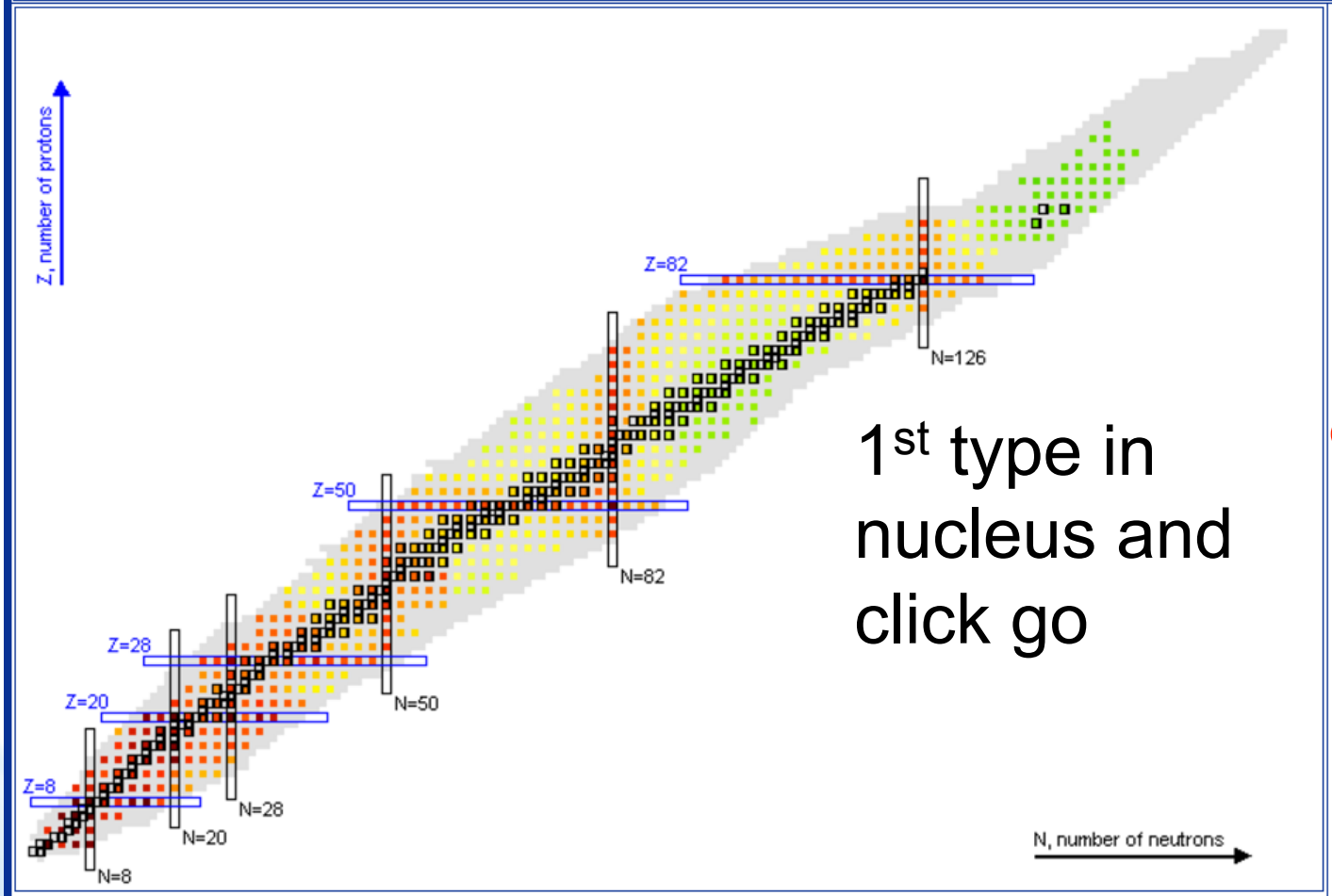
Latest Ground and isomeric states properties

Decay Radiation Search
Radiation type, energy, intensity and dose following nuclear decay

Color code	Half-life	Decay Mode	$Q_{\beta-}$	Q_{EC}	$Q_{\beta+}$	S_n	S_p	Q_α	ΔQ_α	S_{2n}	S_{2p}	$Q_{2\beta-}$	Q_{2EC}	Q_{ECp}	$Q_{\beta-n}$
$Q_{\beta-2n}$	BE/A	(BE-LDM Fit)/A	Pair. gap	$E_{1st\ ex.\ st.}$	E_{2+}	E_{3-}	E_{4+}	E_{4+}/E_{2+}	β_2	$B(E2)_{42}/B(E2)_{20}$	σ(n,γ)	σ(n,F)	235U FY	239Pu FY	252Cf FY



1st type in nucleus and click go

Tooltips: On / Off

Zoom: 1 2 3 4 5 6 7

Uncertainty: NDS / Standard

Screen Size: Narrow / Wide

Nucleus: 152Sm go

keV

3.89E+4	1.16E+3
2.74E+4	8.22E+2
1.93E+4	5.78E+2
1.35E+4	4.07E+2
9.57E+3	2.87E+2
6.74E+3	2.02E+2
4.74E+3	1.42E+2
3.34E+3	1.00E+2
2.35E+3	7.05E+1
1.65E+3	4.97E+1
1.16E+3	3.50E+1
unknown	

Interactive Chart of Nuclides
Click on a nucleus to obtain information

NNDC ENSDF NSR

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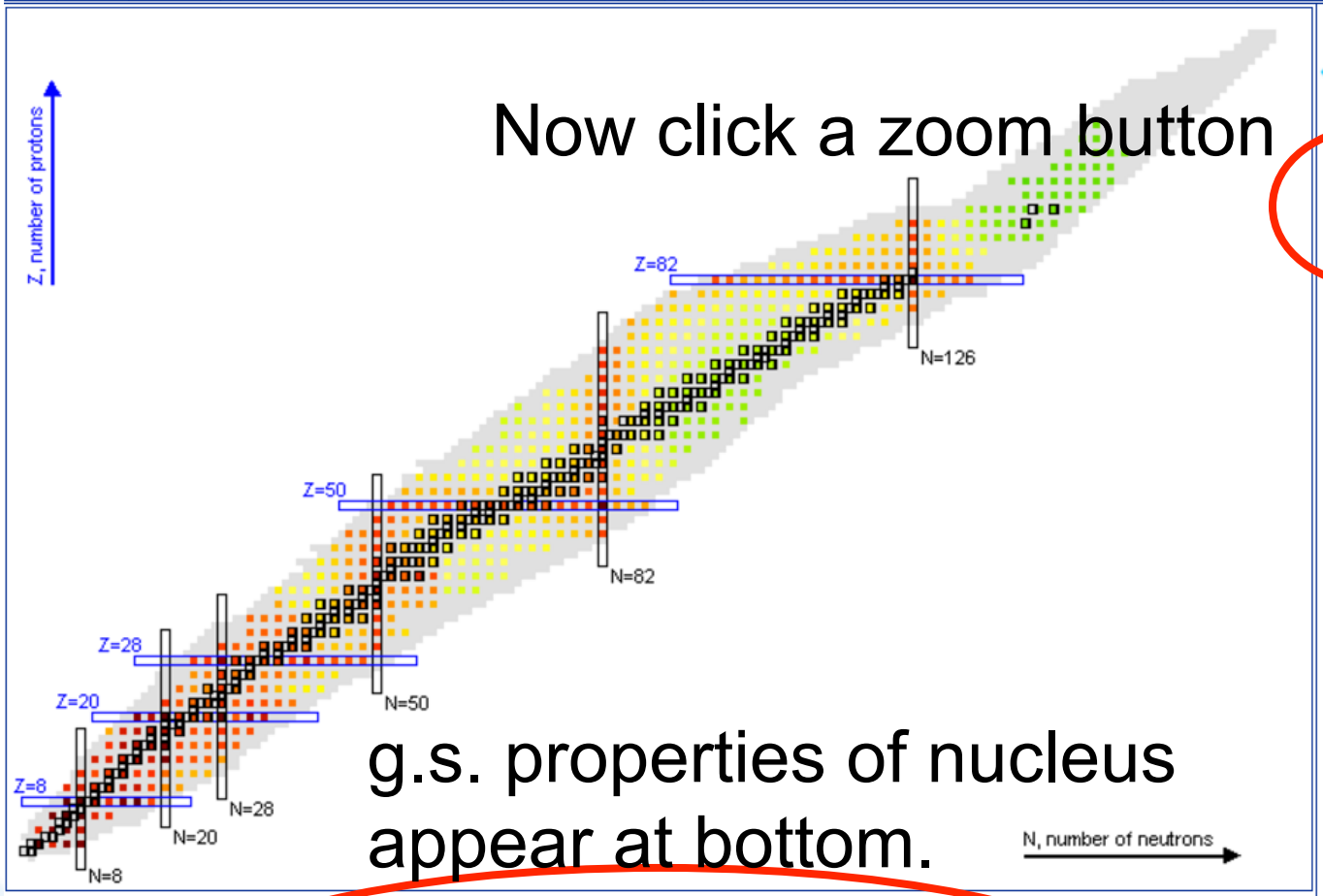
$Q_{\beta-2n}$	BE/A	(BE-LDM Fit)/A	Pair. gap	$E_{1st\ ex.\ st.}$	E_{2+}	E_{3-}	E_{4+}	E_{4+}/E_{2+}	β_2	$B(E2)_{42}/B(E2)_{20}$	σ(n,γ)	σ(n,F)	235U FY	239Pu FY	252Cf FY



Now click a zoom button

g.s. properties of nucleus appear at bottom.

Tooltips: On / Off

Zoom: 1 2 3 4 5 6 7

Uncertainty: NDS / Standard

Screen Size: Narrow / Wide

Nucleus: go

keV

3.89E+4	1.16E+3
2.74E+4	8.22E+2
1.93E+4	5.78E+2
1.35E+4	4.07E+2
9.57E+3	2.87E+2
6.74E+3	2.02E+2
4.74E+3	1.42E+2
3.34E+3	1.00E+2
2.35E+3	7.05E+1
1.65E+3	4.97E+1
1.16E+3	3.50E+1

unknown

NNDC

NNDC ENSDF NSR
Nuclear Wallet Cards

Ground and isomeric state information for $^{152}_{62}Sm$

E(level) (MeV)	Jπ	Δ(MeV)	$T_{1/2}$	Abundance	Decay Modes	E_{2+} (keV)
0.0	0+	-74.7626	STABLE	26.75% *16*		121.7818 *3*

A list of levels and a level scheme, a J vs E^* plot are available

NuDat 2.7β

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Radiation type, energy, intensity and dose following nuclear decay

Color code	Half-life	Decay Mode	$Q_{\beta-}$	Q_{EC}	$Q_{\beta+}$	S_n	S_p	Q_α	ΔQ_α	S_{2n}	S_{2p}	$Q_{2\beta-}$	Q_{2EC}	Q_{ECp}	$Q_{\beta-n}$
$Q_{\beta-2n}$	BE/A	(BE-LDM Fit)/A	Pair. gap	$E_{1st\ ex.\ st.}$	E_{2+}	E_{3-}	E_{4+}	E_{4+}/E_{2+}	β_2	$B(E2)_{42}/B(E2)_{20}$	σ(n,γ)	σ(n,F)	235U FY	239Pu FY	252Cf FY

Z	82	84	86	88	90	92	94	96	N
64	146Gd	148Gd	150Gd	152Gd	154Gd	156Gd	158Gd	160Gd	162Gd
62	144Sm	146Sm	148Sm	150Sm	152Sm	154Sm	156Sm	158Sm	160Sm
60	142Nd	144Nd	146Nd	148Nd	150Nd	152Nd	154Nd	156Nd	158Nd
58	140Ce	142Ce	144Ce	146Ce	148Ce	150Ce	152Ce	154Ce	156Ce

Tooltips: On / Off

Zoom: 1 2 3 4 5 6 7

Uncertainty: NDS / Standard

Screen Size: Narrow / Wide

Nucleus: go

keV
4.00E+3 3.00E+3
2.00E+3 1.80E+3
1.40E+3 1.20E+3
1.00E+3 8.00E+2
6.00E+2 4.00E+2
3.00E+2 2.00E+2
1.50E+2 1.00E+2
7.50E+1 5.00E+1
2.50E+1 0.0
unknown

Scroll down to find more

for $^{152}_{62}Sm$

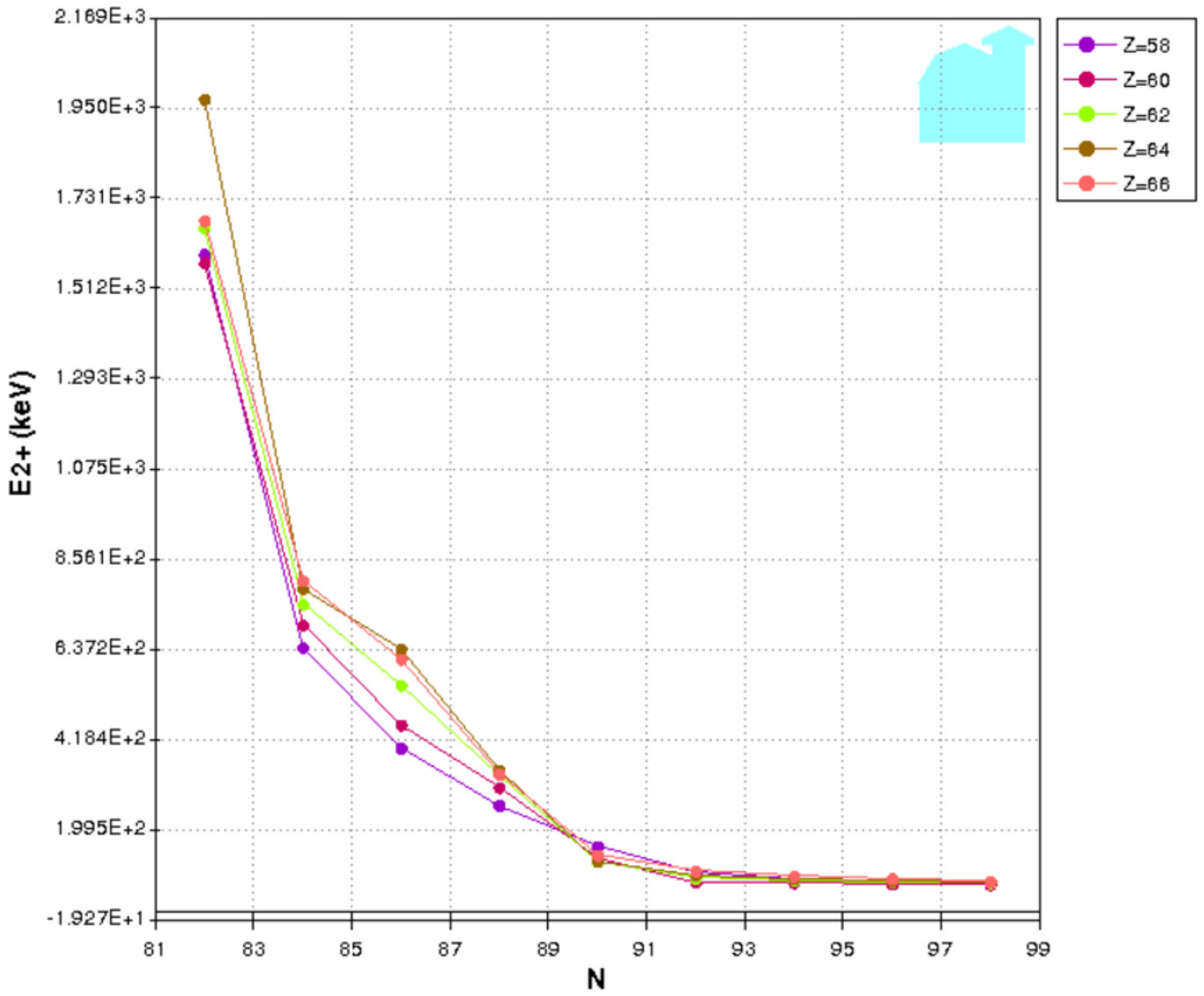
					Decay Modes	E_{2+} (keV)
0.0	0+	-74.7626	STABLE	26.75% *16*		121.7818 *3*

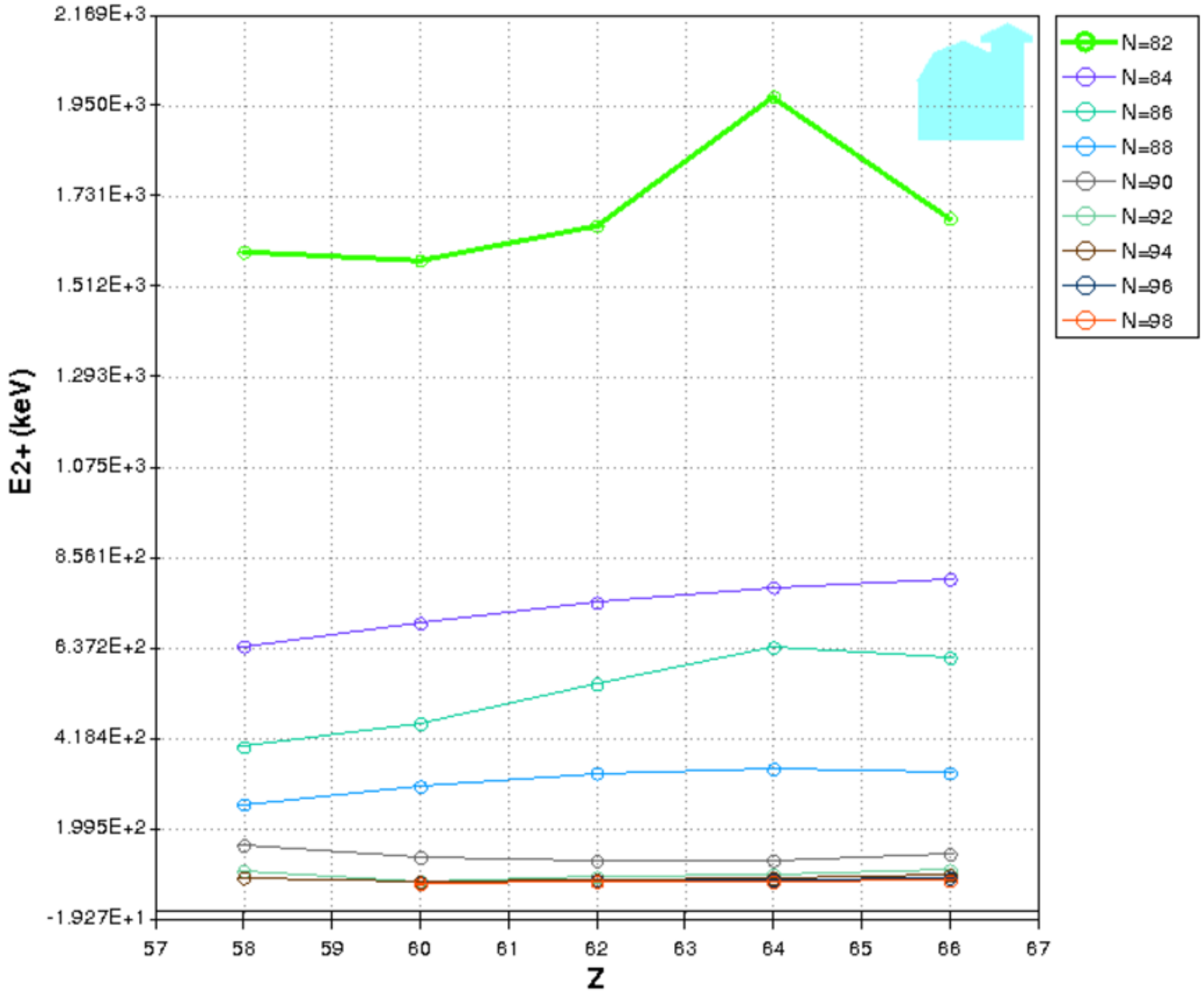
A list of levels and a level scheme, a J vs E^* plot are available
The corresponding projections on the N and Z axis are found below. The data can be found here.

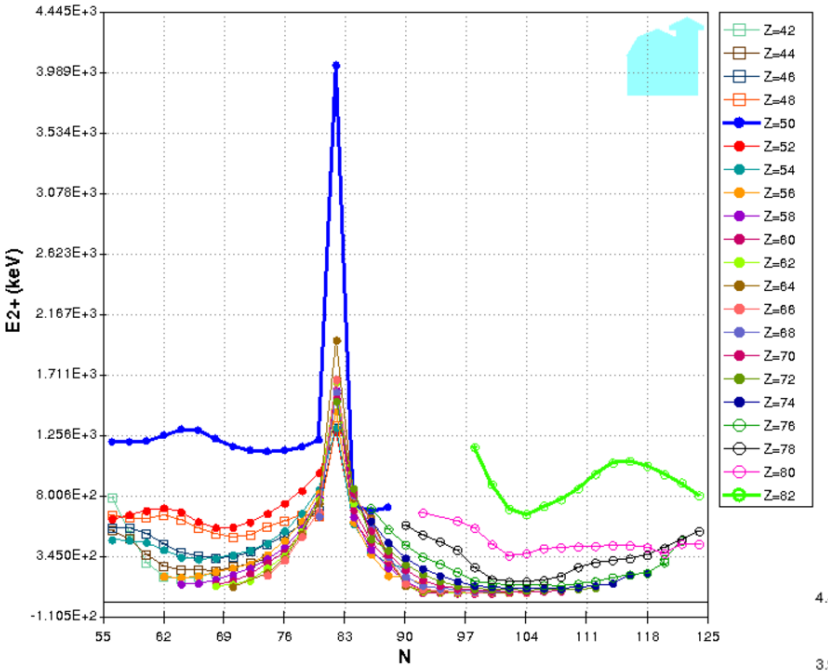
NNDC ENSDF NSR
Nuclear Wallet Cards

Scroll down even more to find even more

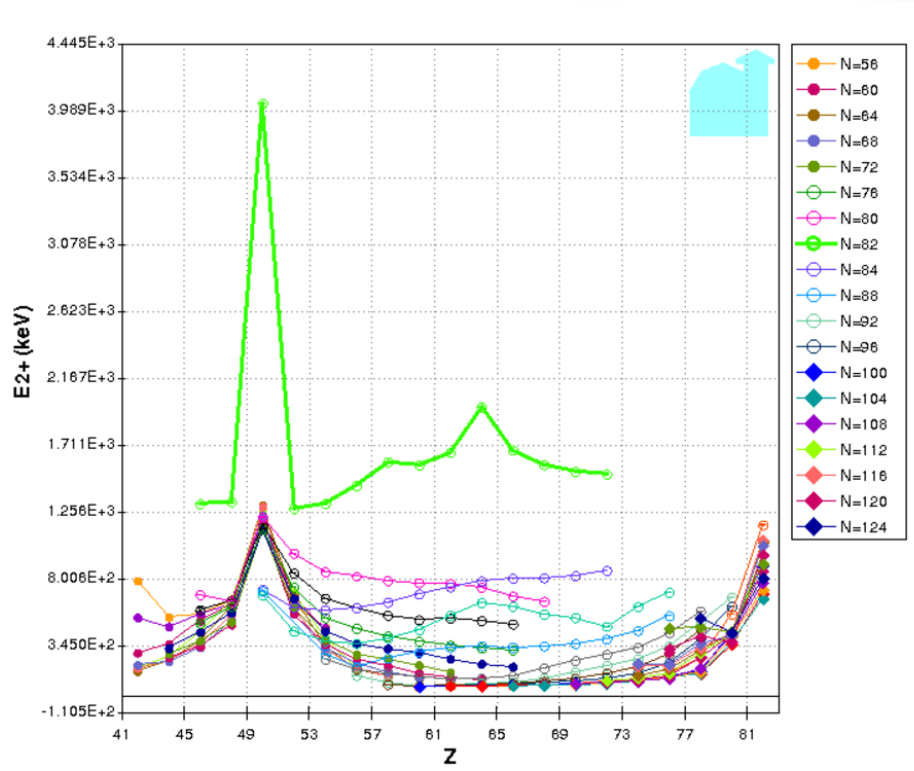
A list of levels and a level scheme, a J vs E* plot are available
The corresponding projections on the N and Z axis are found below. The data can be found here.




2.169E+3
1.950E+3
1.731E+3
1.512E+3
1.293E+3
1.075E+3
8.561E+2
6.372E+2
4.184E+2
1.995E+2
-1.927E+1
E2+ (keV)
57
58
59
60
61
62
63
64
65
66
67
Z
N=82
N=84
N=86
N=88
N=90
N=92
N=94
N=96
N=98



Adjusting the zoom will change the number of nuclei included in the plots



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Q_{β^-2n}	BE/A	(BE-LDM Fit)/A	Pair. gap	$E_{1st\ ex.\ st.}$	E_{2+}	E_{3-}	E_{4+}	E_{4+}/E_{2+}	β_2

Z	82	84	86	88	90	92
66	148Dy	149Dy	150Dy	151Dy	152Dy	153Dy	154Dy	155Dy	156Dy	157Dy	158Dy
65	147Tb	148Tb	149Tb	150Tb	151Tb	152Tb	153Tb	154Tb	155Tb	156Tb	157Tb
64	146Gd	147Gd	148Gd	149Gd	150Gd	151Gd	152Gd	153Gd	154Gd	155Gd	156Gd
63	145Eu	146Eu	147Eu	148Eu	149Eu	150Eu	151Eu	152Eu	153Eu	154Eu	155Eu
62	144Sm	145Sm	146Sm	147Sm	148Sm	149Sm	150Sm	151Sm	152Sm	153Sm	154Sm
61	143Pm	144Pm	145Pm	146Pm	147Pm	148Pm	149Pm	150Pm	151Pm	152Pm	153Pm
60	142Nd	143Nd	144Nd	145Nd	146Nd	147Nd	148Nd	149Nd	150Nd	151Nd	152Nd
59	141Pr	142Pr	143Pr	144Pr	145Pr	146Pr	147Pr	148Pr	149Pr	150Pr	151Pr
58	140Ce	141Ce	142Ce	143Ce	144Ce	145Ce	146Ce	147Ce	148Ce	149Ce	150Ce

Z	N	Value	Uncertainty
66	82	1.67730E3	0.00000E0
64	82	1.97202E3	7.00000E-2
62	82	1.66003E3	1.00000E-2
60	82	1.57578E3	1.00000E-2
58	82	1.59624E3	2.50000E-2
66	84	8.03640E2	9.00000E-2
64	84	7.84433E2	1.50000E-2
62	84	7.47174E2	1.10000E-2
60	84	6.96561E2	1.00000E-2
58	84	6.41282E2	9.00000E-3
66	86	6.13830E2	5.00000E-2
64	86	6.38045E2	1.40000E-2
62	86	5.50255E2	8.00000E-3
60	86	4.53840E2	3.00000E-2
58	86	3.97441E2	9.00000E-3
66	88	3.34340E2	3.00000E-2
64	88	3.44279E2	1.20000E-3
62	88	3.33955E2	1.00000E-2
60	88	3.01705E2	1.60000E-2
58	88	2.58450E2	4.00000E-2
66	90	1.37770E2	8.00000E-2
64	90	1.23071E2	9.00000E-4
62	90	1.21782E2	3.00000E-4
60	90	1.30210E2	7.00000E-2
58	90	1.58467E2	5.00000E-3
66	92	9.89180E1	1.00000E-3
64	92	8.89700E1	1.00000E-3
62	92	8.19810E1	1.50000E-2
60	92	7.24000E1	5.00000E-2
58	92	9.70000E1	1.00000E-1
66	94	8.67878E1	3.00000E-4
64	94	7.95143E1	1.50000E-3

Scroll down to find more

for $^{152}_{62}$Sm

					Decay Modes	E_{2+} (keV)
0.0	0+	-74.7626	STABLE	26.75% *16*		121.7818 *3*

A list of levels and a level scheme, a J vs E^* plot are available
The corresponding projections on the N and Z axis are found below. The data can be found here.

unknown

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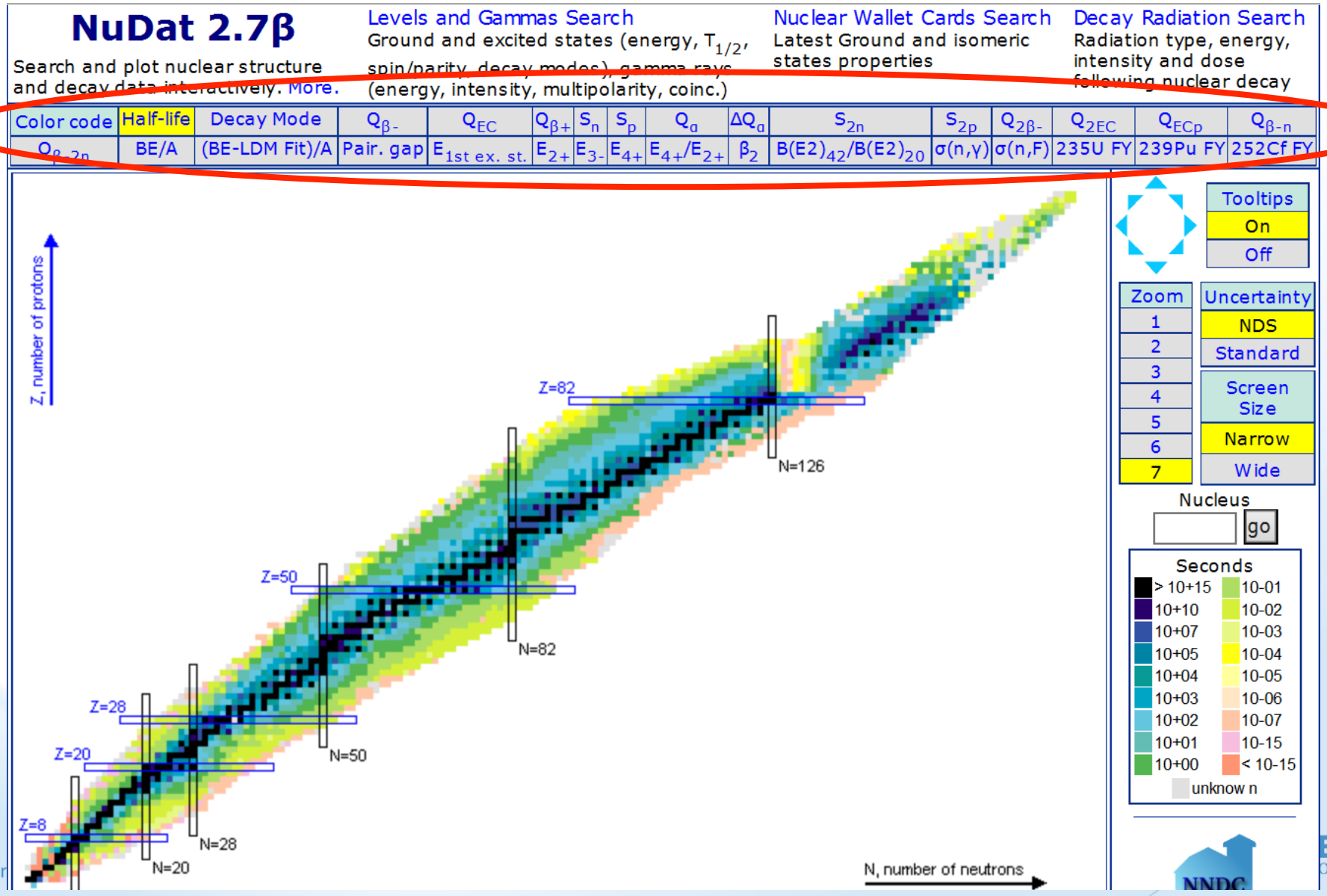
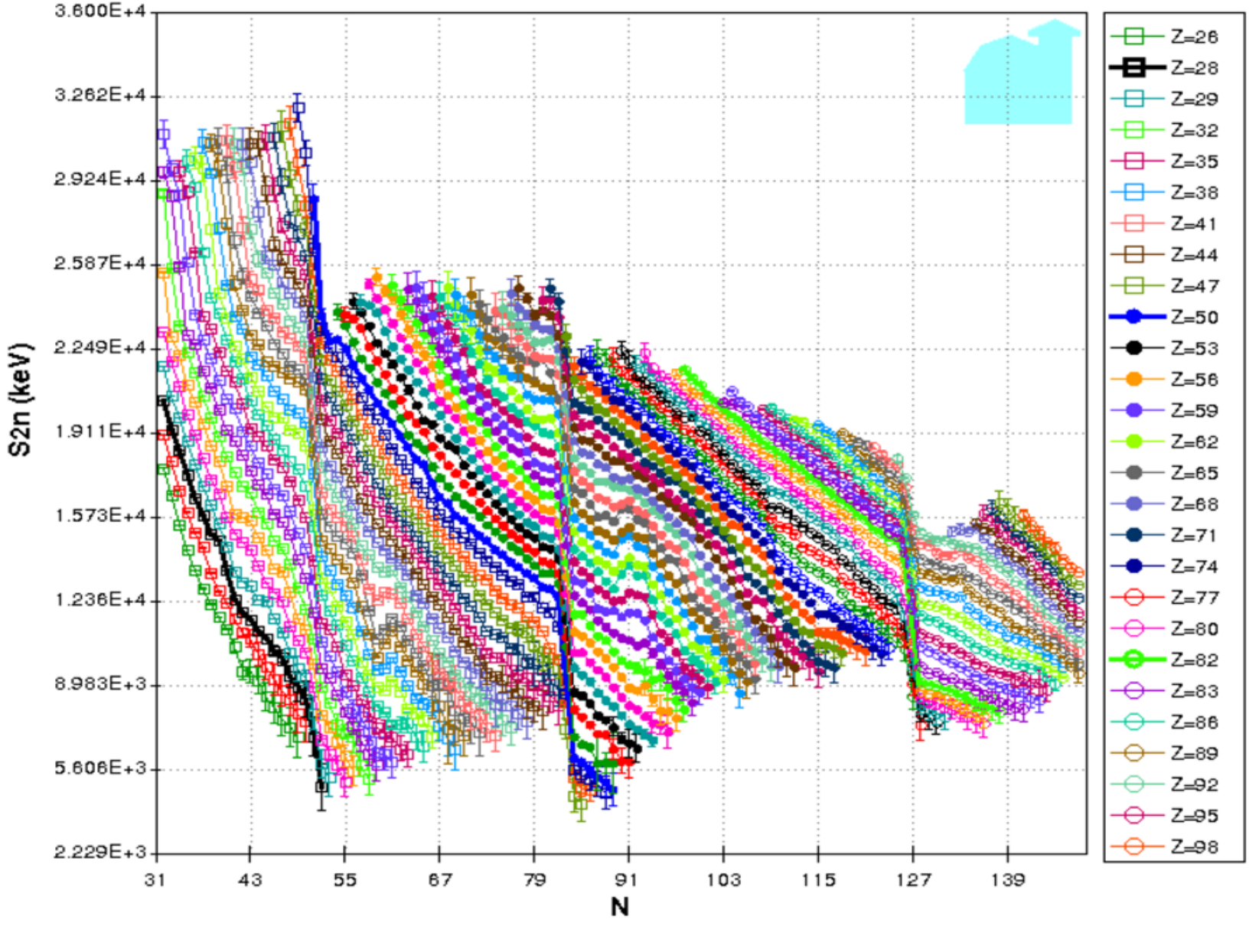
Any of the quantities offered on the main panel, can be plotted



Two neutron separation energies



BROOKHAVEN NATIONAL LABORATORY

NuDat 2.7β

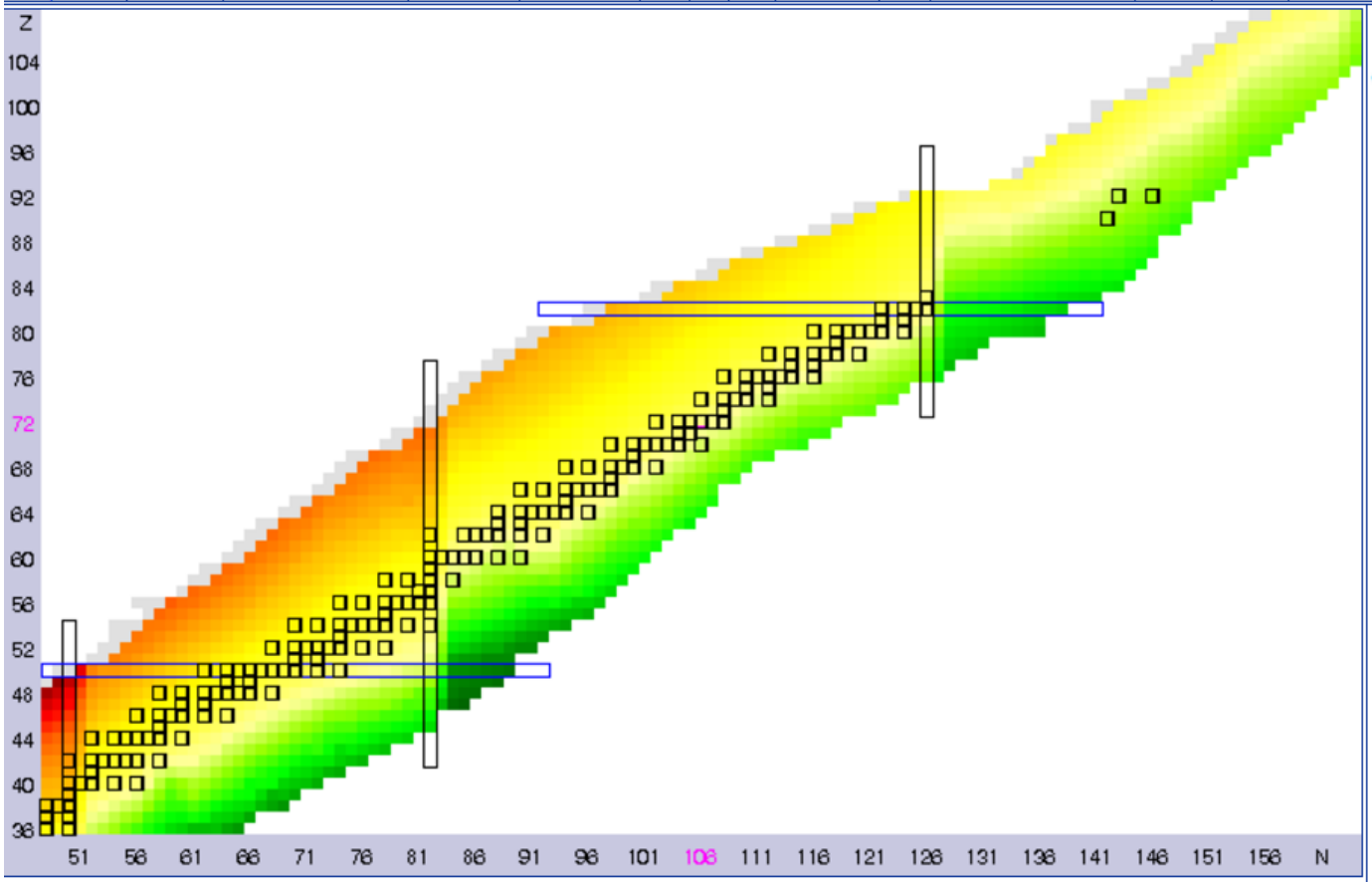
Search and plot nuclear structure and decay data interactively. More.

Levels and Gammas Search
Ground and excited states (energy, $T_{1/2}$, spin/parity, decay modes), gamma rays (energy, intensity, multipolarity, coinc.)

Nuclear Wallet Cards Search
Latest Ground and isomeric states properties

Decay Radiation Search
Radiation type, energy, intensity and dose following nuclear decay

Color code	Half-life	Decay Mode	$Q_{\beta-}$	Q_{EC}	$Q_{\beta+}$	S_n	S_p	Q_α	ΔQ_α	S_{2n}	S_{2p}	$Q_{2\beta-}$	Q_{2EC}	Q_{ECp}	$Q_{\beta-n}$
$Q_{\beta-2n}$	BE/A	(BE-LDM Fit)/A	Pair. gap	$E_{1st\ ex.\ st.}$	E_{2+}	E_{3-}	E_{4+}	E_{4+}/E_{2+}	β_2	$B(E2)_{42}/B(E2)_{20}$	σ(n,γ)	σ(n,F)	235U FY	239Pu FY	252Cf FY



Tooltips: On / Off

Zoom: 1 2 3 4 5 6 7

Uncertainty: NDS / Standard

Screen Size: Narrow / Wide

Nucleus: go

keV

3.36E+4	1.89E+4
3.21E+4	1.74E+4
3.06E+4	1.59E+4
2.92E+4	1.45E+4
2.77E+4	1.30E+4
2.62E+4	1.15E+4
2.48E+4	1.01E+4
2.33E+4	8.64E+3
2.18E+4	7.17E+3
2.03E+4	5.70E+3
1.89E+4	4.23E+3

unknown

Ground and isomeric state information for $^{178}_{72}$**Hf**

E(level) (MeV)	Jπ	Δ(MeV)	$T_{1/2}$	Abundance	Decay Modes	S_{2n} (keV)
0.0	0+	-52.4352	STABLE	27.28% *7*		14001.5 *10*
1.1474	8-	-51.2878	4.0 s *2*		IT : 100.00 %	
2.4461	16+	-49.9891	31 y *1*		IT : 100.00 %	

A list of levels and a level scheme, a J vs E^* plot are available
The corresponding projections on the N and Z axis are found below. The data can be found here.

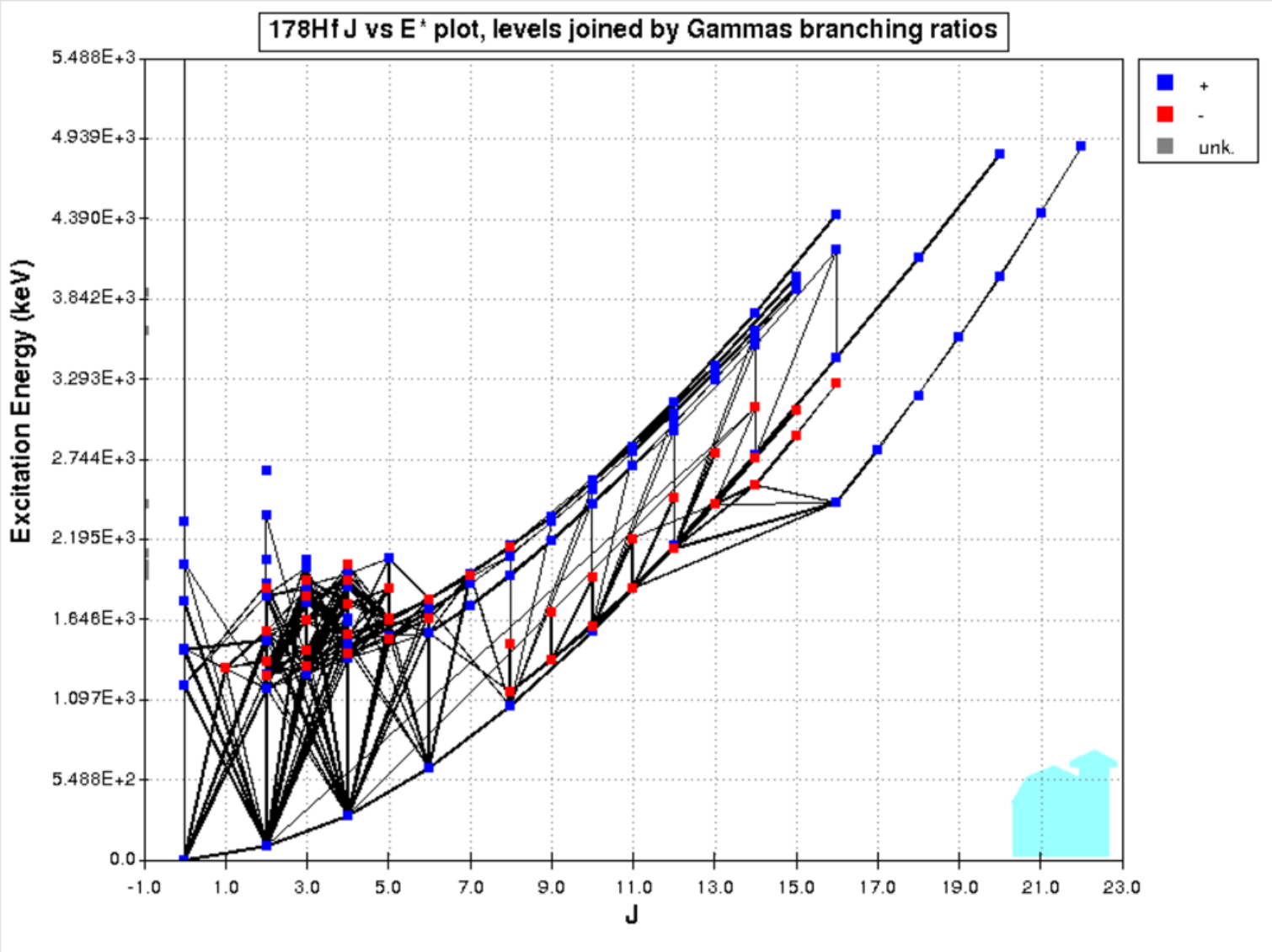
NNDC ENSDF NSR
Nuclear Wallet Cards

Brookhaven National Laboratory

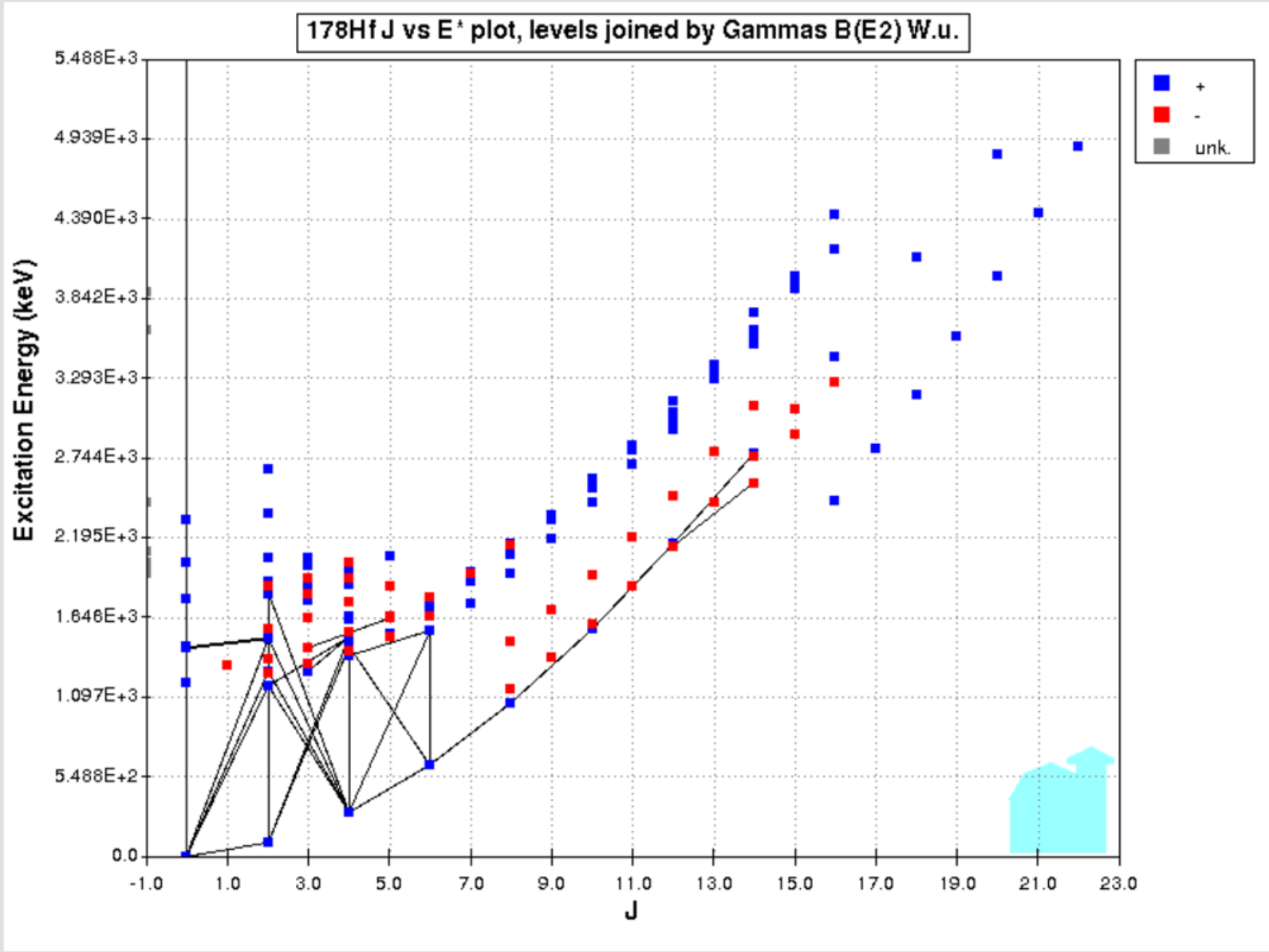
Preliminary release

Max. Level Energy= 5488.60 | X Axis: (•) J ( ) J(J+1) | Levels joined by γ's: (•) Branching Ratio ( ) BE1(W.u) ( ) BE2(W.u) ( ) BE3(W.u) ( ) BE5(W.u)

Min. Thickness= 1.00 | Max. Thickness= 2.00 | Plot | Reset



Preliminary release

Max. Level Energy= 5488.60 | X Axis: J J(J+1) | Levels joined by γ's: Branching Ratio BE1(W.u) BE2(W.u) BE3(W.u)

Min. Thickness= 1.00 | Max. Thickness= 2.00 | Plot | Reset