



XUNDL/ENSDF/NDS

Libby Ricard
National Nuclear Data Center



@BrookhavenLab

XUNDL New Faces



G. Gurdal

- Under contract for FY24
- Contract will continue into FY25
- Compiles published papers



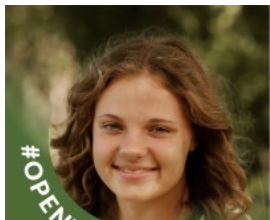
J. Wu

- Trained by J. Chen and E. Ricard for PRC checking
- Will increase XUNDL compilation effort focusing on PRC pre-check



K. Setoodehnia

- Trained by J. Kelley
- Increasing XUNDL effort in $A < 20$ region



Rylie DuBois



Hang Su

- J. Chen training undergraduates at MSU

XUNDL Pre-publication Checking Statistics

Started in June 2024 to collect statistics on compilation reports

- 35 papers
- **312** “Minor” fixes
- **40** “Major” fixes

Roughly 10 fixes per paper

Minor fix examples:

- Jpi in Figure and Table don't match
- Gamma energy in Spectrum and Table don't match
- Small differences in calculated values (transition strengths, beta feedings, etc)

Major fix examples:

- Gammas that don't fit in level scheme
- Large negative intensity imbalances
- Large differences in calculated values that change physics interpretation

ENSDF Metrics

FY 23

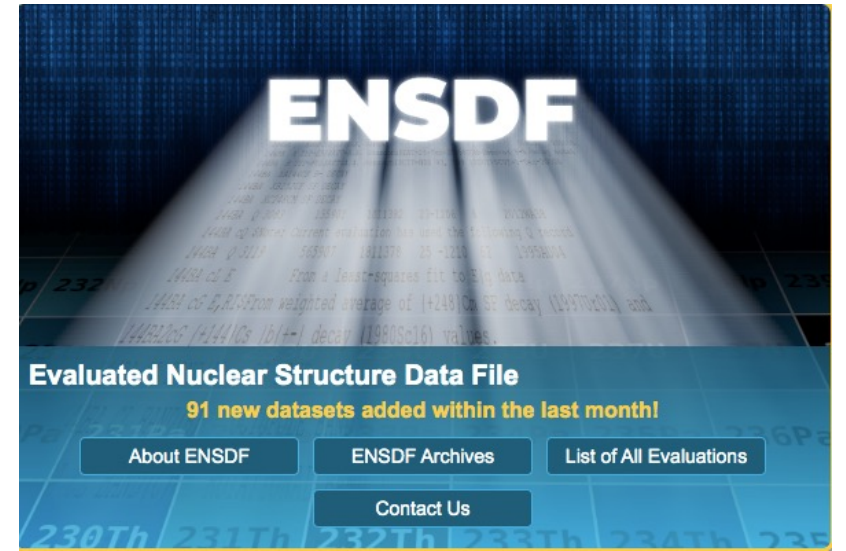
Evaluated 207 nuclides, 13 mass chains

FY 24

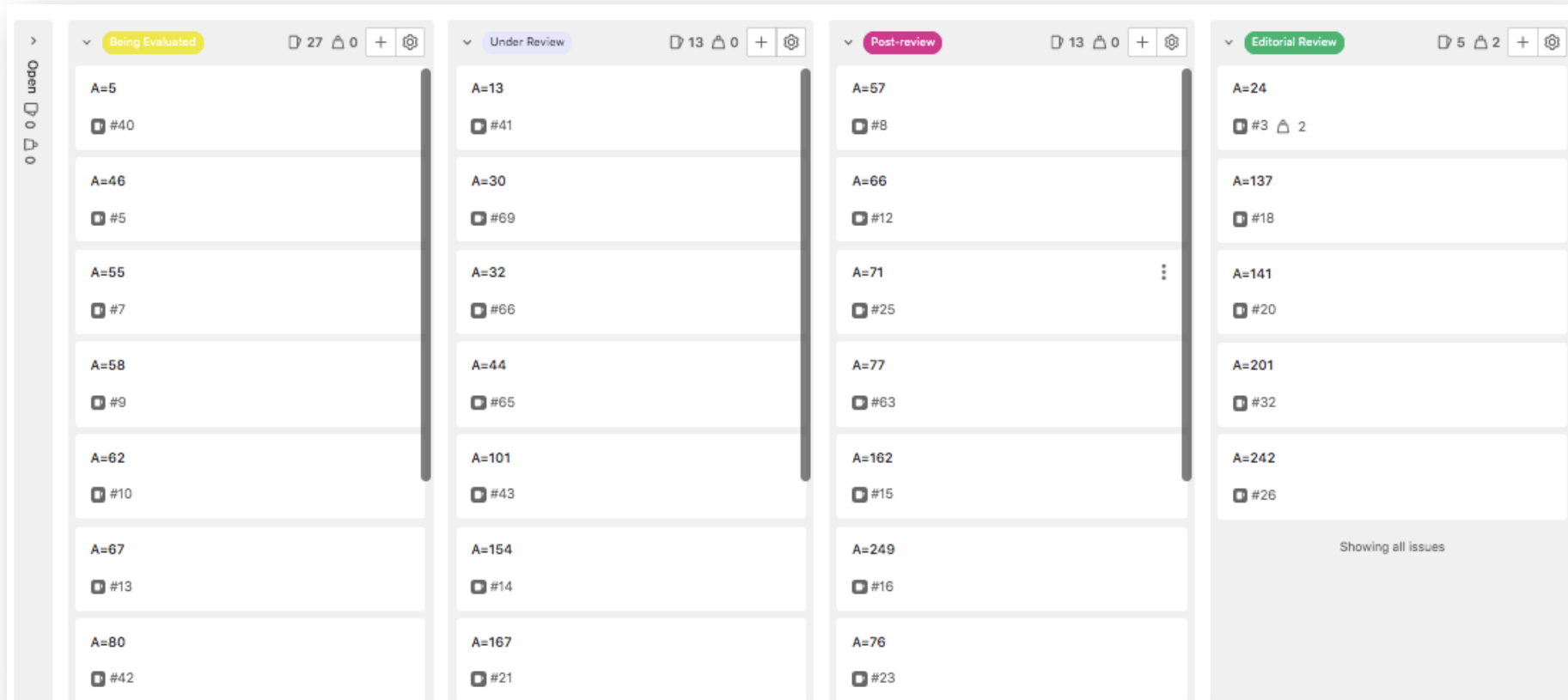
Stay tuned, more than half of all mass chain submissions for the year arrive on Sept 30th

Full database is 19828 datasets for 3437 nuclides**

** As of September 17, 2024



GitLab for ENSDF tracking



- Issues list exported as .csv
- Spreadsheet with status of mass chains emailed monthly (if needed)
- Sometimes unaware of “Being Evaluated” Status

Bottleneck in Post Review

The screenshot displays a Kanban board with three columns representing different stages of mass chain review. Each card in the board includes an ID (A=) and a corresponding issue number (#).


Being Evaluated (26)	Under Review (9)	Post-review (20)
A=5 (#40)	A=62 (#10)	A=13 (#41)
A=46 (#5)	A=80 (#42)	A=57 (#8)
A=55 (#7)	A=47 (#64)	A=66 (#12)
A=58 (#9)	A=25 (#73)	A=32 (#66)
A=67 (#13)	A=234 (#50)	A=101 (#43)
A=103 (#44)	A=72 (#81)	A=154 (#14)
A=107 (#45)	A=156 (#83)	A=77 (#63)
A=118 (#46)	A=250 (#84)	A=130 (#22)
A=120 (#47)	A=248 (#89)	A=137 (#18)
A=124 (#48)	Showing all issues	
A=132 (#34)		A=172 (#30)
A=151 (#50)		A=196 (#53)
A=173 (#51)		A=197 (#54)
A=174 (#52)		A=253-259_odd (#39)
A=215 (#56)		A=261,265 (#55)
A=216 (#57)		A=148 (#71)
A=221 (#58)		A=81 (#72)
A=223 (#60)		A=86 (#74)
A=226 (#36)		A=33 (#77)
A=229 (#61)		A=69 (#79)
A=237		A=206 (#88)

As of September 17th

- 9 mass chains under review (likely several will move to post review as people turn in end of year reviews)
- 20 mass chains in post review

Uptick in User Questions/Feedback


Contact Us

How can we help? 

National Nuclear Data Center

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Upton, NY 11973-5000

 Contact Us

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 info@ndc.bnl.gov

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Uptick in User Questions/Feedback



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Databases



Structure & Decay



Reactions



Resources



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✓ How can we help?

General

Feature Requests

Databases

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XUNDL

ENDF

EXFOR

NSR

Web Applications

NuDat

Sigma

MIRD

Capgam

Logft

Other (not listed)

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U.S. DEPARTMENT OF
ENERGY

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Science

Valuable Feedback Improves ENSDF

Databases: ENSDF

Name: Chin Jian Kai

Email: chinjiankai0.69314718056@gmail.com

Message:

Dear Sir or Madam,

The data on 225Ra needs update. The alpha decay of 225Ra has been observed, here

Liang, C. F.; Paris, P.; Sheline, R. K. (2000-09-19). "α decay of 225Ra". Physical Review
Bibcode:2000PhRvC..62d7303L. doi:10.1103/physrevc.62.047303. ISSN 0556-2813.

Best regards,
Chin Jian Kai

225Ra Levels

Cross Reference (XREF) Flags

- A 229Th α decay
- B 225Fr β⁻ decay
- C 226Ra(d,t), (pol d,t)
- D 226Ra(³He,α)

E(level)	J ^π	T _{1/2}	XREF	Comments
0.0 [†]	1/2 ⁺	14.9 d 2	ABC	<p>%β⁻=100 μ = -0.7338 15 (LASER spectroscopy; 1987Ar20,1983Ah03). μ = -0.85 was calculated by 1988Le13 for octupole deformation of β₃=0.15 and quadrupole deformation of β₂=0.148. See also 1983Ra28, 1985Dz04 for calculated μ values. No α's observed: %α<0.0001 (1960Ma40). J^π spin measured (LASER spectroscopy, 1983Ah03); the orbital assignment from measured magnetic moment. T_{1/2}: measured values: 15.0 d 6 (1987Mi10), 14.8 d 2 (1950Ha52). Other measurement: 14 d (1947En03).</p>

²²¹₈₆Rn₁₃₅

From ENSDF

²²¹₈₆Rn₁₃₅

225Ra α decay 2000Li37

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Ashok Jain, Sukhjeet Singh, Suresh Kumar, Jagdish Tuli		NDS 108, 883 (2007)	15-Jan-2007

Parent: ²²⁵Ra: E=0.0; J^π=1/2⁺; T_{1/2}=14.9 d 2; Q(α)=5097 5; %α decay=0.026 6
²²⁵Ra-g.s. interpreted as a member of an octupole parity doublet.
 2000Li37: the activity extracted from ²²⁹Th source. Measured α, αγ, x-ray-α.

221Rn Levels

E(level)	J ^π	Comments
0	7/2 ⁽⁺⁾	Interpreted as a mixture of K=3/2 and K=1/2 octupole parity doublets.
30 10	(3/2 ⁺)	

α radiations

Eα	E(level)	Iα [‡]	HF [†]	Comments
4976 5	30	6×10 ⁻⁶ 3	3.4×10 ⁷ 19	α measured in coincidence with Rn L x ray.
5006 5	0	2.0×10 ⁻⁵ 5	1.55×10 ⁷ 53	

[†] r₀=1.5521.

[‡] For absolute intensity per 100 decays, multiply by 0.00026 6.

ENSDF Updates for FY24

Welcome two new ENSDF evaluators funded through the NDIAWG FOA



Anthony Ramirez

- PhD from Ohio University – level densities
- Postdoc Kentucky – nuclear structure
- New LLNL Staff - fission yield measurements



Vincent Cheung

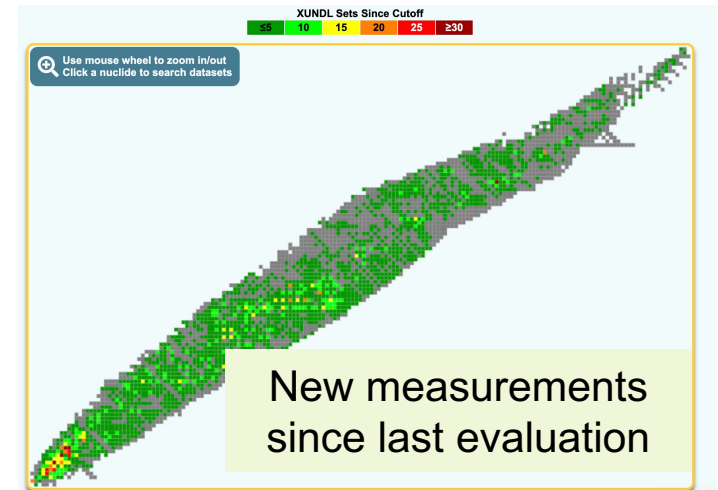
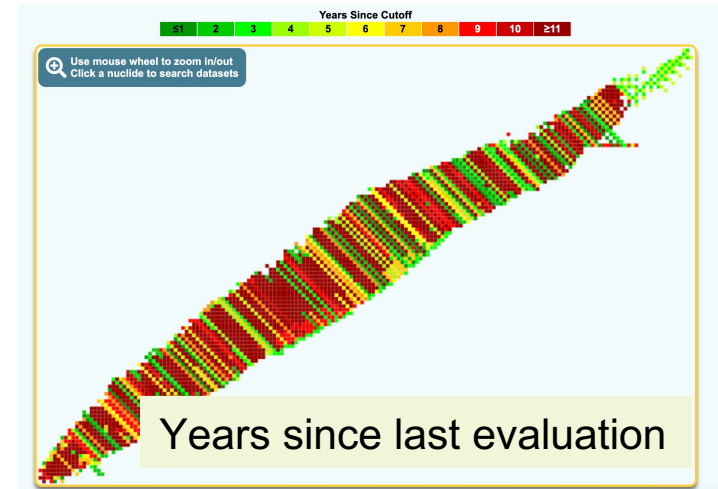
- PhD – High Energy Theory
- LLNL – Converting ENSDF decay into GNDS Decay Sublibrary
- New LLNL Staff

High Priority Metrics

From Second NSAC report on Nuclear Data

Issue: There is an average of 10 years between updates of any mass chain. The gap in time between publication of a measurement and incorporation into the ENSDF library is too large, impacting downstream applications.

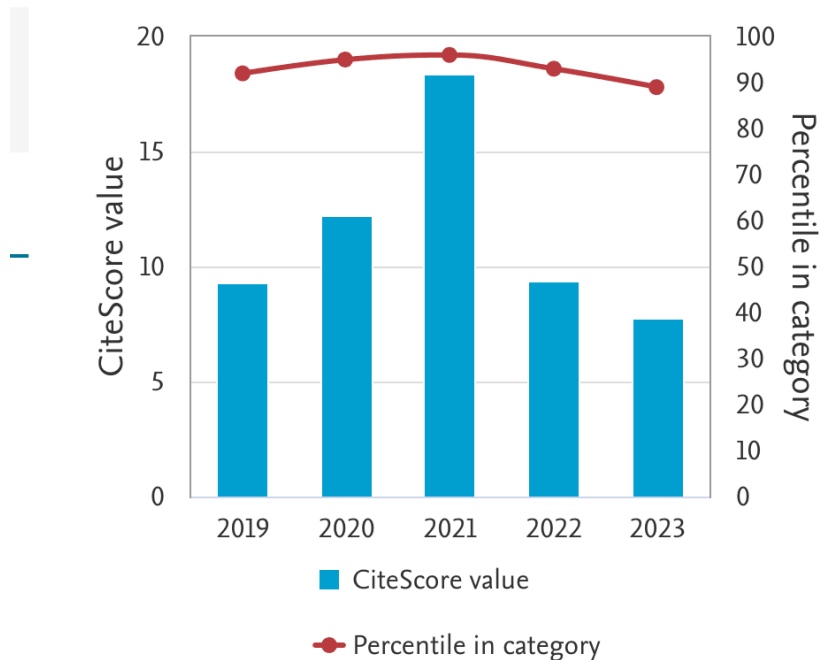
Impact: An increased frequency of evaluation and prioritized mass chain plan will ensure that applications reliant on up-to-date nuclear structure information will receive this information in a timely manner. It will also aid in the accuracy of the reaction evaluation process given the role of discrete state data in nuclear reaction evaluation.



Center	Nuclides	Adopted Levels	Adopted Gammas	Mass Chains	< Mass Chain Age >	# of XUNDL Datasets
ANL	13	493	616	1		
BNL	90	501	525	5		
LBNL	20	734	1136	2		

Nuclear Data Sheets for “FY24”

CiteScore trend



- 10th out of 87 journals (down from 6rd in 2022)
- Good news – we have a number of what will be (likely) highly cited papers in the pipeline

8 **FENDL: A library for fusion research and applications**



Schnabel, G; Aldama, DL; (...); Zohar, A



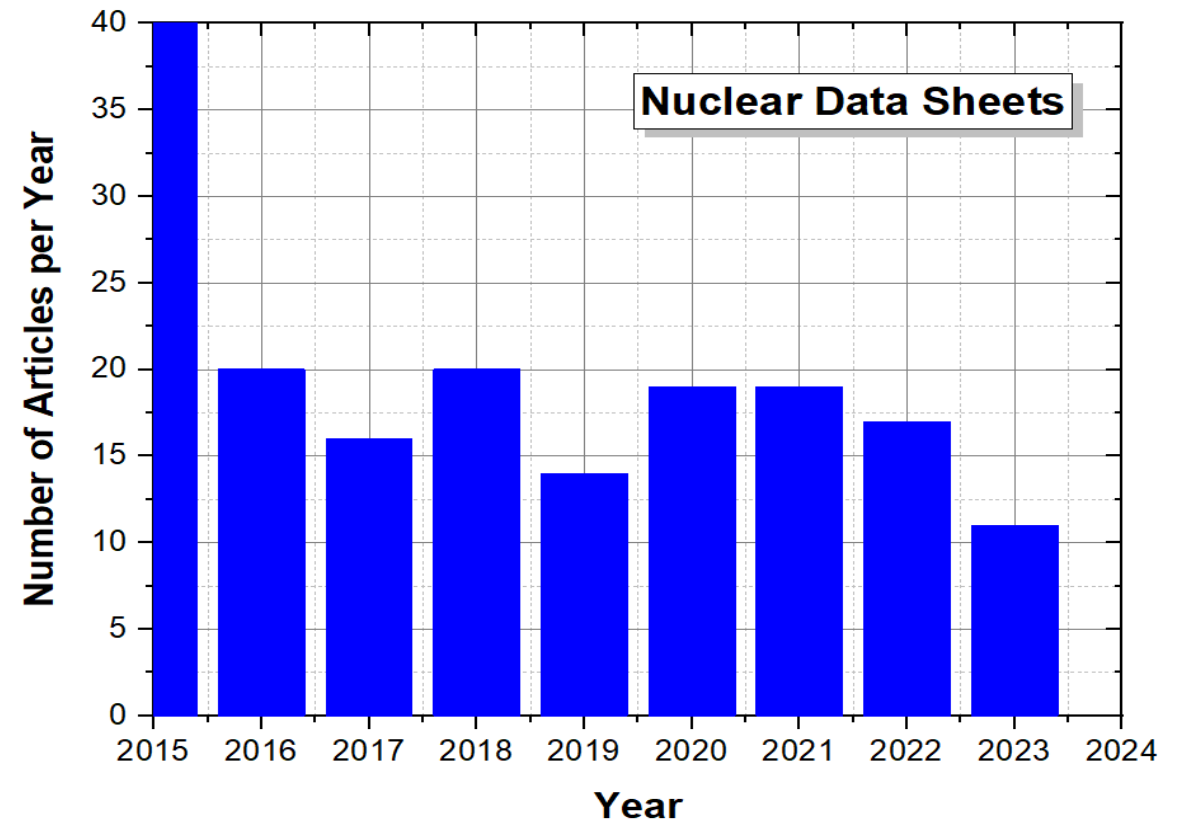
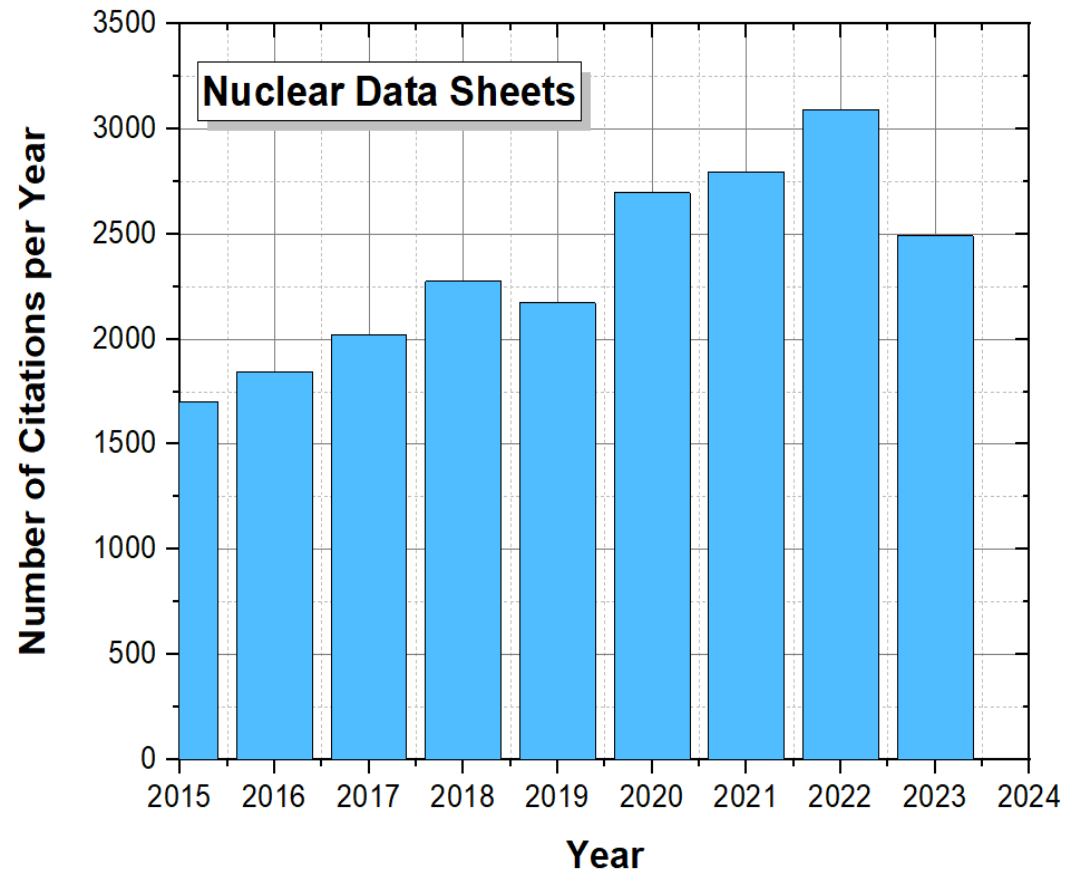
Feb 2024 | NUCLEAR DATA SHEETS ▾ 193, pp.1-78

The Fusion Evaluated Nuclear Data Library (**FENDL**) is a comprehensive and validated collection of nuclear cross section data coordinated by the International Atomic Energy Agency (IAEA) Nuclear Data Section (NDS). **FENDL** assembles the best nuclear data for fusion applications selected from available nuclear data libraries and has been under develop ... [Show more](#)

- 6 issues
- 10 mass chains
- 1 Special Issue on Nuclear Data

Next year (Calendar 2025) we will increase from 6 to 8 issues per year

NDS Metrics



Nuclear Data Sheets in FY24

March/April – Memorial Issue to Balraj



Available online at www.sciencedirect.com

ScienceDirect

Nuclear Data Sheets 194 (2024) 1–2

Nuclear Data Sheets


www.elsevier.com/locate/nds

Dr. Balraj Singh (1941/12 - 2023/10)




Our dear colleague, mentor, teacher, and friend, Balraj Singh, passed away on 9 October 2023. As a nuclear data evaluator, Balraj was the single most prolific evaluator in the history of Nuclear Data Sheets and ENSDF (Experimental Nuclear Structure Data File), and one of the longest-serving members of the international network of Nuclear Structure and Decay Data evaluators (NSDD). A total of 80 published mass chains out of 300 in ENSDF have his name on them. That is 27% of all the mass chains; a feat only Balraj could accomplish.

Balraj completed his PhD at the University of Toronto in 1971 with Dr. Harry Taylor. The title of his thesis was “Directional Correlation and Multipole Mixing of Gamma Transitions in ^{134}Ba and ^{102}Ru ”. He then held post-doctoral fellowships at McMaster University (1971-1974), University of Toronto (1974-1976), and McGill University (1976-1978). He was a Research Scientist at the Kuwait Institute for Scientific Research (KISR) from 1978 to 1984. In 1985 he moved back to Canada to start the Nuclear Data Program with John Cameron at McMaster University in Hamilton, Ontario. He remained at McMaster University until his retirement in 2013. From the mid 80s to early 90s he spent some time at the Lawrence Berkeley National Laboratory where he worked with some of the nuclear data giants of the time, Virginia Shirley, C.M. Lederer, and Eddie Browne. After his retirement, he continued working for the National Nuclear Data Center (NNDC) of the US Nuclear Data Program (USNDP) at the Brookhaven National Laboratory until 2023.




Nuclear Data Sheets

Volume 194, April 2024, Pages 460-877




Nuclear Structure and Decay Data for A=165 Isobars ☆

Balraj Singh ^{a 1}, Jun Chen ^b ✉



Nuclear Data Sheets

Volume 194, April 2024, Pages 3-459



Nuclear Structure and Decay Data for A=76 Isobars ☆

Balraj Singh ^{a 1}, Jun Chen ^b ✉, Ameenah R. Farhan ^c