

From ENSDF to NuDat: Search, Filter and Visualize Nuclear Data

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Evaluated Nuclear Structure Data File

ENSDF contains recommended nuclear structure and decay data for all the known nuclides

Includes:

- Nuclear level properties
- Gamma ray information
- Nuclear radiation and decay data



Evaluated Nuclear Structure Data File

ENSDF contains recommended nuclear structure and decay data for all the known nuclides

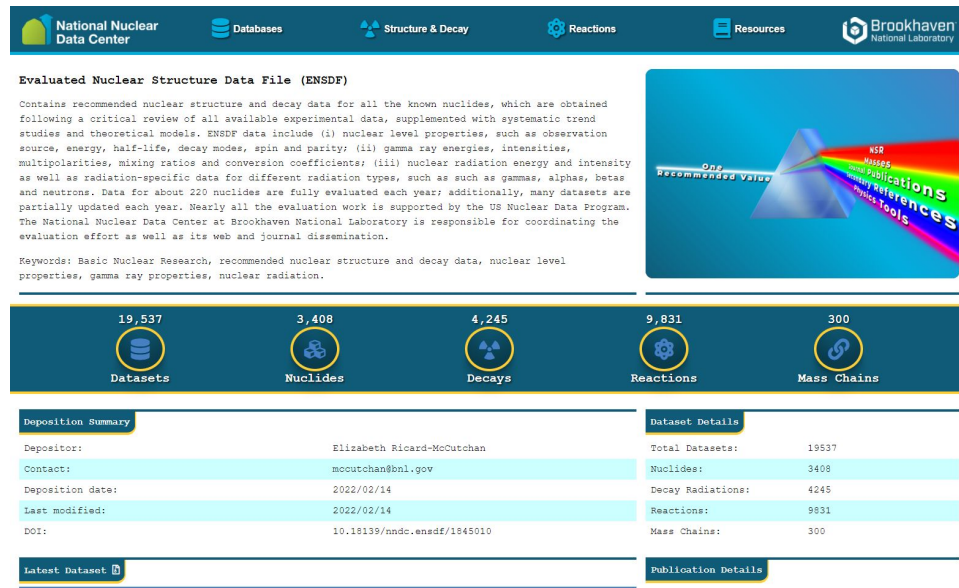
Includes:

- Nuclear level properties
- Gamma ray information
- Nuclear radiation and decay data

ENSDF Landing Page:

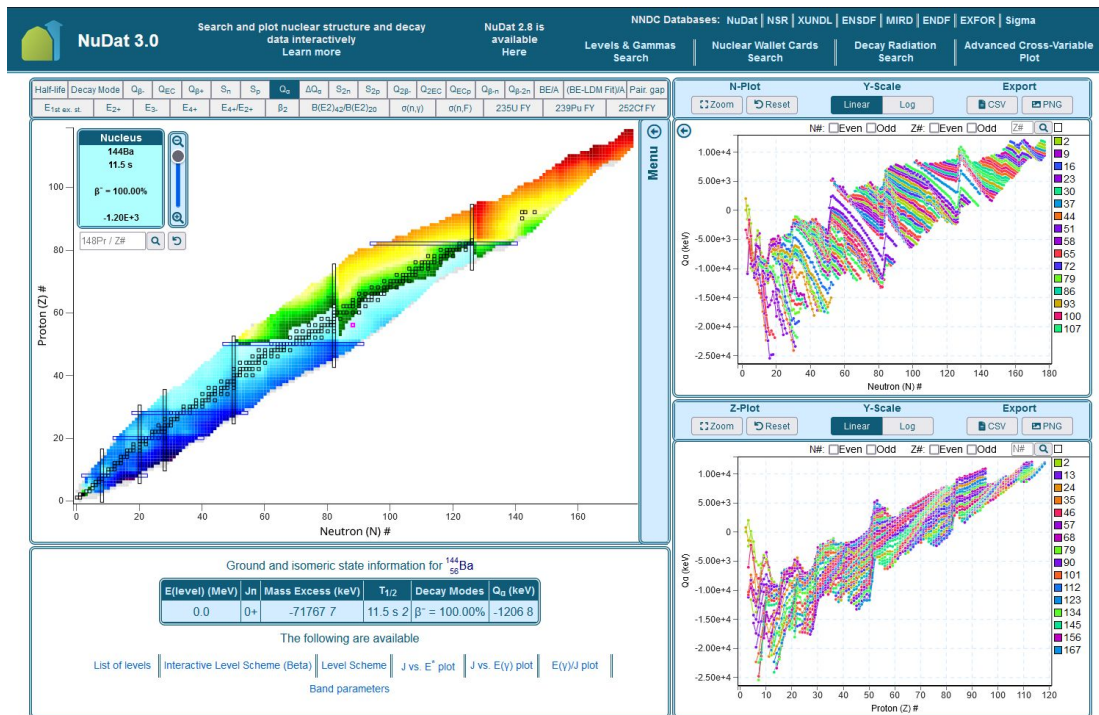
 www.nndc.bnl.gov/ensdfarchivals

DOI: 10.18139/nndc.ensdf/1845010



NuDat Overview

NuDat is the main application used to query and visualize nuclear data from **ENSDF**



 www.nndc.bnl.gov/nudat

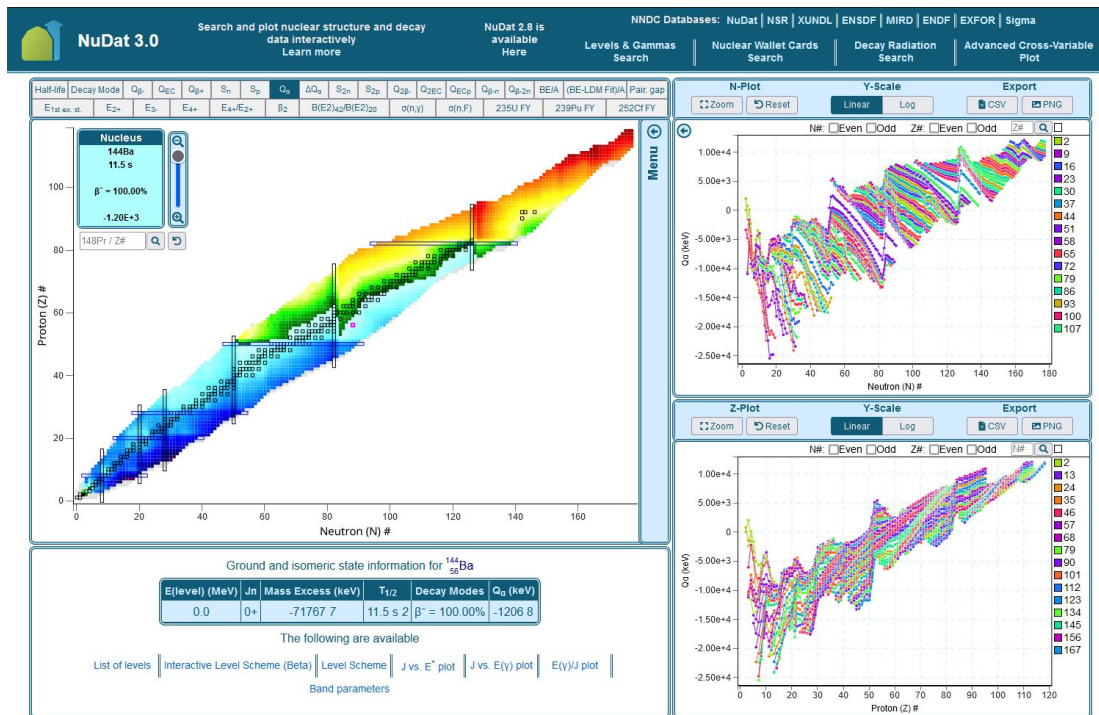
NuDat Overview

NuDat is the main application used to query and visualize nuclear data from **ENSDF**

Search and visualize:

- Nuclear structure
- Nuclear decay
- Neutron-induced nuclear reactions

 www.nndc.bnl.gov/nudat

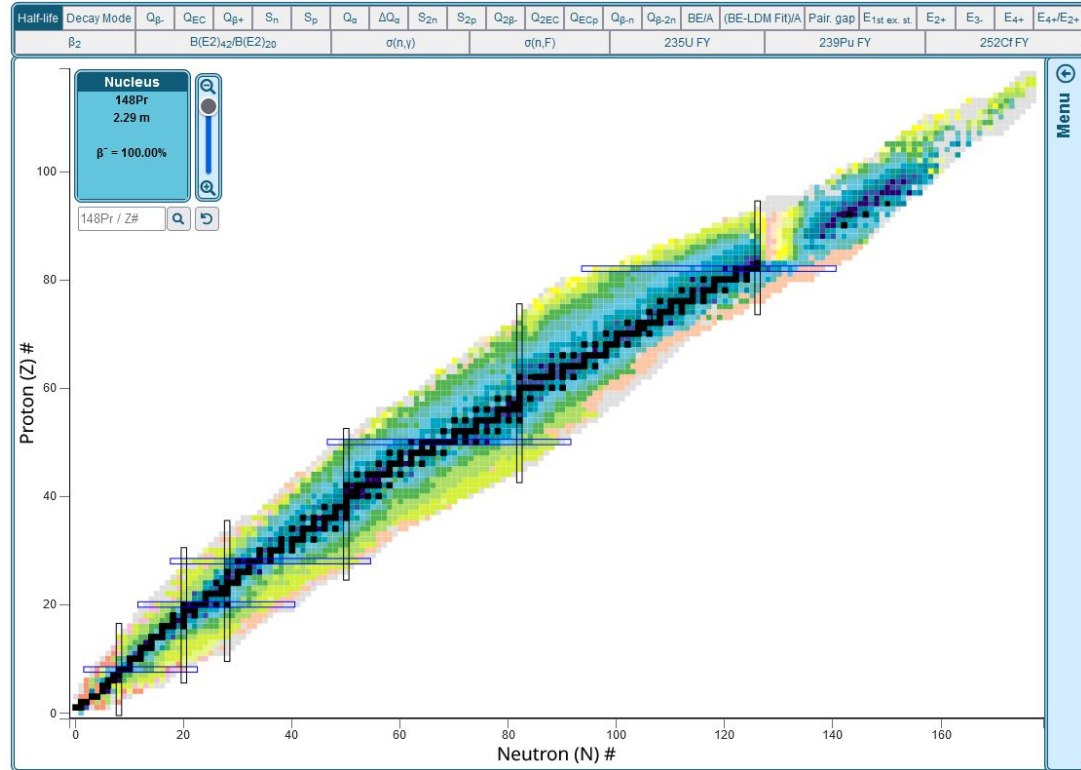


NuDat 3.0

NuDat 3.0 supports exploring nuclear data using responsive visualizations

Fully interactive nuclide chart and 1-D plots

Smooth pan and zoom using intuitive gestures

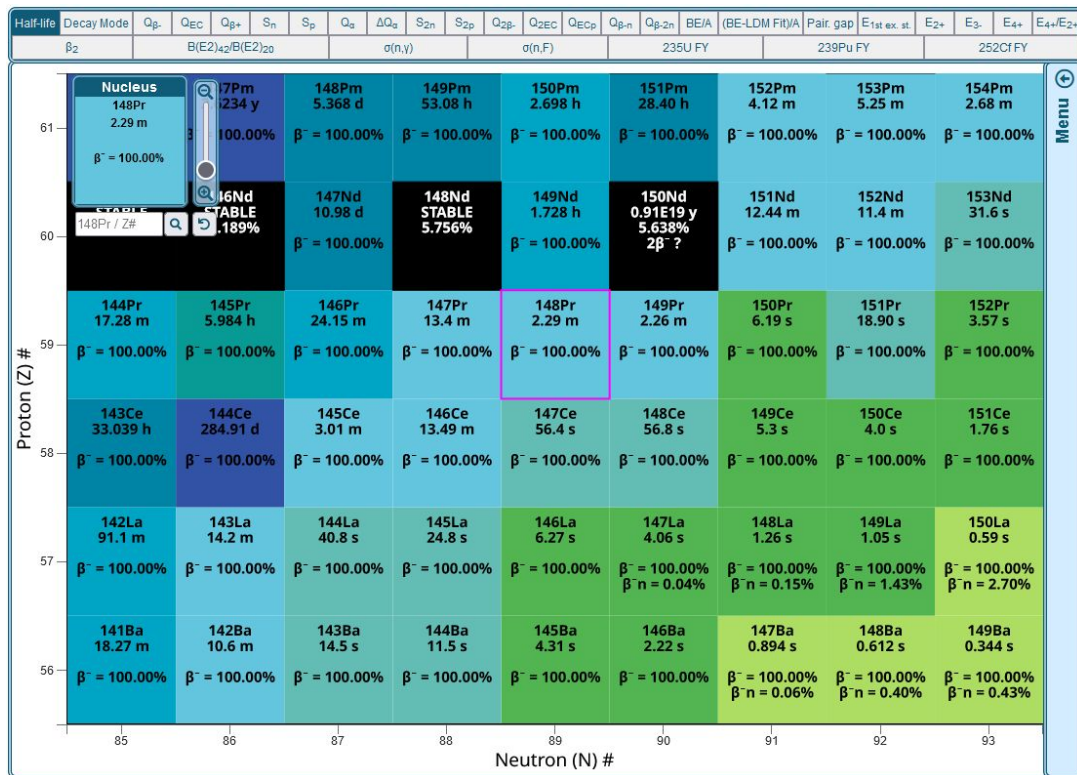


NuDat 3.0

NuDat 3.0 supports exploring nuclear data using responsive visualizations

Features:

- Interactive chart of nuclides
- 1-D neutron and proton plots
- Data Filtering
- Export Data (CSV, PNG, Link)
- Additional Resources

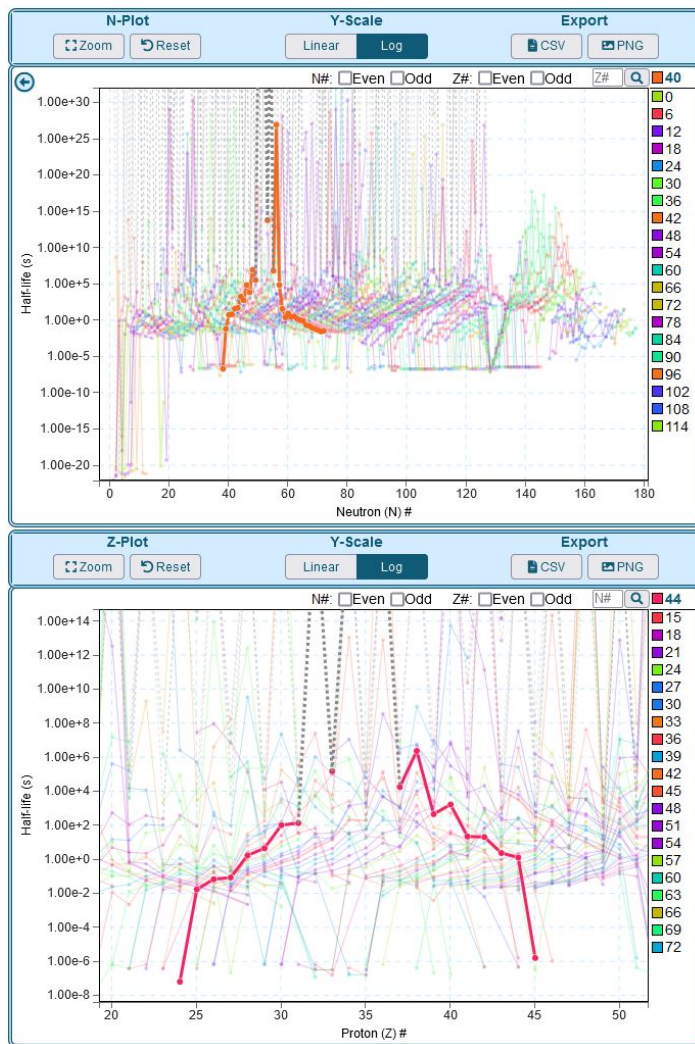


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Features:

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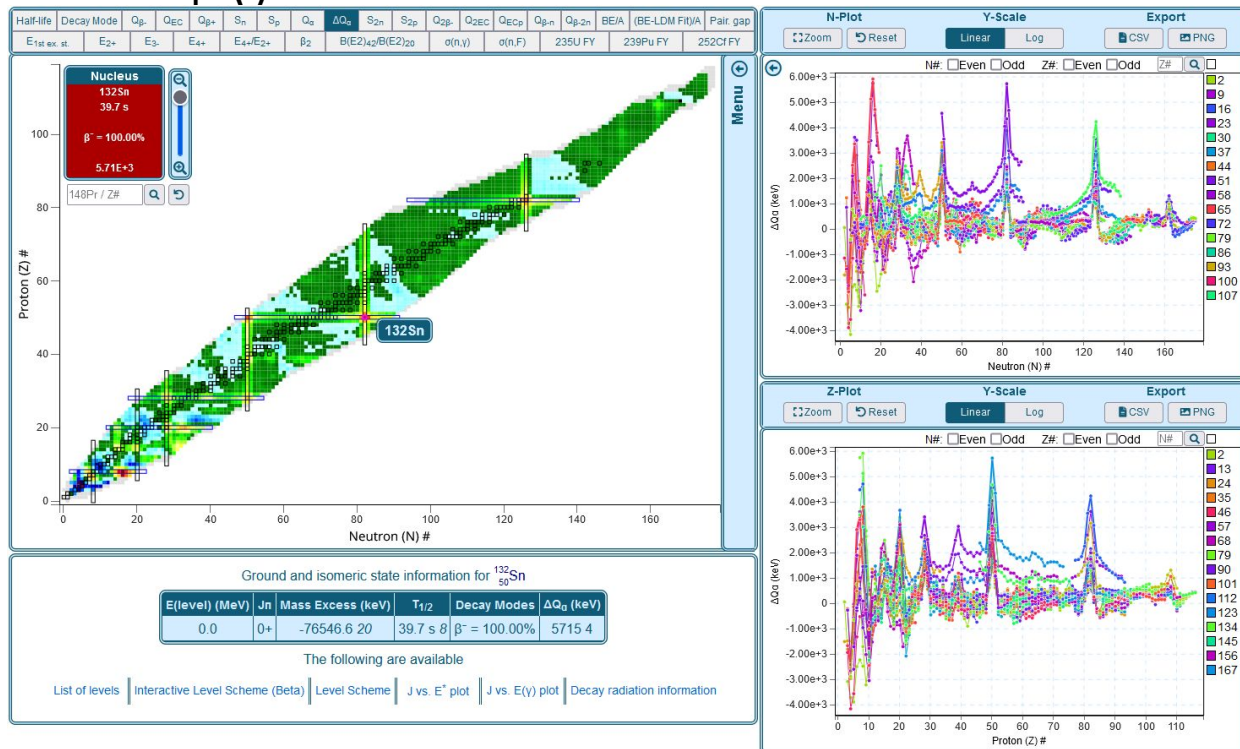
Synchronized 1-D Plots

$$\Delta Q_{\alpha} = 0.5 \times (Q_{\alpha}(Z+2, N+2) - Q_{\alpha}(Z, N)), \text{ in}$$

Optionally sync plots:

1-D plots update to the current view of the chart of nuclides

Visualize patterns in regions of chart, such as peaks



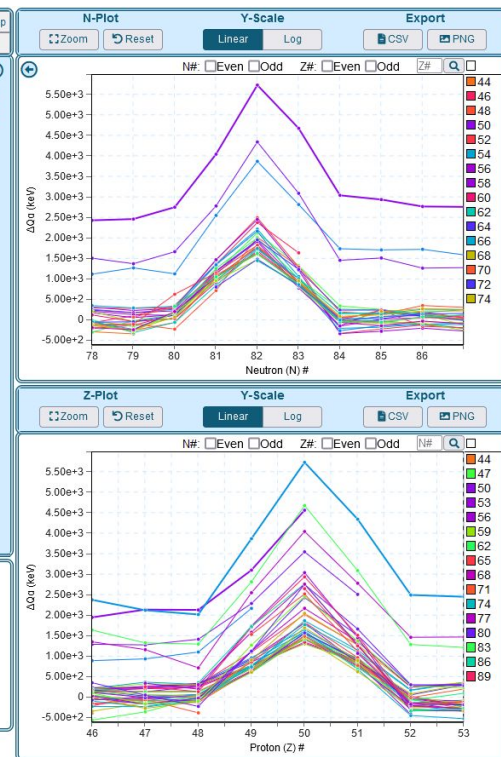
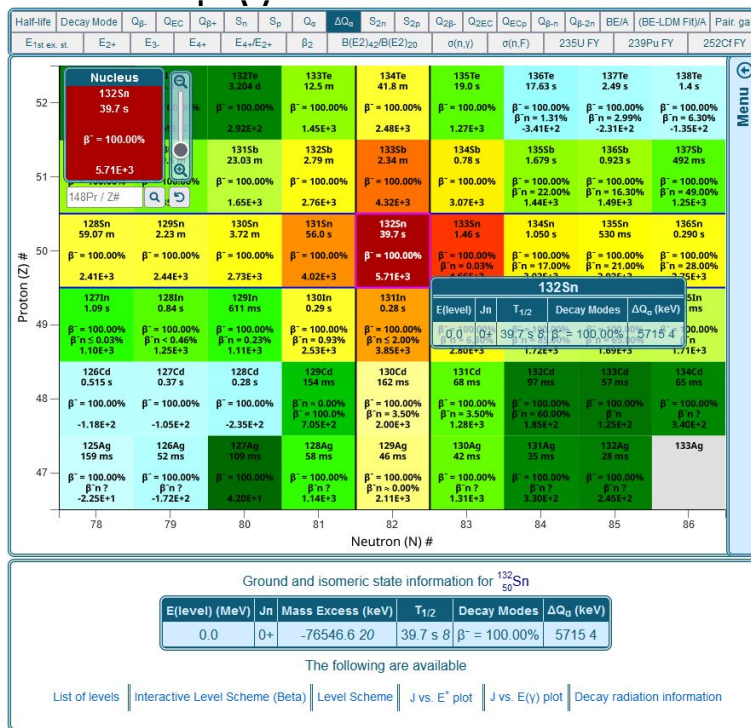
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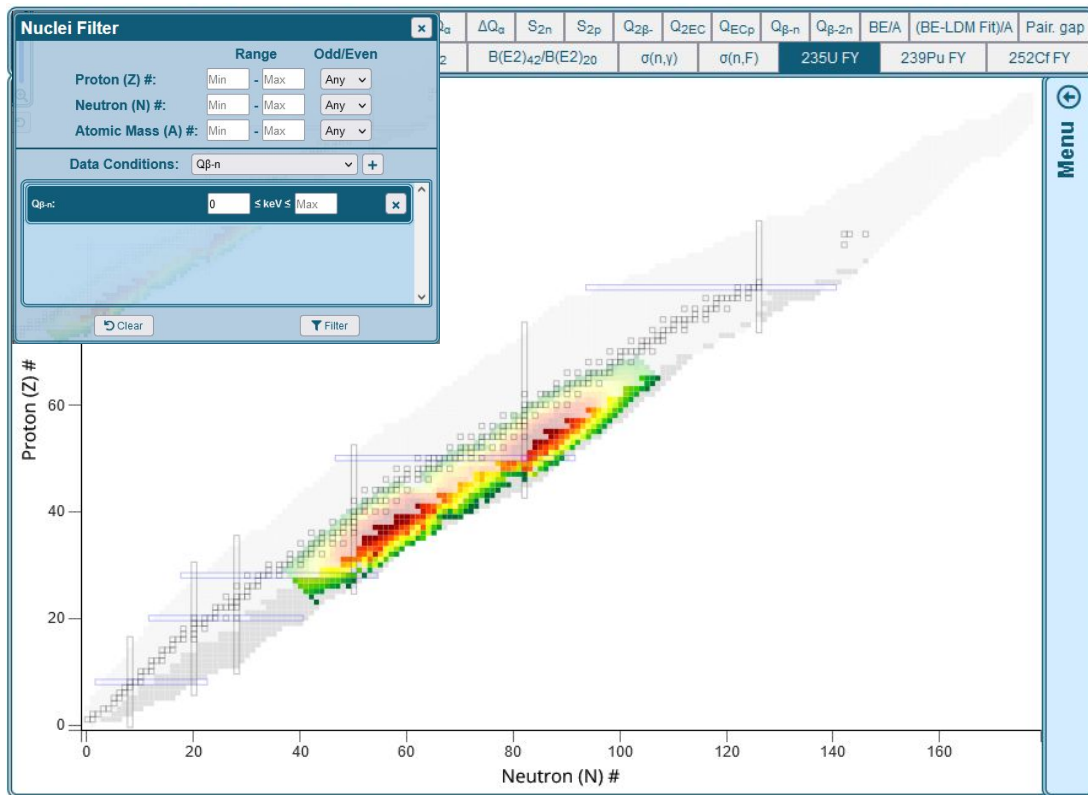


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NuDat Data Filter

Customizable filter:

- Number of protons
- Number of neutrons
- Atomic mass
- NuDat observables
 - Half-life
 - Decay mode
 - Q-Values
 - Separation energies
 - And more

The screenshot shows the 'Nuclei Filter' window. It has a title bar with a close button. The main area is divided into two sections. The top section has three rows of filters: 'Proton (Z) #:', 'Neutron (N) #:', and 'Atomic Mass (A) #:'. Each row has a 'Range' column with 'Min' and 'Max' input boxes, and an 'Odd/Even' column with a dropdown menu set to 'Any'. The bottom section is titled 'Data Conditions:' and has a dropdown menu set to 'Half-life' and a '+' button. Below this is a large empty box for additional conditions. At the bottom are 'Clear' and 'Filter' buttons.

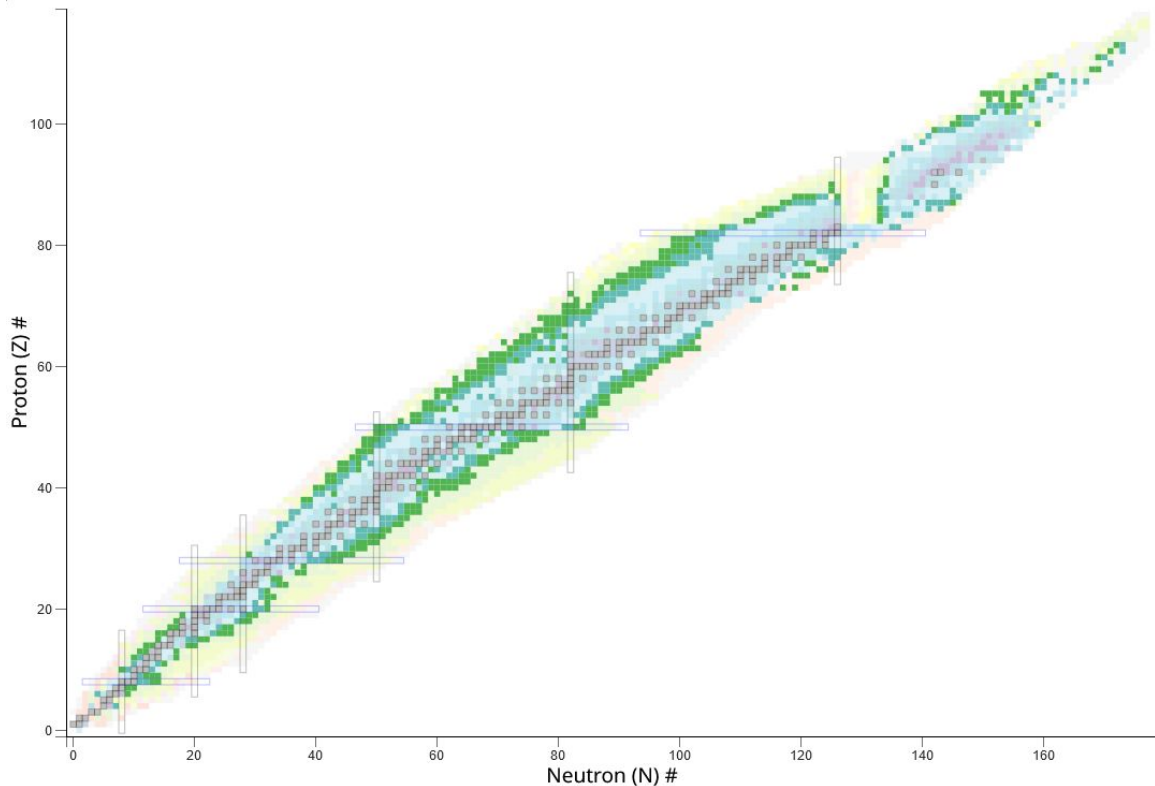
	Range	Odd/Even
Proton (Z) #:	Min - Max	Any
Neutron (N) #:	Min - Max	Any
Atomic Mass (A) #:	Min - Max	Any

Data Conditions: Half-life +

Clear Filter

NuDat Data Filter

Half-life



Nuclides with half-life
from 1s to 1m

Nuclei Filter [X]

	Range	Odd/Even
Proton (Z) #:	Min - Max	Any
Neutron (N) #:	Min - Max	Any
Atomic Mass (A) #:	Min - Max	Any

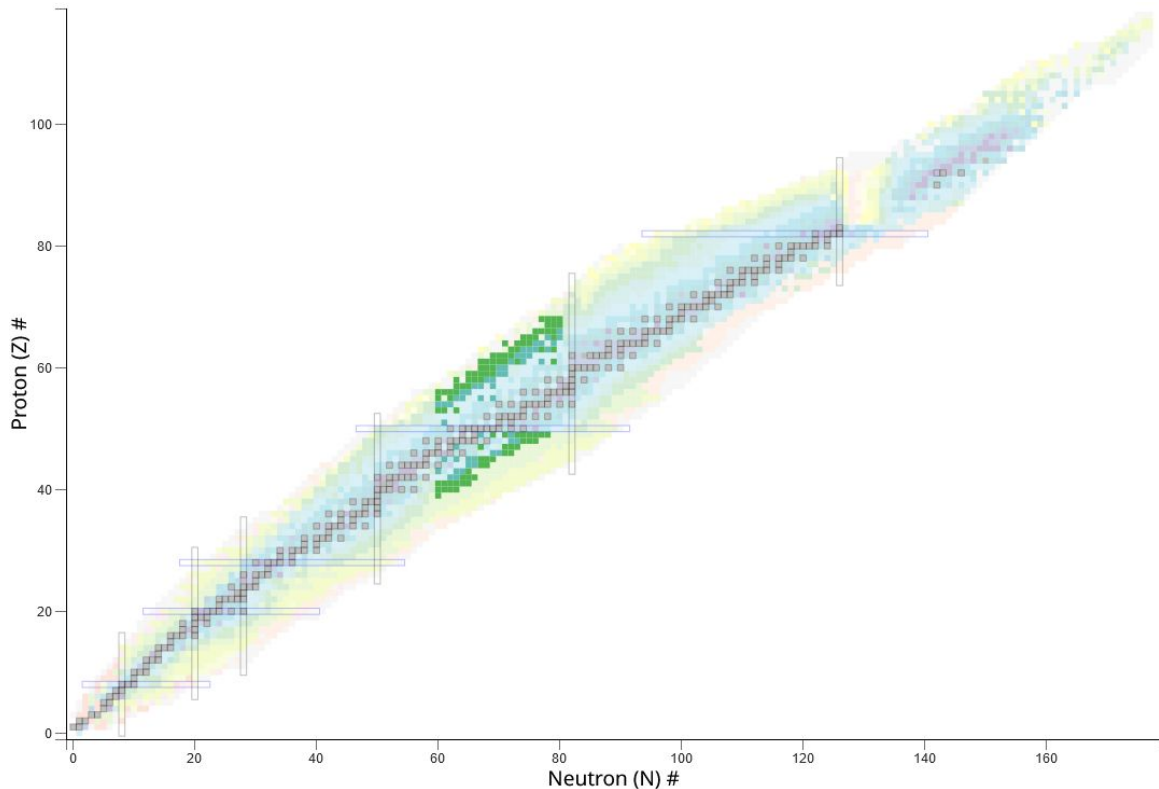
Data Conditions: Half-life [v] +

Half-life: 1 S - 1 M [X]

[Clear] [Filter]

NuDat Data Filter

Half-life



Nuclides with half-life
from 1s to 1m

+

of neutrons 60-80

Nuclei Filter [x]

	Range	Odd/Even
Proton (Z) #:	Min - Max	Any
Neutron (N) #:	60 - 80	Any
Atomic Mass (A) #:	Min - Max	Any

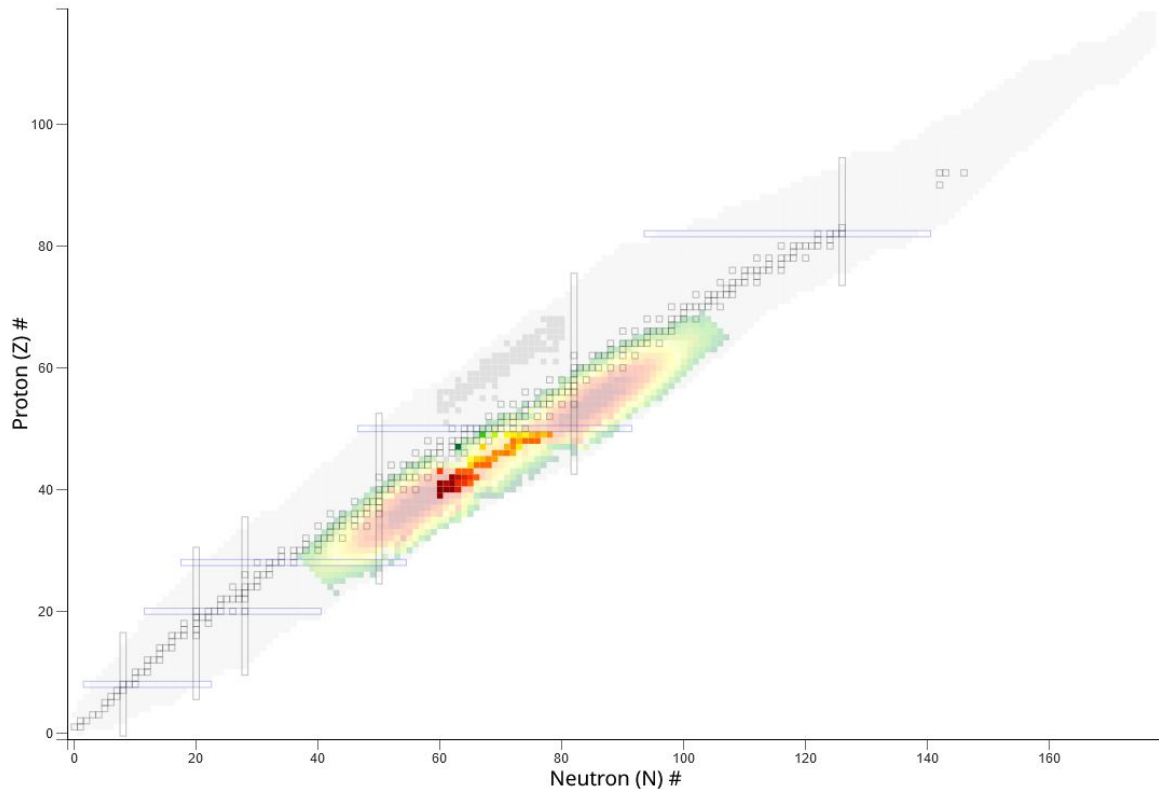
Data Conditions: Half-life [v] +

Half-life: 1 S - 1 M [x]

[Clear] [Filter]

NuDat Data Filter

Thermal Neutron Fission Yields for ^{235}U



Nuclides with half-life
from 1s to 1m

+

of neutrons 60-80

Nuclei Filter [X]

	Range	Odd/Even
Proton (Z) #:	Min - Max	Any ▾
Neutron (N) #:	60 - 80	Any ▾
Atomic Mass (A) #:	Min - Max	Any ▾

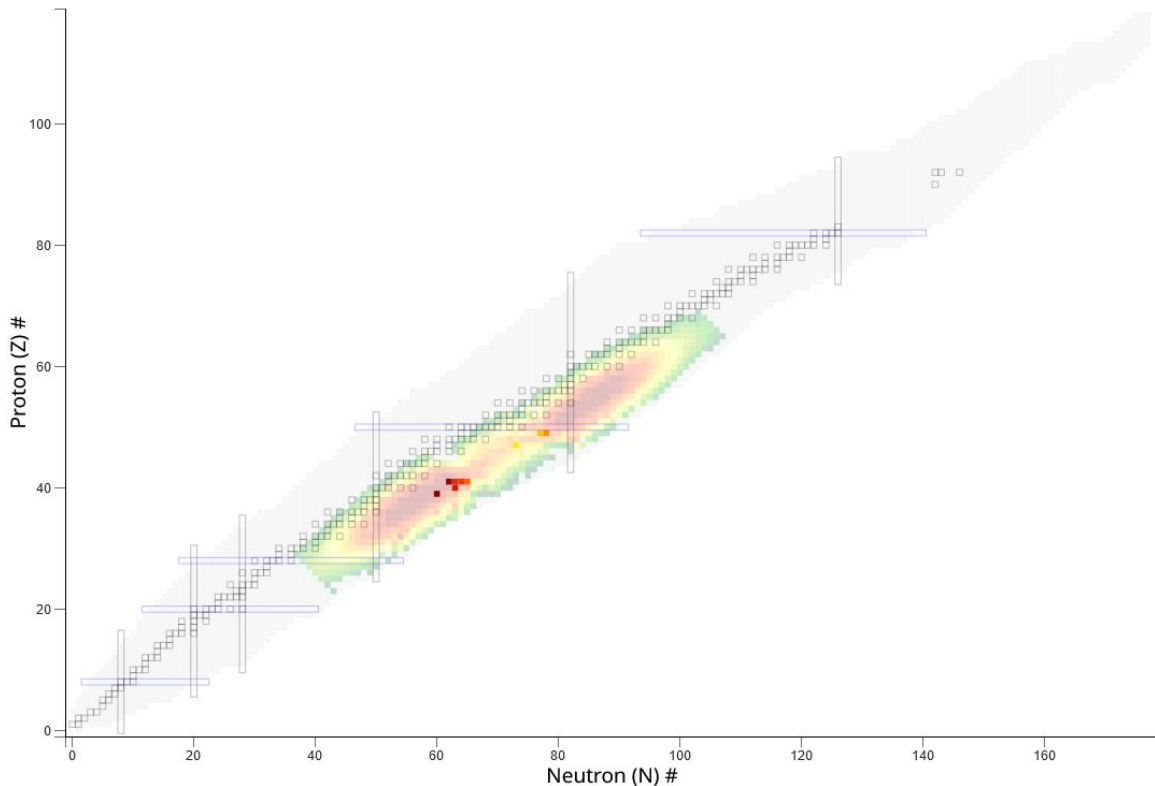
Data Conditions: Half-life ▾ +

Half-life: 1 S ▾ - 1 M ▾ [X]

[Clear] [Filter]

NuDat Data Filter

Thermal Neutron Fission Yields for ^{235}U



Nuclides with half-life
from 1s to 1m

+

of neutrons 60-80

+

$Q(\beta) - n > 0$

Nuclei Filter

	Range	Odd/Even
Proton (Z) #:	Min - Max	Any
Neutron (N) #:	Min - Max	Any
Atomic Mass (A) #:	Min - Max	Any

Data Conditions: $Q\beta-n$

Half-life: 1 S - 1 M

$Q\beta-n$: 0 ≤ keV ≤ Max

Clear Filter

Brookhaven
National Laboratory

- CSV format
- Specify which datasets to export
- Export filtered observables
- Export filtered nuclides

[illegible]

Export CSV

Select Datasets

Select All Datasets

Select Filtered Datasets

Clear Datasets

Selected Datasets

Available Datasets

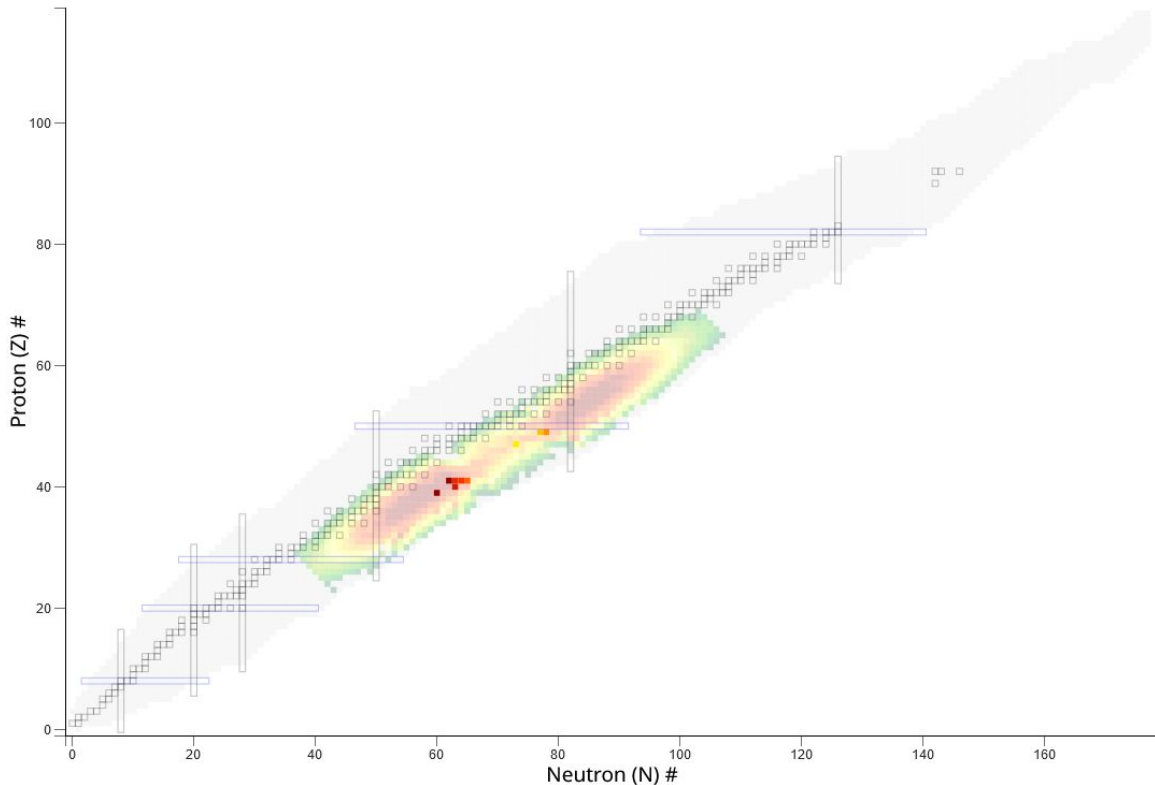
Abundance
Half-life
 J^{π}
Decay Mode
Mass Excess

Filter Nuclides:

 Export Canc

NuDat Data Export

Thermal Neutron Fission Yields for ^{235}U



Nuclides with half-life
from 1s to 1m

+

of neutrons 60-80

+

$Q(\beta) - n > 0$

Nuclei Filter

	Range	Odd/Even
Proton (Z) #:	Min - Max	Any
Neutron (N) #:	Min - Max	Any
Atomic Mass (A) #:	Min - Max	Any

Data Conditions: $Q\beta-n$

Half-life: 1 S - 1 M

$Q\beta-n$: 0 ≤ keV ≤ Max

Clear Filter

NuDat Data Export

z	n	name	levelEnergy(MeV)	halflife	betaMinusOneNeutronEmission(keV)
39	60	99Y	0	1.484 s 7	2567 11
40	63	103Zr	0	1.32 s 11	418 10
41	62	103Nb	0	1.5 s 2	461 9
41	65	106Nb	0	1.02 s 5	3057 9
41	65	106Nb	0.2048	0.82 us 6	3057 9
41	64	105Nb	0	2.95 s 6	2357 10
41	63	104Nb	0	4.9 s 3	1072 9
41	63	104Nb	0.215	0.94 s 4	1072 9
47	73	120Ag	0	1.23 s 4	2.5E+2 4
47	73	120Ag	0.203	0.40 s 3	2.5E+2 4
49	77	126In	0	1.53 s 1	13 4
49	77	126In	0.102	1.64 s 5	13 4
49	78	127In	0	1.09 s 1	1064 15
49	78	127In	0.462	3.67 s 4	1064 15
49	78	127In	1.863	1.04 s 10	1064 15

Export filtered datasets and nuclides

Export CSV

Select Datasets

Select All Datasets

Select Filtered Datasets

Clear Datasets

Selected Datasets

Available Datasets

Half-life

Q_{β-n}

Abundance

J_π

Decay Mode

Mass Excess

Q_{β-}

Q_{EC}

Q_{β+}

S_n

S_p

Q_α

ΔQ_α

S_{2n}

S_{2p}

Q_{2β-}

Filter Nuclides: ☒

Export

Cancel

NuDat Data Export

z	n	name	levelEnergy(MeV)	halflife	betaMinusOneNeutronEmission(keV)	FY235U
39	60	99Y	0	1.484 s 7	2567 11	0.0195 12
40	63	103Zr	0	1.32 s 11	418 10	0.005 3
41	62	103Nb	0	1.5 s 2	461 9	0.014 3
41	65	106Nb	0	1.02 s 5	3057 9	1.6E-4 10
41	65	106Nb	0.2048	0.82 us 6	3057 9	1.6E-4 10
41	64	105Nb	0	2.95 s 6	2357 10	0.00139 11
41	63	104Nb	0	4.9 s 3	1072 9	0.0029 18
41	63	104Nb	0.215	0.94 s 4	1072 9	0.0029 18
47	73	120Ag	0	1.23 s 4	2.5E+2 4	4.E-6 3
47	73	120Ag	0.203	0.40 s 3	2.5E+2 4	4.E-6 3
49	77	126In	0	1.53 s 1	13 4	1.6E-5 11
49	77	126In	0.102	1.64 s 5	13 4	1.6E-5 11
49	78	127In	0	1.09 s 1	1064 15	6.E-5 3
49	78	127In	0.462	3.67 s 4	1064 15	6.E-5 3
49	78	127In	1.863	1.04 s 10	1064 15	6.E-5 3

Add columns from available datasets

Export CSV

Select Datasets

Select All Datasets

Select Filtered Datasets

Clear Datasets

Selected Datasets

Available Datasets

Half-life

Q_{β-n}

235U FY

Abundance

J_π

Decay Mode

Mass Excess

Q_{β-}

Q_{EC}

Q_{β+}

S_n

S_p

Q_α

ΔQ_α

S_{2n}

S_{2p}

Q_{2β-}

Filter Nuclides: ☒

Export

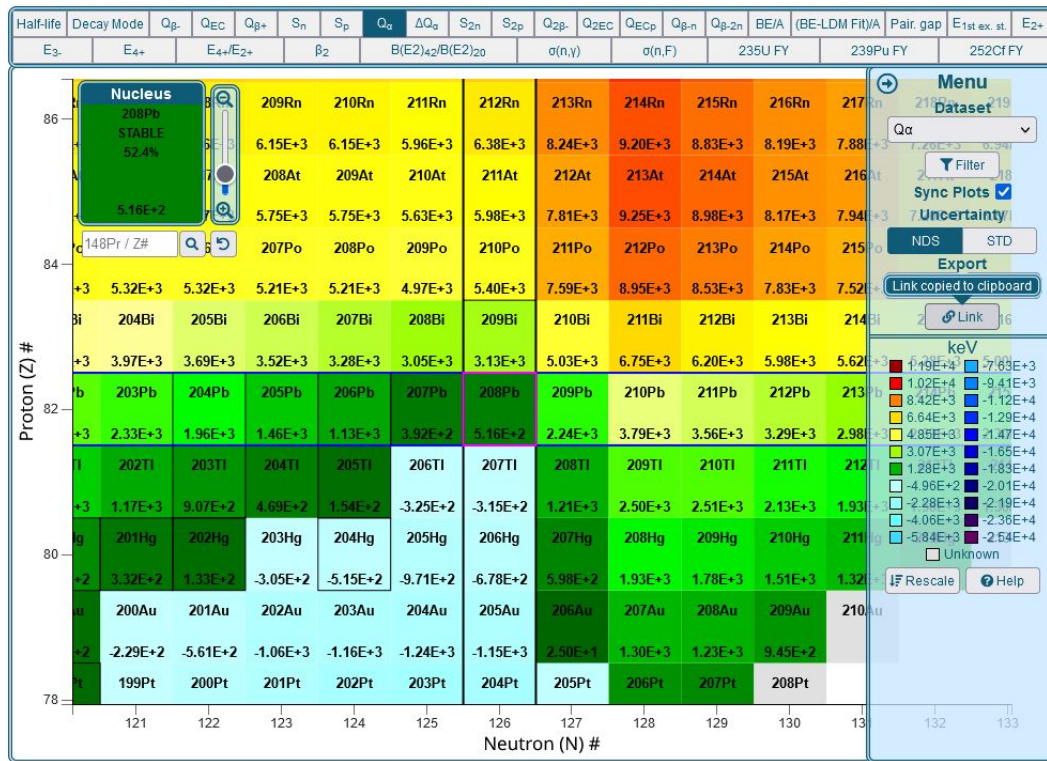
Cancel

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- **Export Data (CSV, PNG, Link)**
- SVG Export

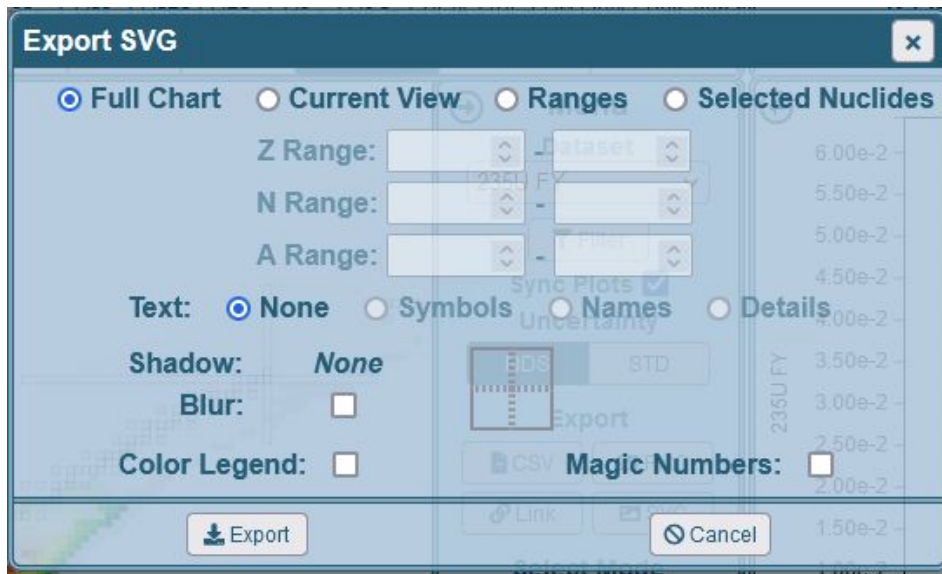


www.nndc.bnl.gov/nudat3/?x=-9.29&y=-3.88&k=13.92&z=82&n=126&mode=7

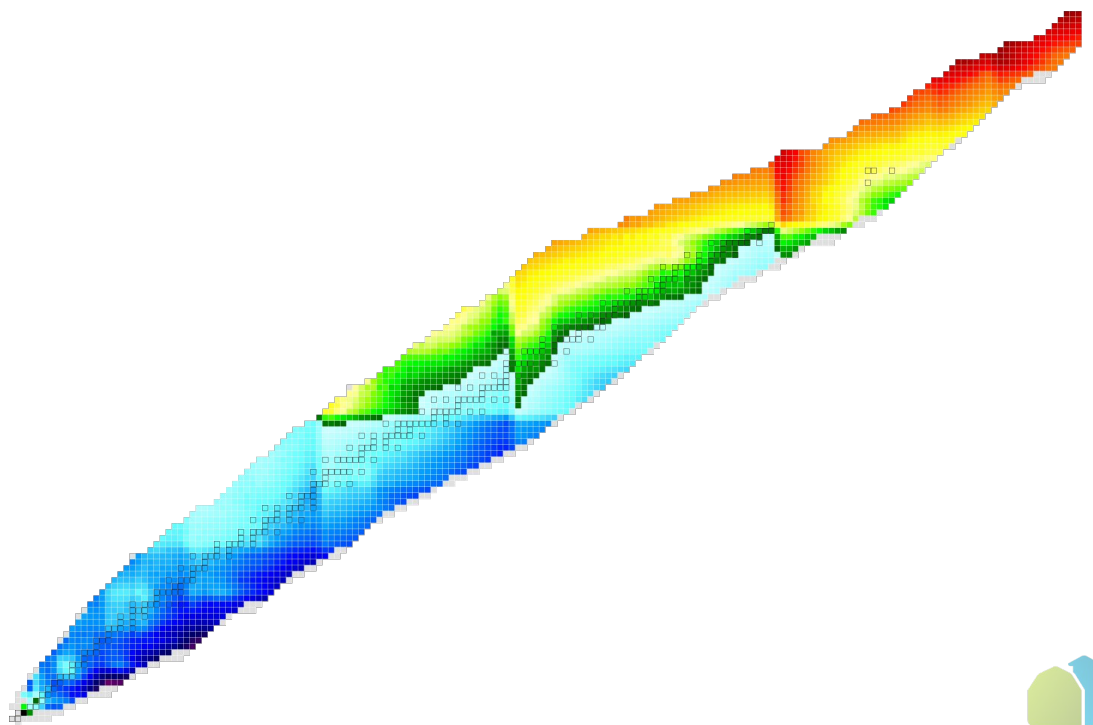
NuDat SVG Export

Customizable SVG export:

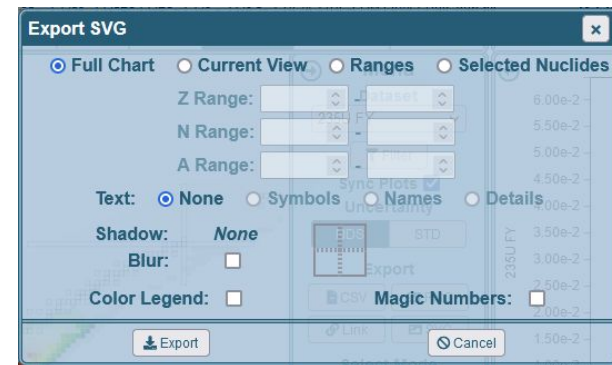
- Export chart of nuclides
 - Full chart
 - Current view
 - Z/N Ranges
- Include text
 - None
 - Element symbol
 - Nuclide name
 - Dataset details
- Shadow (flat or blur)
- Color Key
- Magic Numbers



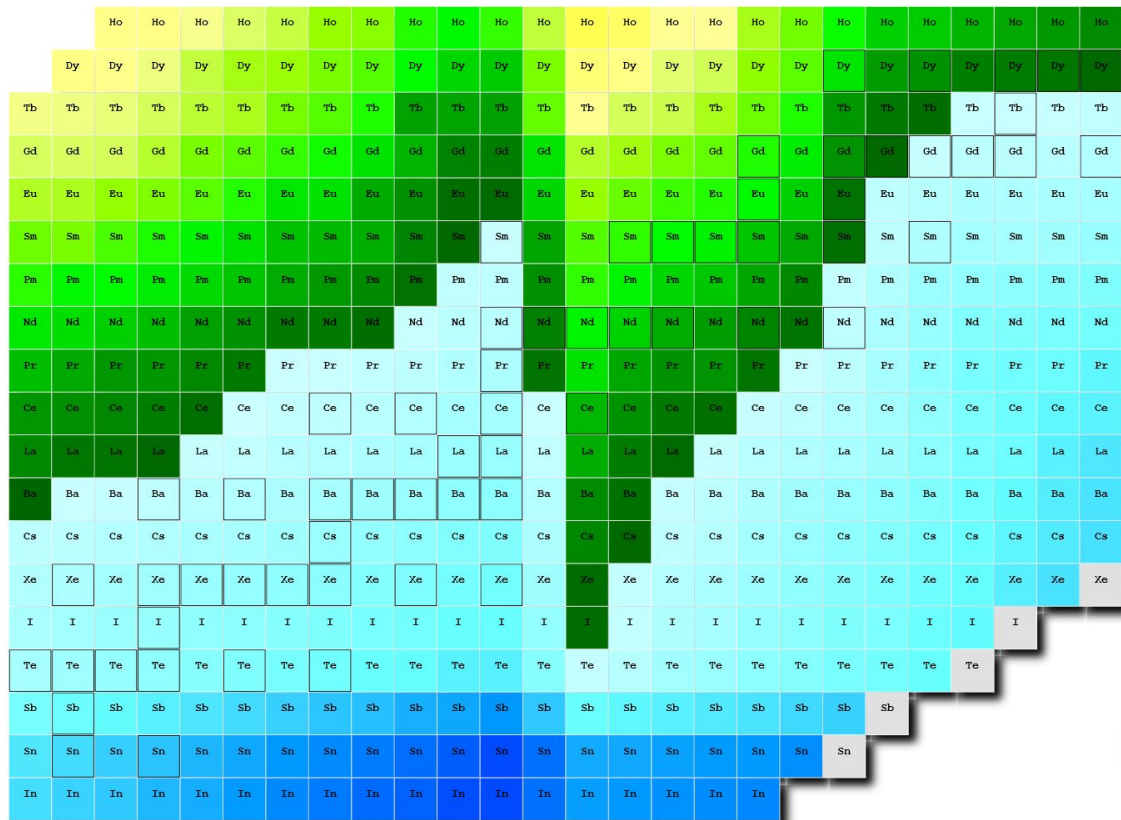
NuDat SVG Export



Q(α) full chart
without text



NuDat SVG Export



Q(α) current view
with element symbols
and bottom-right shadow



NuDat SVG Export

$Q(\alpha)$ chart z/n range
with element symbols
and top-left shadow



Export SVG

☐ Full Chart ☐ Current View ☒ Ranges ☐ Selected Nuclides

Z Range: 27 - 29

N Range: - -

A Range: - -

Text: ☐ None ☐ Symbols ☒ Names ☐ Details

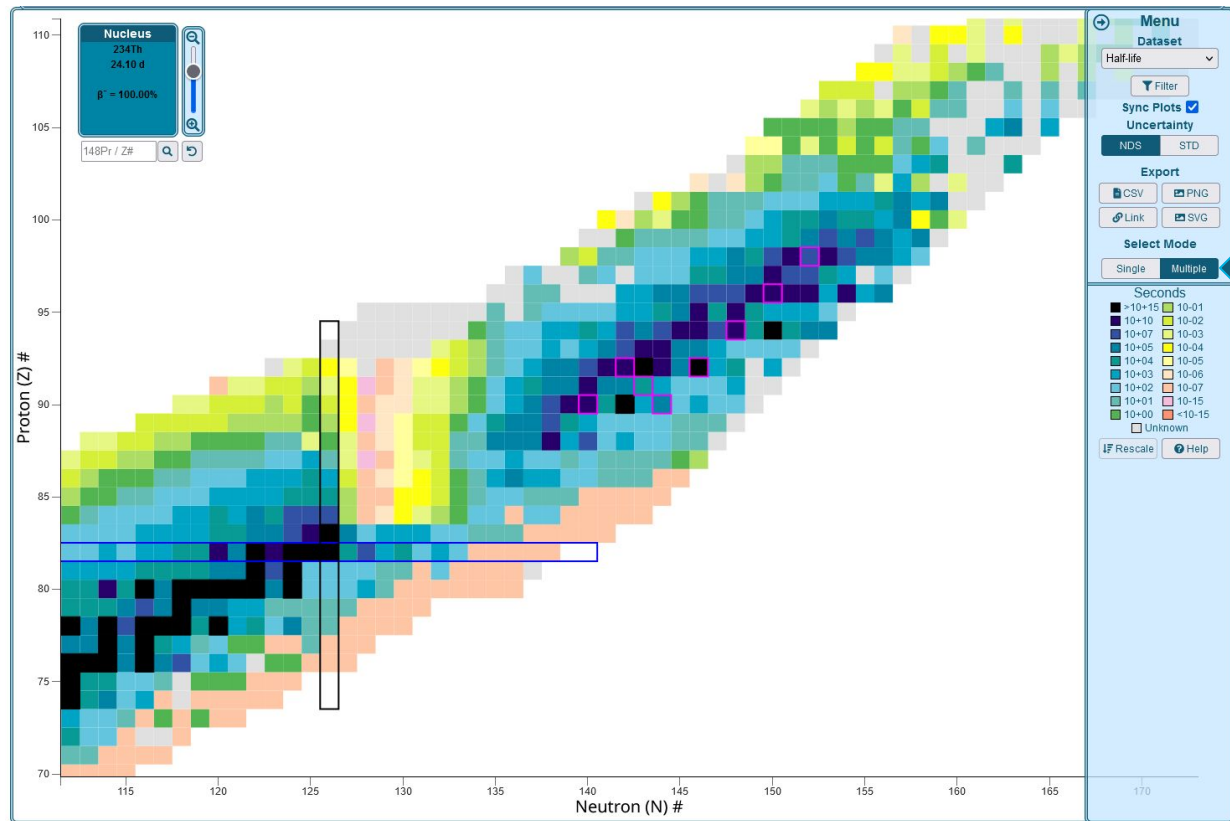
Shadow: ☒ Top-left

Blur: ☐

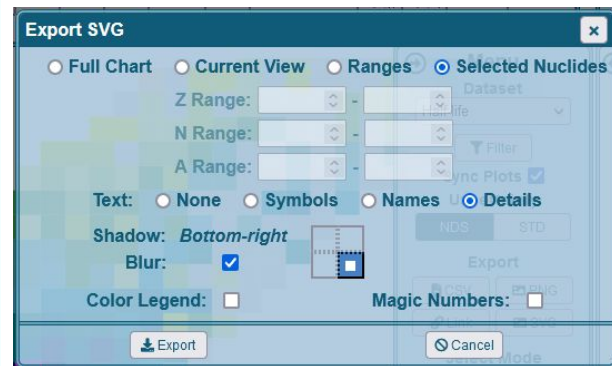
Color Legend: ☐

Magic Numbers: ☐

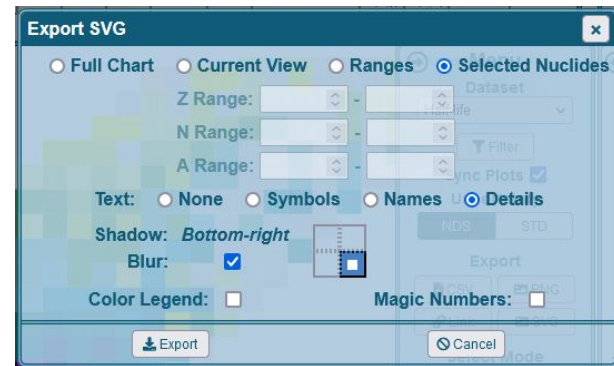
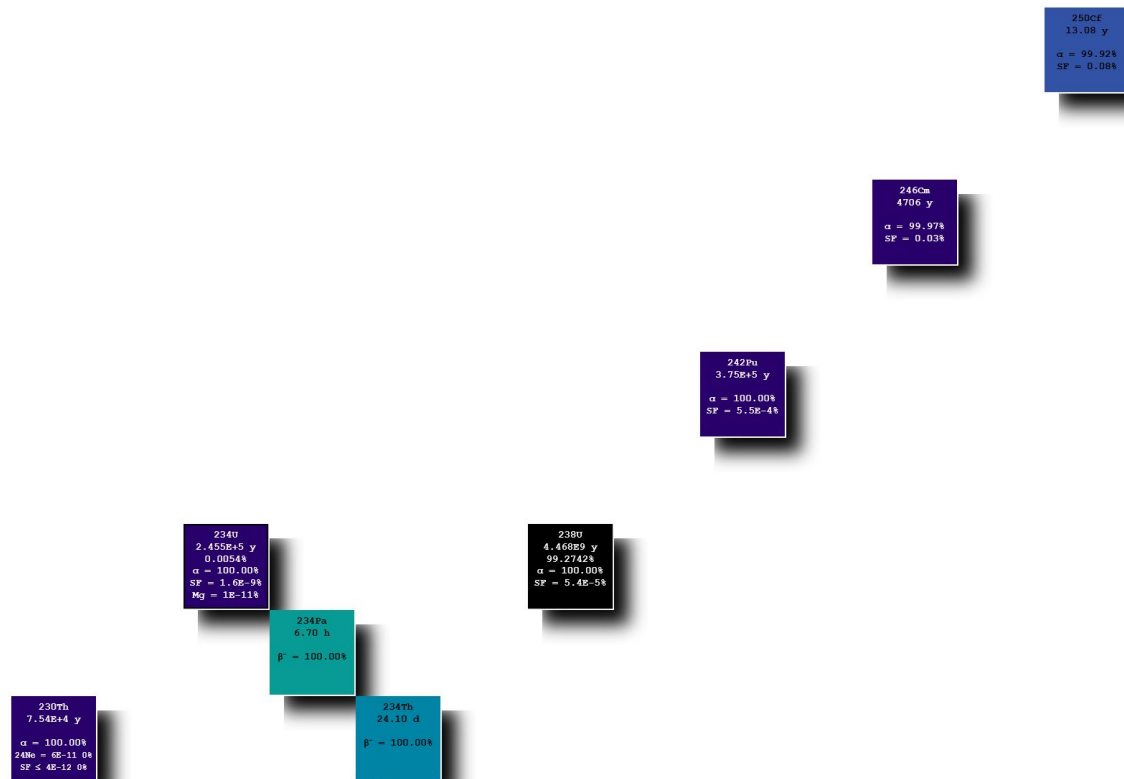
NuDat SVG Export



Select specific nuclides using the "Multiple" select mode



NuDat SVG Export



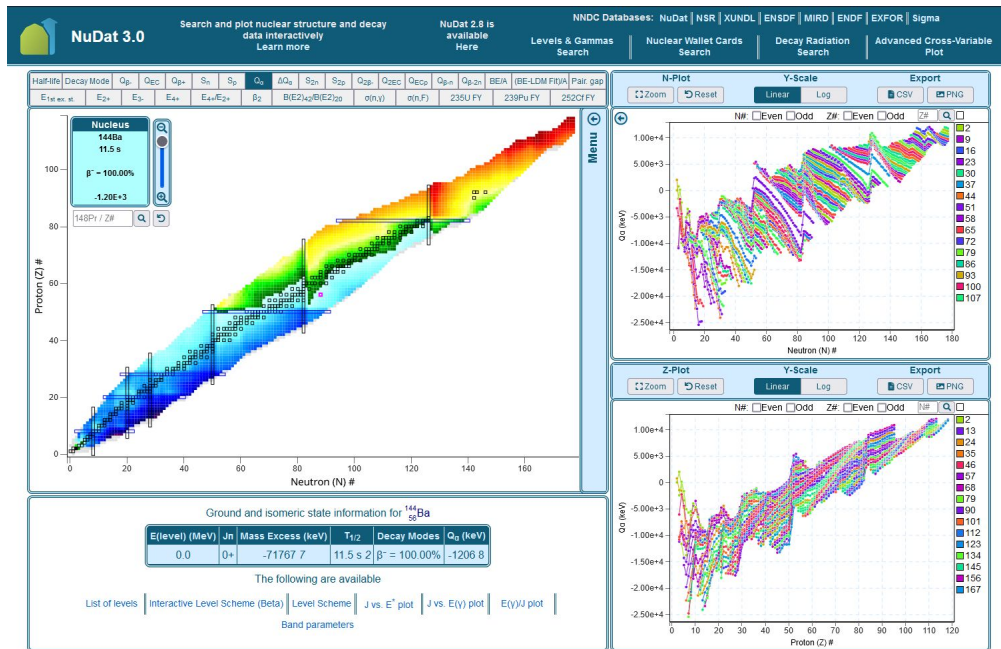
Contact Us

NuDat 3 is available here:
www.nndc.bnl.gov/nudat3/

Improvements based on
community feedback

We encourage you to send us
your feedback and suggestions

Thank you!



Donnie Mason - dmason@bnl.gov



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