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U.S. DEPARTMENT OF ENERGY

Wallet Cards Pipeline

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November 13, 2023

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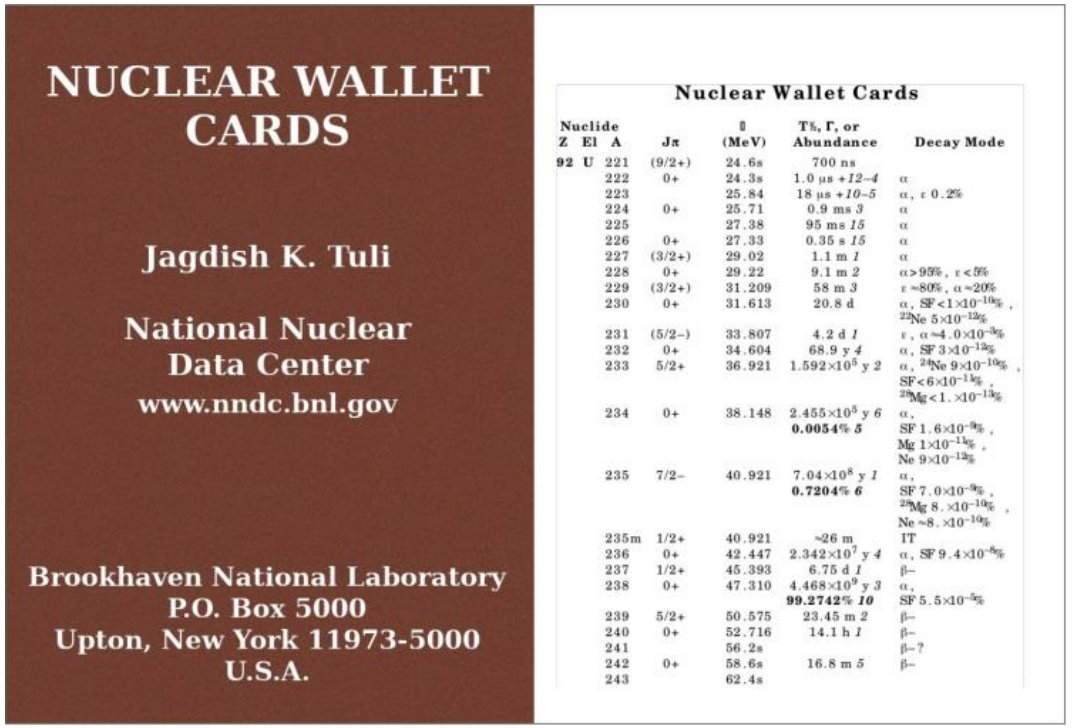
A Brief History

Wallet Cards last updated in 2011

- Printed booklets still in circulation, while also missing >10 years of physics
- Original code outpaced by other NNDC modernization projects
- Metadata (update history, measurements, methodology) missing from original records



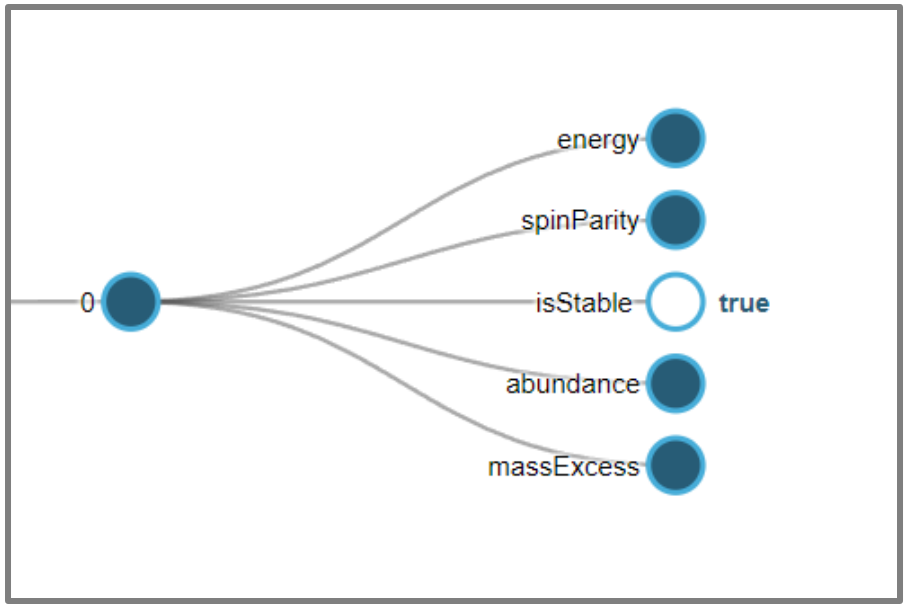
ENSDF Modernization

Conversion of original 80-column datasets into JSON files

- Included data models for ground- and isomer-states
- Provided (most of) the pieces needed for Wallet Cards datasets

Source:
009Be.json

0 index indicates that this is a ground state



JSON object structure enables specific field names for complex data

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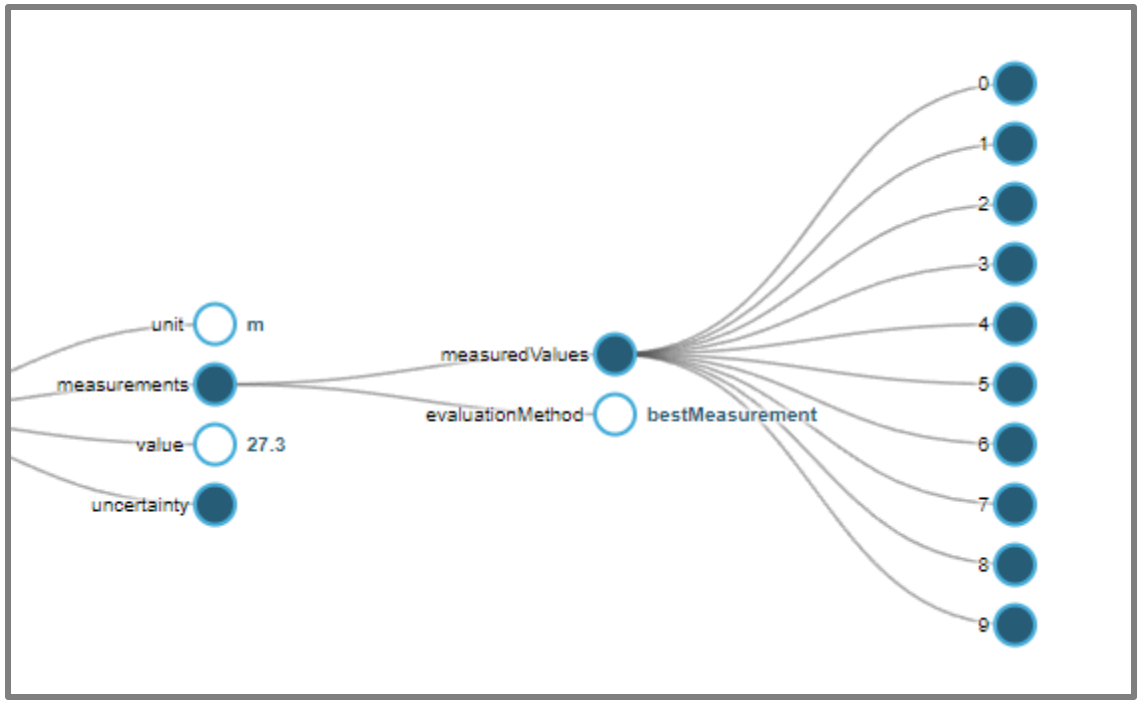
ENSDF Modernization (contd.)

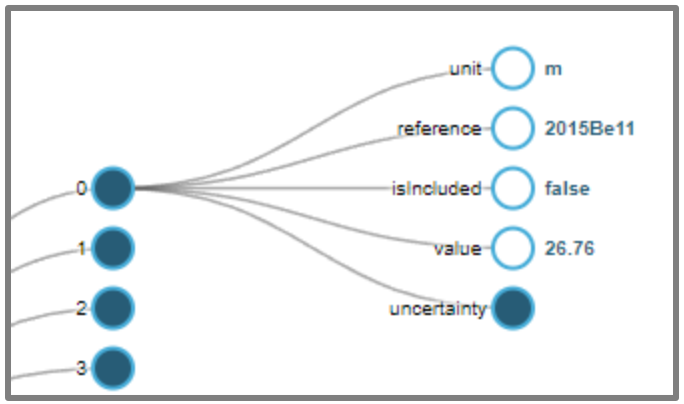
ENSDF schema also provides definitions for measurements

- Enables more detailed recordkeeping for evaluations

Source:
235U.json

Fields stored in **halfLife** object





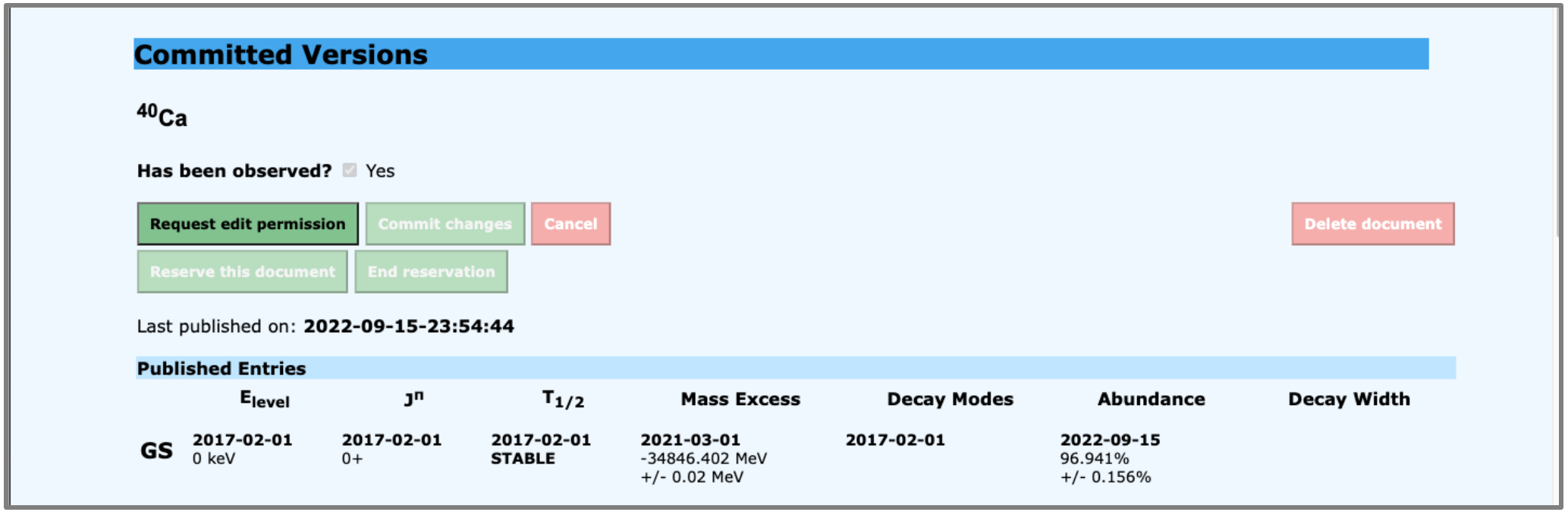
Data from a half-life measurement stored in a JSON object.

Note the NSR key in its **reference** field.

WalletCraft Website

Internal website used for Wallet Cards evaluations

- Developed before ENSDF modernization, with a different format



Committed Versions

^{40}Ca

Has been observed? Yes

Request edit permission | Commit changes | Cancel | Delete document

Reserve this document | End reservation

Last published on: **2022-09-15-23:54:44**

Published Entries

	E_{level}	J^{π}	$T_{1/2}$	Mass Excess	Decay Modes	Abundance	Decay Width
GS	**2017-02-01** 0 keV	**2017-02-01** 0+	**2017-02-01** **STABLE**	**2021-03-01** -34846.402 MeV +/- 0.02 MeV	**2017-02-01**	**2022-09-15** 96.941% +/- 0.156%	

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JSON Conversion

Files re-formatted using **walletcraft-convert** executable

```
> Task :run
Retrieving nuclides by Z: 100% [==================] 119/119 (0:00:48 / 0:00:00)
Downloading JSON: 100% [======================] 3371/3371 (0:04:06 / 0:00:00)

BUILD SUCCESSFUL in 5m 4s
18 actionable tasks: 18 executed
```

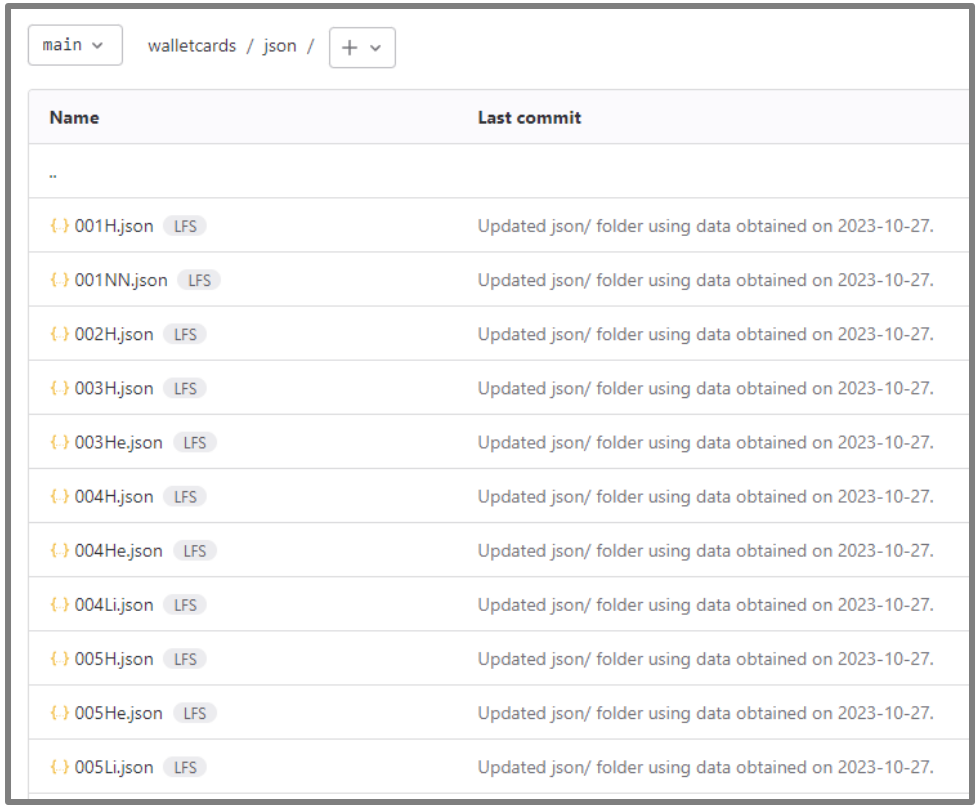
```
> Task :run
Converting documents: 100% [====================] 3371/3371 (0:00:06 / 0:00:00)

BUILD SUCCESSFUL in 8s
24 actionable tasks: 1 executed, 23 up-to-date
benjaminshu@LNE-154828 walletcraft-convert %
```

Version Control

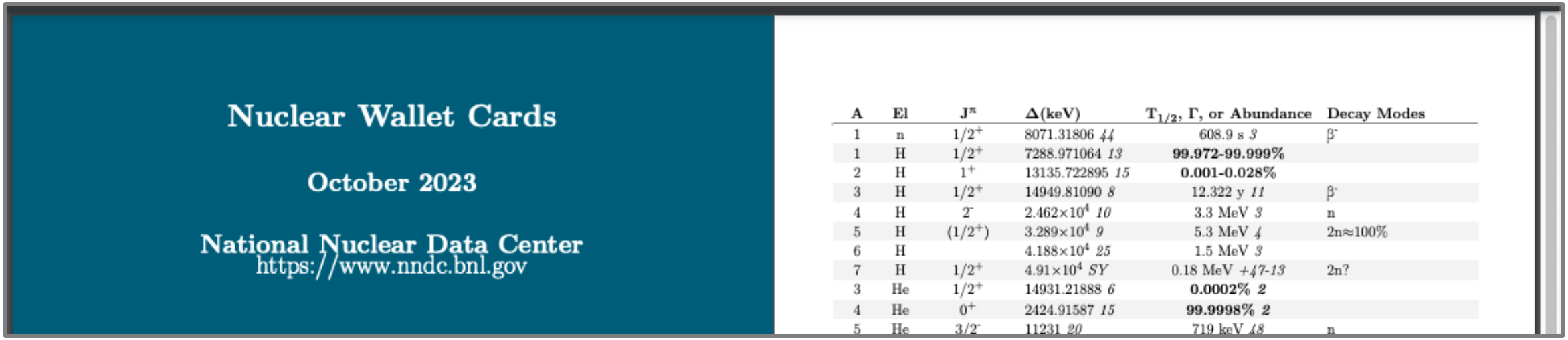
Data stored in **databases/walletcards**

- Through Git, keeps record of:
  - **when** changes were made
  - **which** files were changed
  - **what** was modified
  - **who** made the change
- Helps ensure consistency across multiple applications
- Simplifies future distribution of data



Distribution – Printed Booklets

JSON datasets converted into LaTeX using **walletcards-print**



Nuclear Wallet Cards

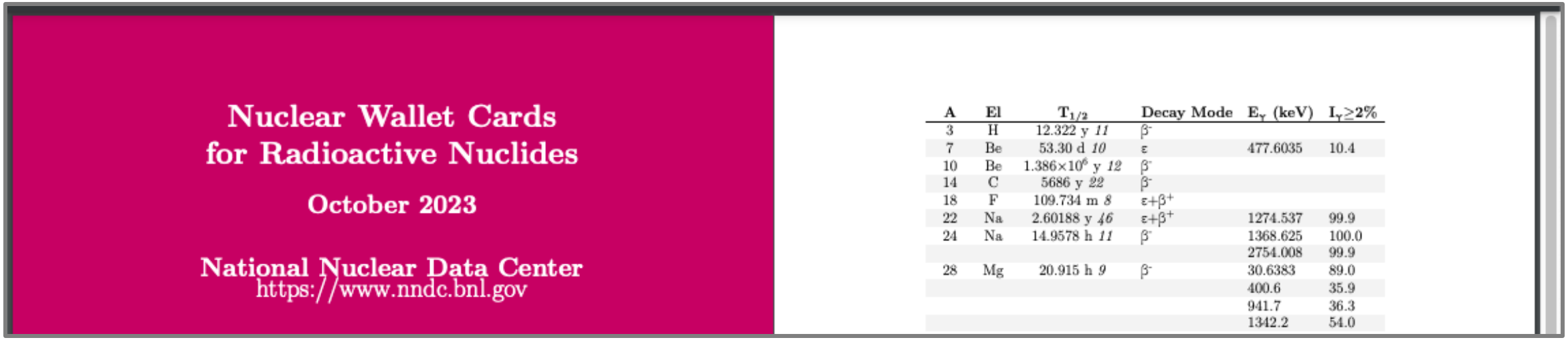
October 2023

National Nuclear Data Center
https://www.nndc.bnl.gov

A	El	J^{π}	Δ(keV)	$T_{1/2}$, Γ, or Abundance	Decay Modes
1	n	$1/2^+$	8071.31806 *44*	608.9 s *3*	β^-
1	H	$1/2^+$	7288.971064 *13*	**99.972-99.999%**	
2	H	1^+	13135.722895 *15*	**0.001-0.028%**	
3	H	$1/2^+$	14949.81090 *8*	12.322 y *11*	β^-
4	H	2^-	2.462×10^4 *10*	3.3 MeV *3*	n
5	H	$(1/2^+)$	3.289×10^4 *9*	5.3 MeV *4*	2n≈100%
6	H		4.188×10^4 *25*	1.5 MeV *3*	
7	H	$1/2^+$	4.91×10^4 *SY*	0.18 MeV *+47-13*	2n?
3	He	$1/2^+$	14931.21888 *6*	**0.0002%** *2*	
4	He	0^+	2424.91587 *15*	**99.9998%** *2*	
5	He	$3/2^-$	11231 *20*	719 keV *48*	n

Distribution – Printed Booklets

JSON datasets converted into LaTeX using **walletcards-print**



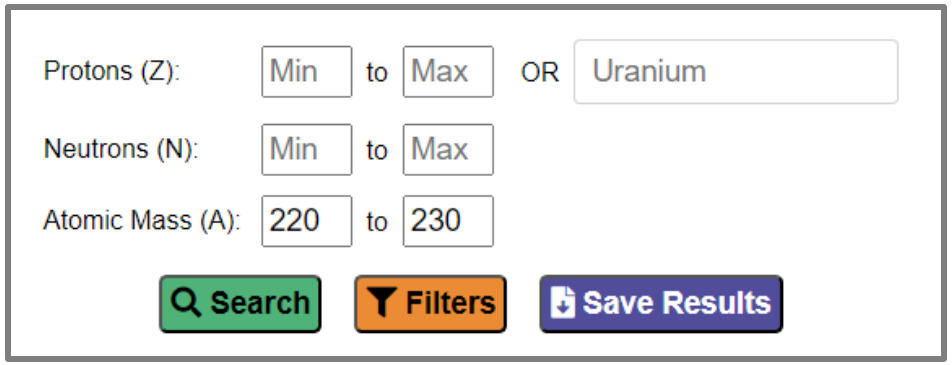
A	El	$T_{1/2}$	Decay Mode	E_γ (keV)	$I_\gamma \geq 2\%$
3	H	12.322 y *11*	β^-		
7	Be	53.30 d *10*	ε	477.6035	10.4
10	Be	1.386×10^{6} y *12*	β^-		
14	C	5686 y *22*	β^-		
18	F	109.734 m *8*	$\varepsilon+\beta^+$		
22	Na	2.60188 y *46*	$\varepsilon+\beta^+$	1274.537	99.9
24	Na	14.9578 h *11*	β^-	1368.625	100.0
				2754.008	99.9
28	Mg	20.915 h *9*	β^-	30.6383	89.0
				400.6	35.9
				941.7	36.3
				1342.2	54.0

Distribution – Web Application

walletcards website enables searching in JSON data

- Updates only require replacing data files

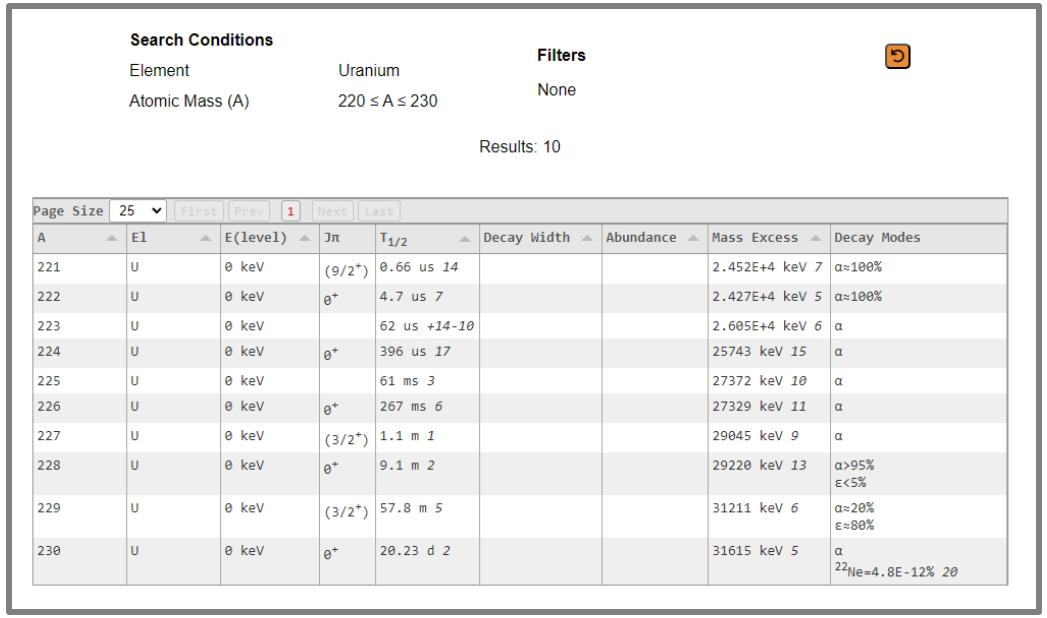
Searching for Uranium isotopes between 220-230



Also available: downloading results as a **.csv** file

Summary of search inputs

Paginated results table of observable properties



Search Conditions

Element	Uranium
Atomic Mass (A)	220 ≤ A ≤ 230

Filters

None

Results: 10

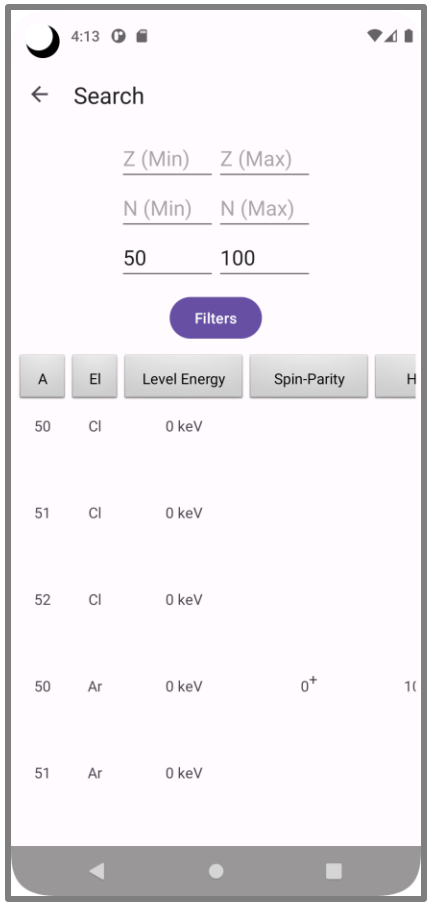
Page Size 25 | First | Prev | 1 | Next | Last

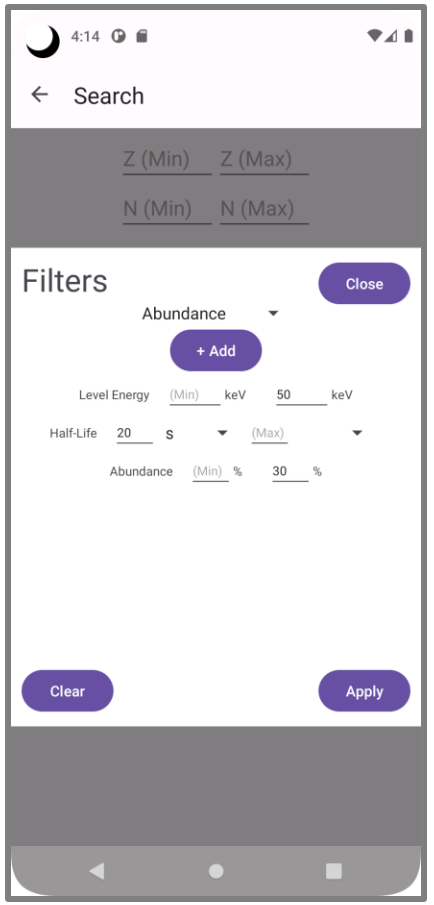
A	El	E(level)	Jπ	$T_{1/2}$	Decay Width	Abundance	Mass Excess	Decay Modes
221	U	0 keV	$(9/2^+)$	0.66 us *14*			2.452E+4 keV *7*	α≈100%
222	U	0 keV	0^+	4.7 us *7*			2.427E+4 keV *5*	α≈100%
223	U	0 keV		62 us *+14-10*			2.605E+4 keV *6*	α
224	U	0 keV	0^+	396 us *17*			25743 keV *15*	α
225	U	0 keV		61 ms *3*			27372 keV *10*	α
226	U	0 keV	0^+	267 ms *6*			27329 keV *11*	α
227	U	0 keV	$(3/2^+)$	1.1 m *1*			29045 keV *9*	α
228	U	0 keV	0^+	9.1 m *2*			29220 keV *13*	α>95% ε<5%
229	U	0 keV	$(3/2^+)$	57.8 m *5*			31211 keV *6*	α≈20% ε≈80%
230	U	0 keV	0^+	20.23 d *2*			31615 keV *5*	α ^{22}Ne=4.8E-12% *20*

Distribution – Mobile Apps

All datasets, packaged into a phone

- Provides basic searching by Z, N, A
- Adds optional filters for observable ground- and isomer-state properties
- No Internet connection required
- Currently Android only – working on iOS support





Future Plans

- ENSDF JSON editor support
- Mobile app releases for Android ***and*** iOS
- Public access to JSON data files