

# Progress towards the ENDF/B-VIII.1 release

G.P.A. Nobre<sup>1</sup>, D.A. Brown<sup>1</sup>



National Nuclear  
Data Center



@BrookhavenLab

WONDER 2023

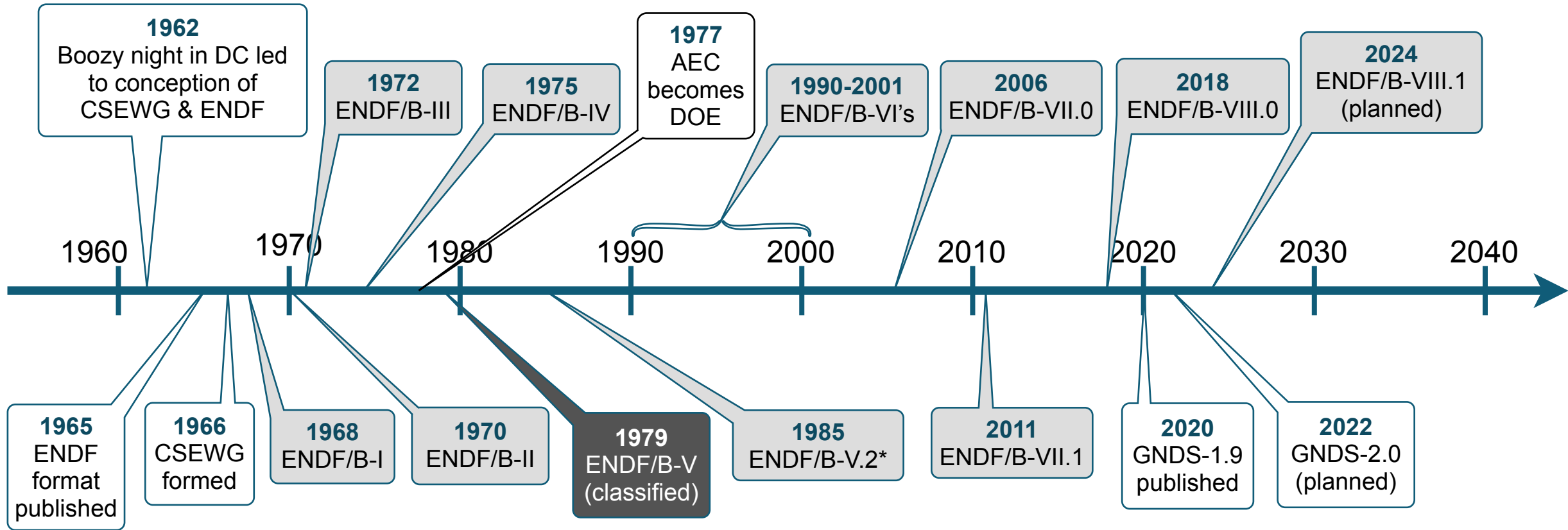
<sup>1</sup>National Nuclear Data Center, Brookhaven National Laboratory

# Outline

- Release Timeline
- ENDF library repository
- ENDF/B-VIII.1-Beta1
- ENDF/B-VIII.1-Beta1.1
- Validation feedback
- What to expect for ENDF/B-VIII.1-Beta2
- Some ENDF-6 format changes

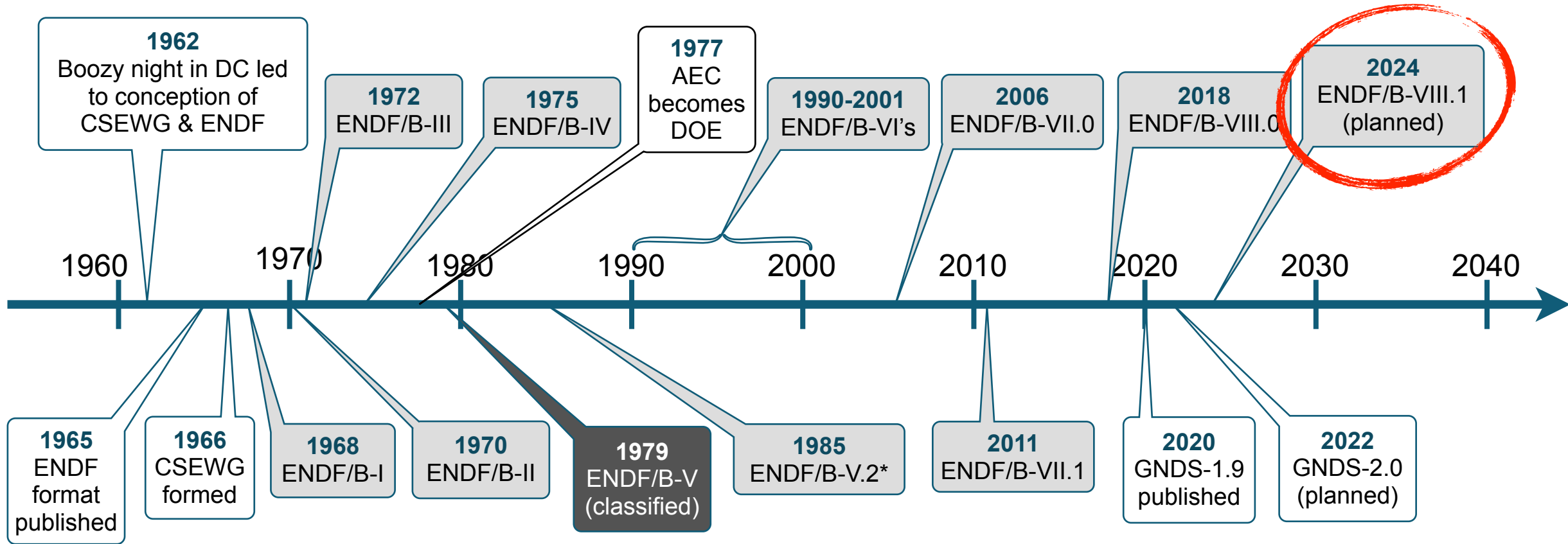


# ENDF Timeline



\* everybody's favorite release

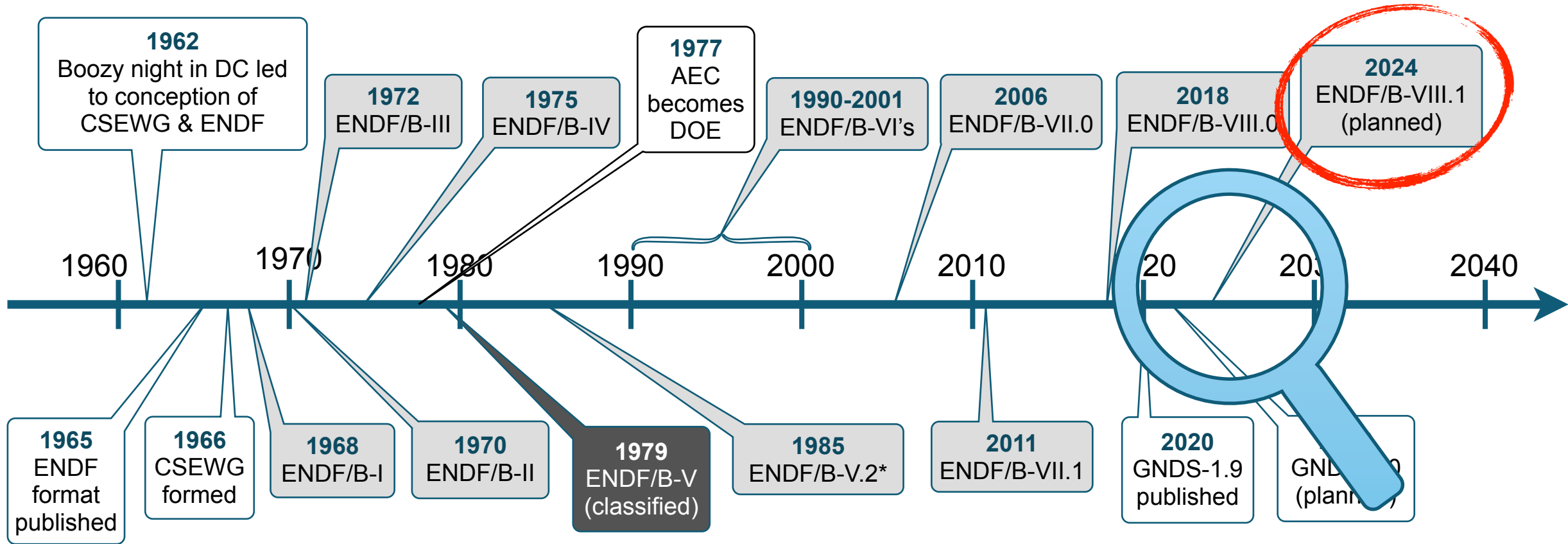
# ENDF Timeline



\* everybody's favorite release



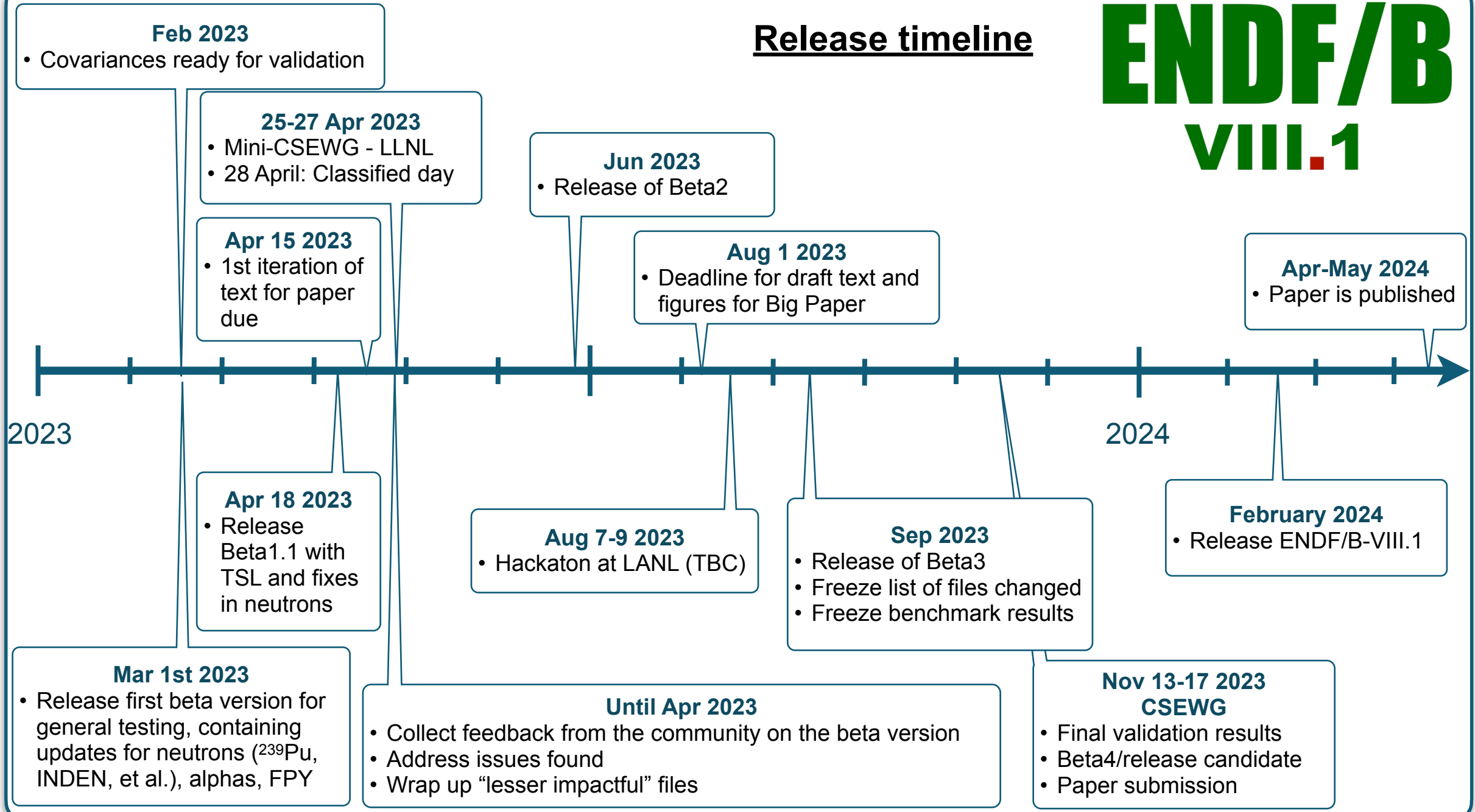
# ENDF Timeline



\* everybody's favorite release

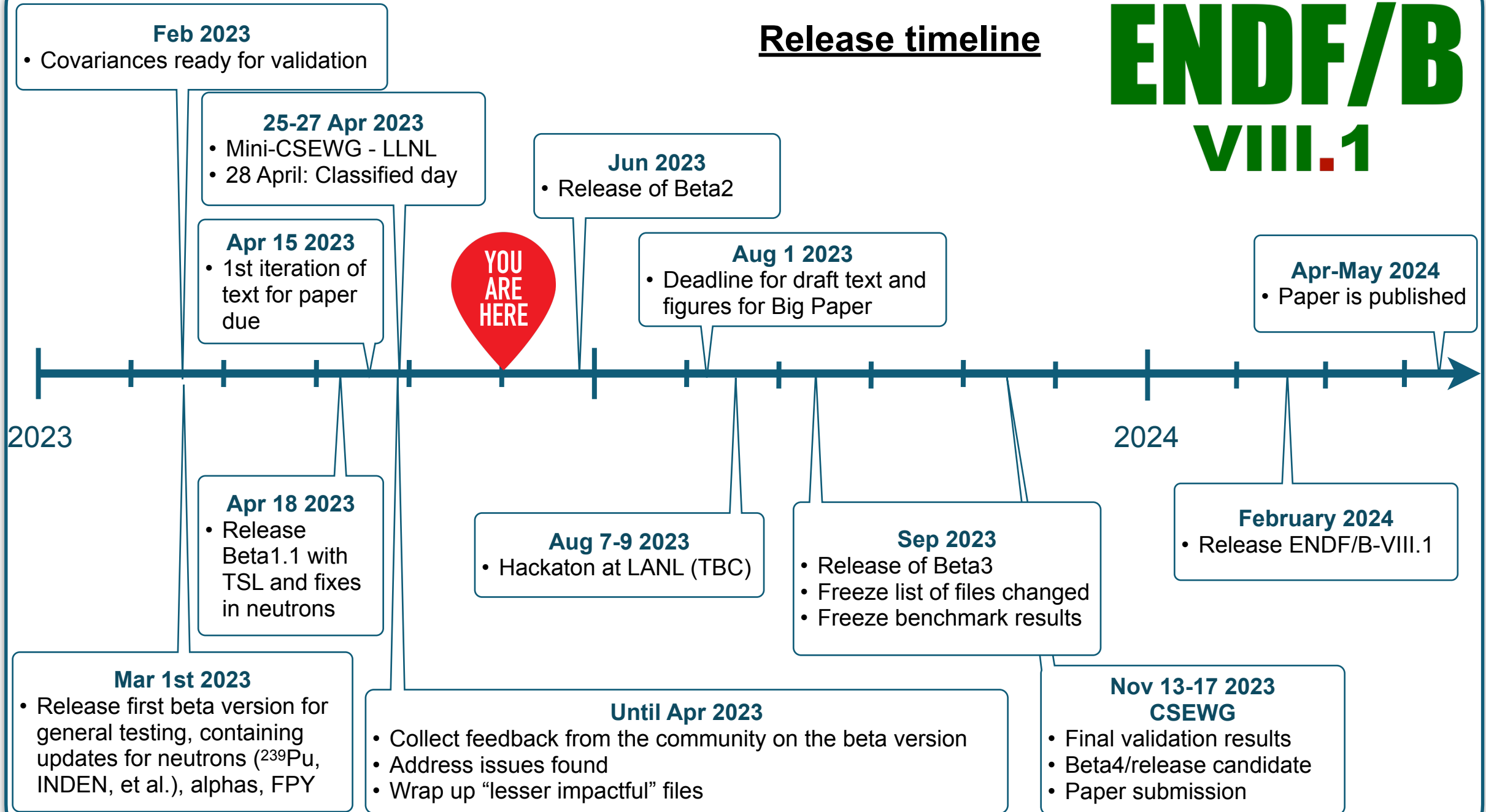
# ENDF/B VIII.1

## Release timeline



# ENDF/B VIII.1

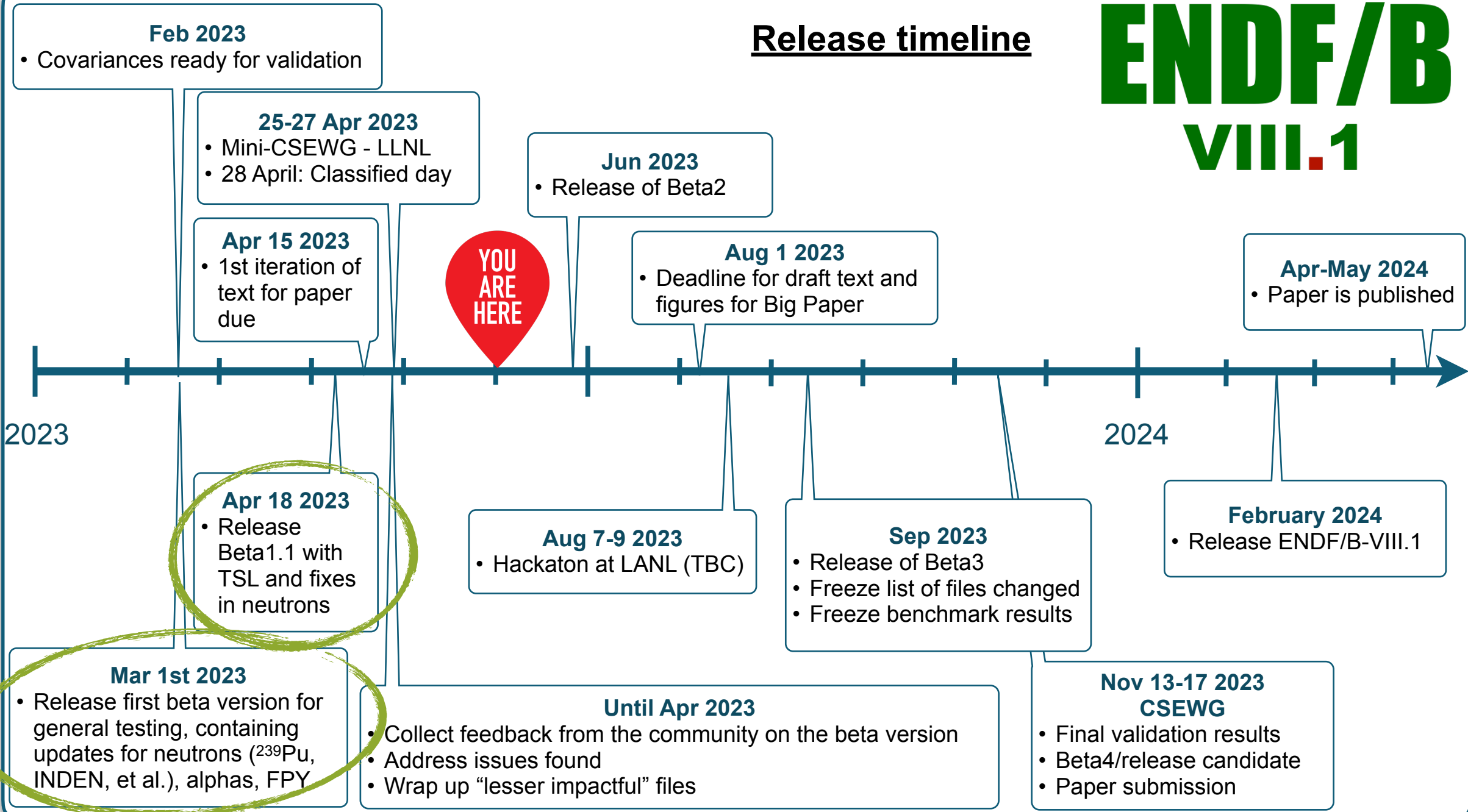
## Release timeline





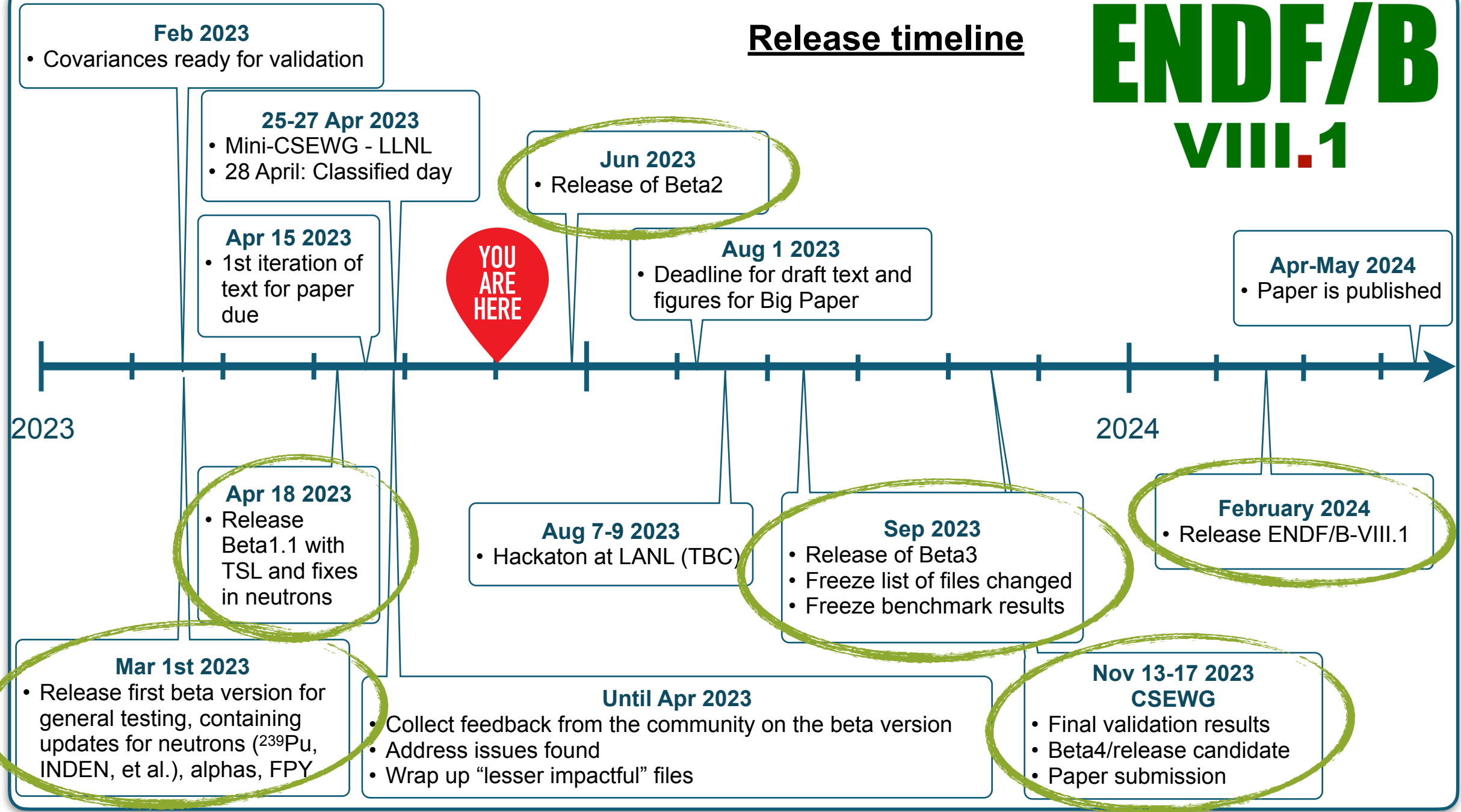
# ENDF/B VIII.1

## Release timeline




# ENDF/B VIII.1

## Release timeline



# ENDF versioned repository: GitLab

USNDP Collaboration Platform



The U.S. nuclear data community working together to continuously advance the state of nuclear data for science and technology applications.

NOTICE TO USERS

This is a Federal computer system (and/or it is directly connected to a BNL local network system) and is the property of the United States Government. It

Username or email

Password

Remember me [Forgot your password?](#)

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ENDF/B library

- Subgroup information
- Epics 0
- Issues 176
- Merge requests 623
- Security & Compliance
- CI/CD
- Packages and registries
- Analytics
- Wiki
- Settings

ENDF > library

ENDF/B VIII.dev library [Leave group](#)

The ENDF library project itself. At the time of creation of this project area, ENDF comprises 15 sublibraries. The full ENDF/B history is available as an archived project named "svn-export". See the "README" in each project for more information.

Recent activity Last 30 days

Merge requests created	327	Issues created	12	Members added	0
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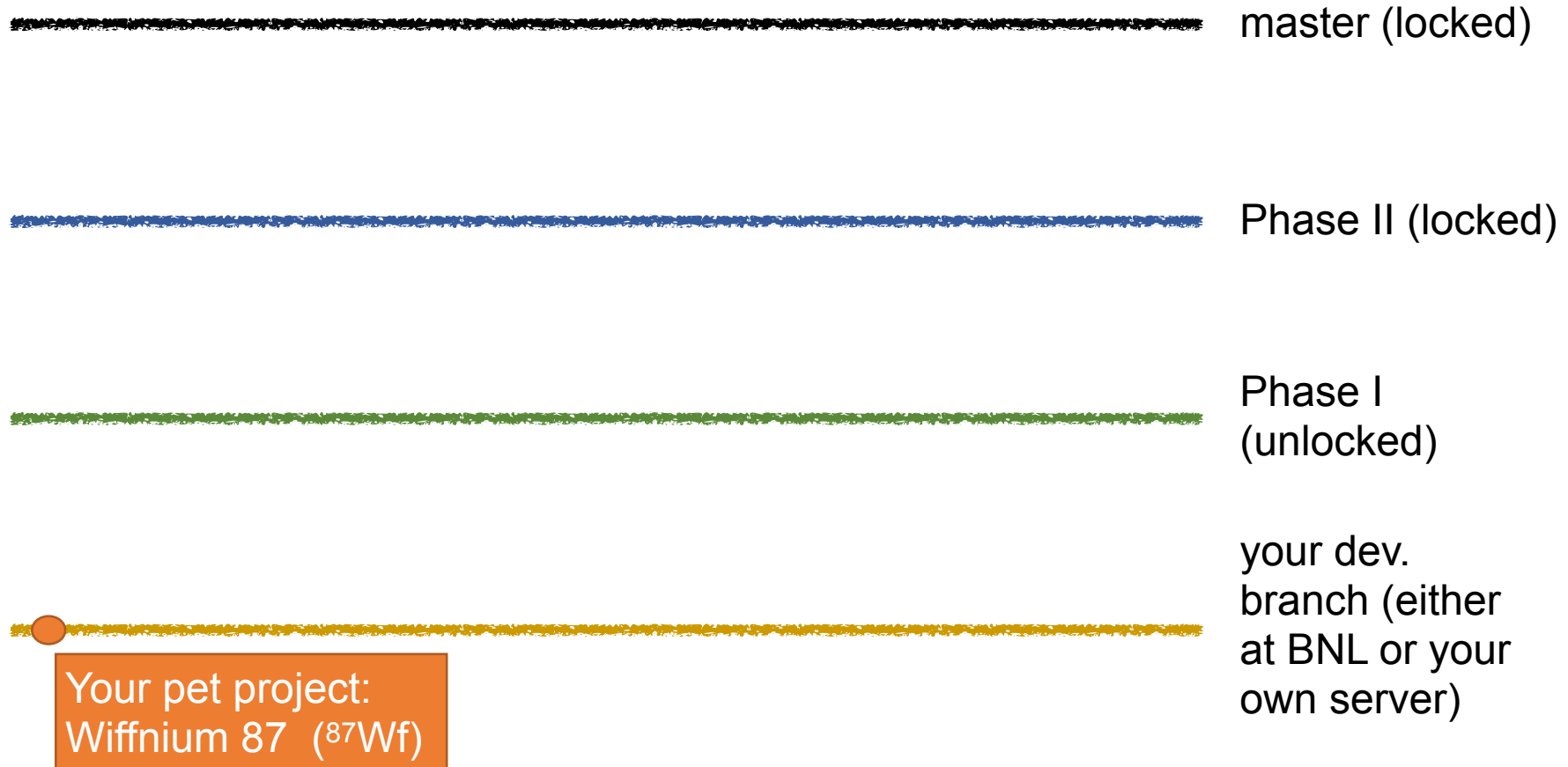
Subgroups and projects Shared projects Archived projects

Project Name	Stars	Last Updated
neutrons ENDF/B neutron sublibrary	2	55 minutes ago
sfy ENDF/B spontaneous FPY sublibrary	0	4 days ago
nfy ENDF/B neutron FPY sublibrary	0	4 days ago
gammas ENDF/B gamma sublibrary	0	2 weeks ago
thermal_scatt ENDF/B thermal neutron scattering sublibrary	1	2 weeks ago
helium3s ENDF/B 3He sublibrary	0	2 months ago
deuterons ENDF/B deuteron sublibrary	0	3 months ago
decay ENDF/B decay sublibrary	2	4 months ago
protons ENDF/B proton sublibrary	0	4 months ago
alphas ENDF/B alphas sublibrary	1	4 months ago
tritons ENDF/B triton sublibrary	0	4 months ago
standards ENDF/B nuclear data standards sublibrary	0	5 months ago
atomic_relax ENDF/B atomic relaxation sublibrary	0	8 months ago
electrons ENDF/B electron sublibrary	1	8 months ago
super Super project for the entire ENDF library.	0	1 year ago
photoat ENDF/B photo-atomic sublibrary	0	2 years ago

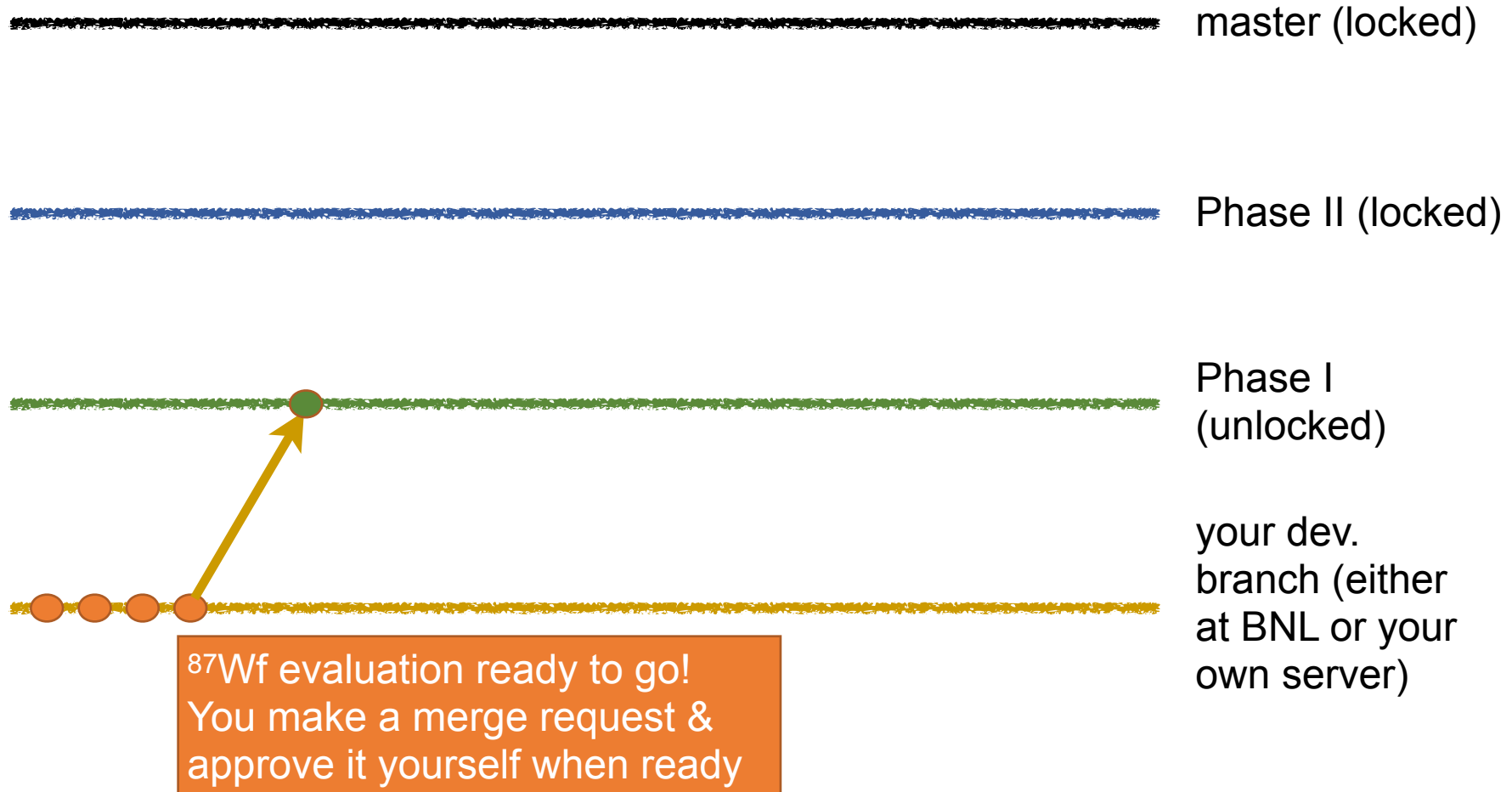
- Constantly updated and maintained
- Keeps track of
  - Any changes
  - Development, review and release branches
  - Issue trackers
  - etc...
- Usage is growing! Currently ~60 active members in ENDF library group (unfortunately there's a seat limit)
- Integration of library repository in GitLab with a **Continuous Integration system: ADVANCE** (R. Arcilla, R. Coles, B. Shu, D. Brown)



# ENDF project branches & workflow (names subject to change)



# ENDF project branches & workflow (names subject to change)

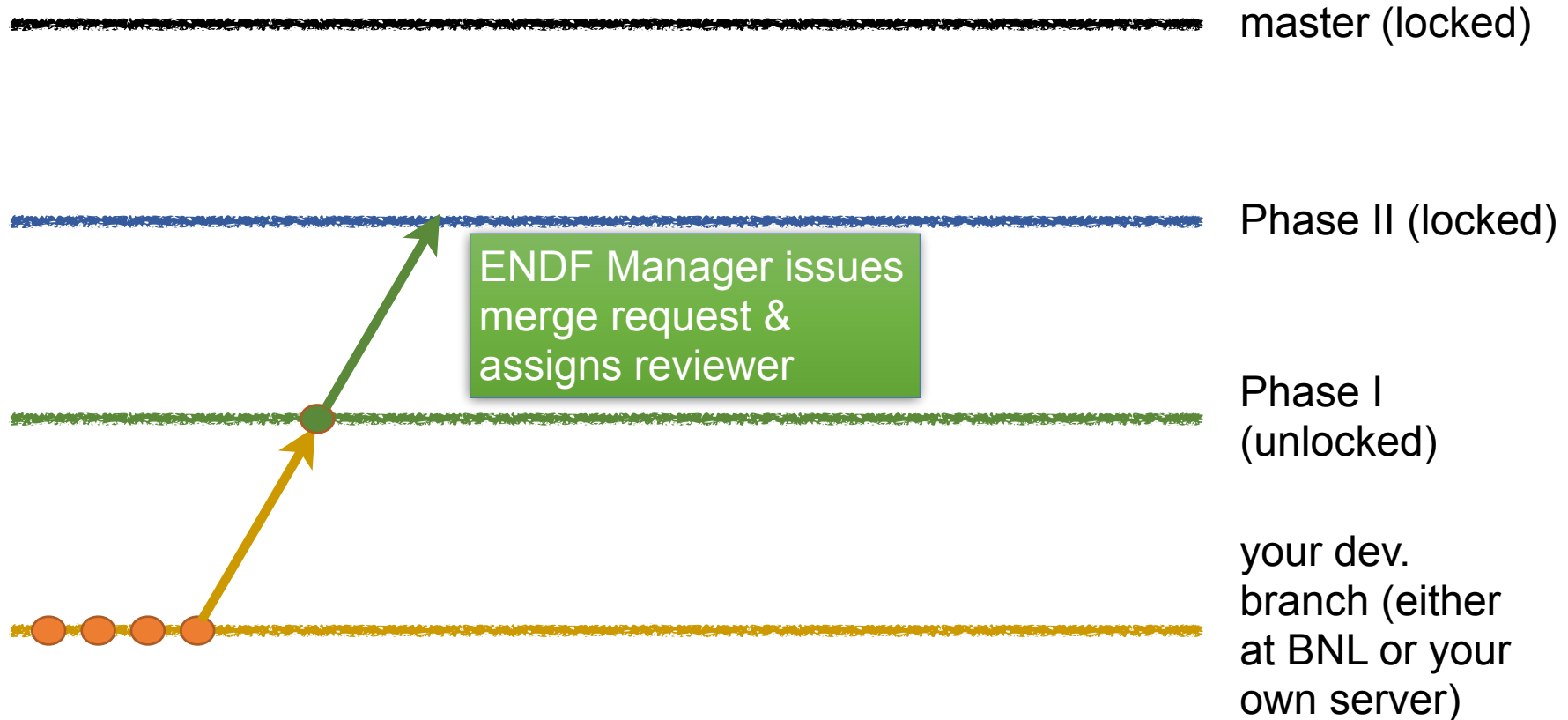


# ENDF project branches & workflow (names subject to change)

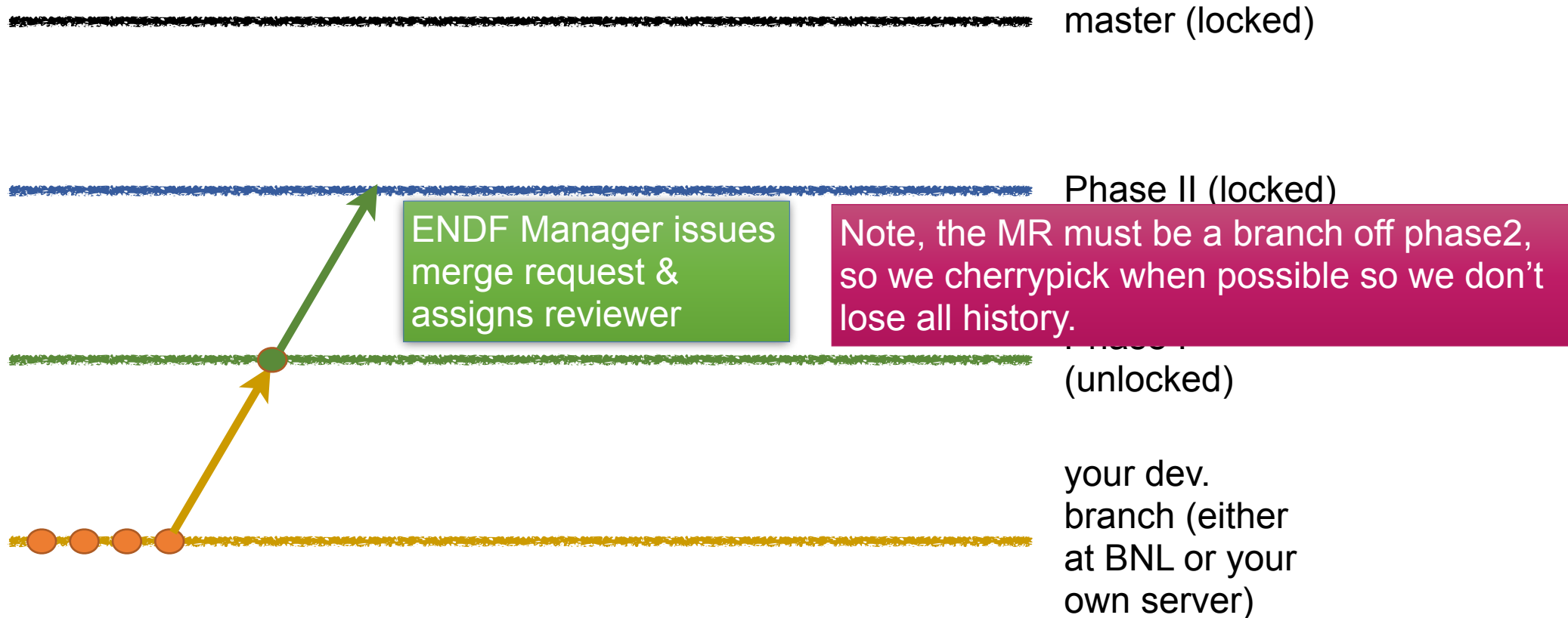




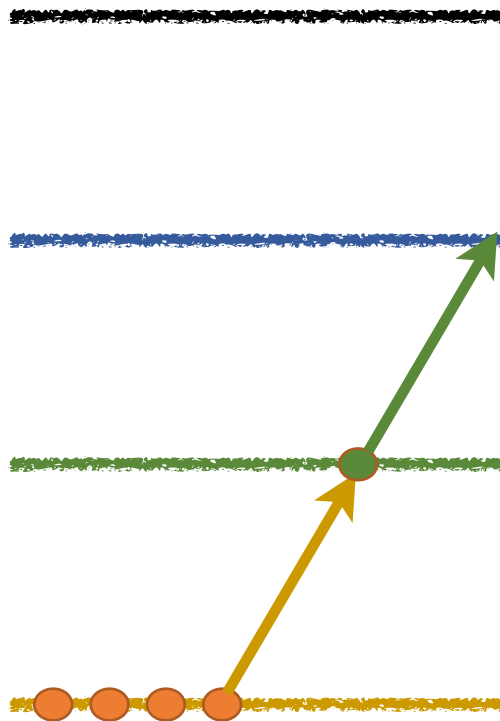
# ENDF project branches & workflow (names subject to change)



# ENDF project branches & workflow (names subject to change)



# ENDF project branches & workflow (names subject)



ENDF > library > alphas > Merge requests > !8

Open Created 1 day ago by David Alan Brown Owner Edit Mark as ready

## Draft: Review/a-008\_O\_018

Overview 0 Commits 1 Changes 3

### Phase I Review

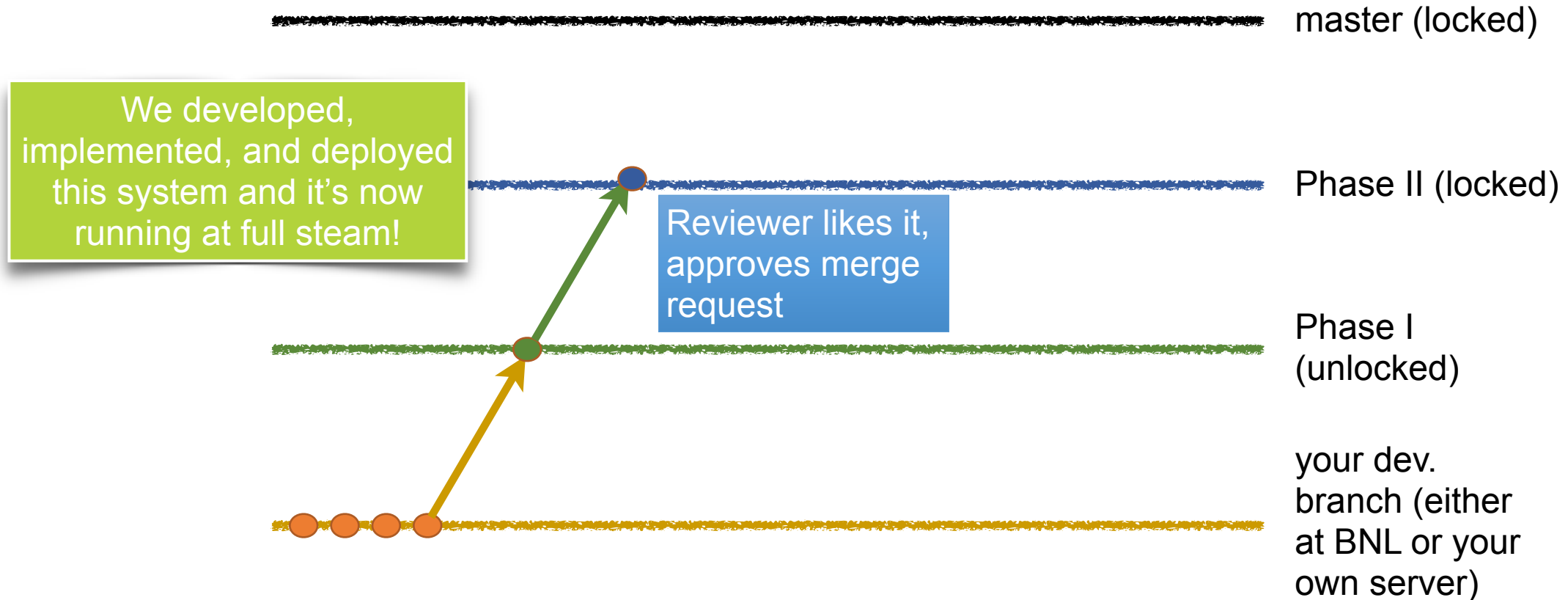
#### ENDF/B-VIII.1, Alphas Sublibrary

- **Filename:** a-008\_O\_018.endf
- **Sublibrary:** Alphas
- **Material:** 8-O - 18 (MAT=831)
- **Evaluators:** Holmes, Pavlou, Thompson, Zerkle
- **Submitter:** David Brown
- **Submitter email:** [dbrown@bnl.gov](mailto:dbrown@bnl.gov)
- **Review form generated at:** 16/11/2021 19:40:30
- **Reviewer:** \_\_\_\_\_
- **Reviewer email:** \_\_\_\_\_
- **Date:** \_\_\_\_\_

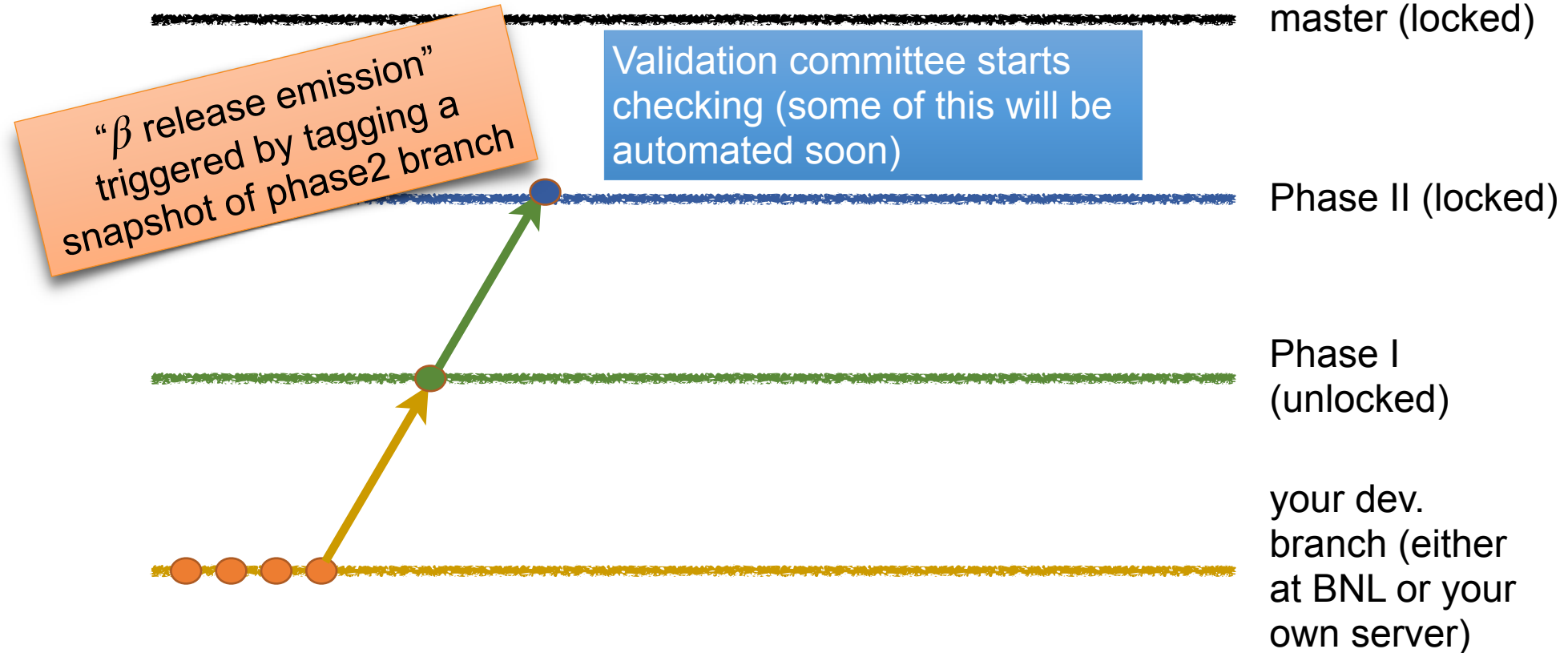
You are being asked to review the evaluation for a-008\_O\_018.endf from branch phase1. The full ADVANCE test report for this evaluation is available at [https://www.nndc.bnl.gov/endl/b7.dev/qa/alphas/a-008\\_O\\_018/a-008\\_O\\_018.html](https://www.nndc.bnl.gov/endl/b7.dev/qa/alphas/a-008_O_018/a-008_O_018.html). Please edit this file on the Review/a-008\_O\_018 merge request tracker page at !8. You can do this simply by clicking the "edit" button and filling the empty fields. This document uses the Markdown format (see <https://docs.gitlab.com/ee/user/markdown.html> for a reference.).

Peer review follows template & uses gitlab issue tracker. Each evaluation assigned one or more reviewers.

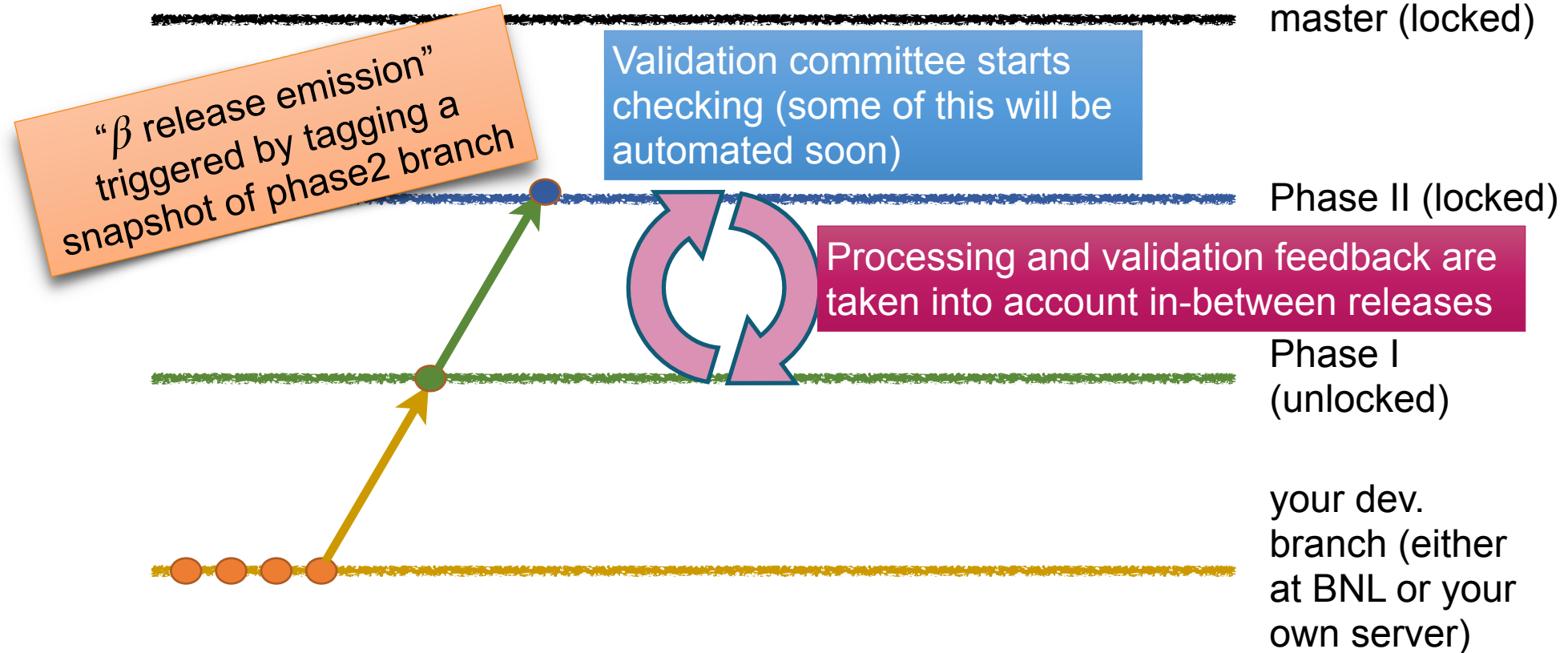
# ENDF project branches & workflow (names subject to change)



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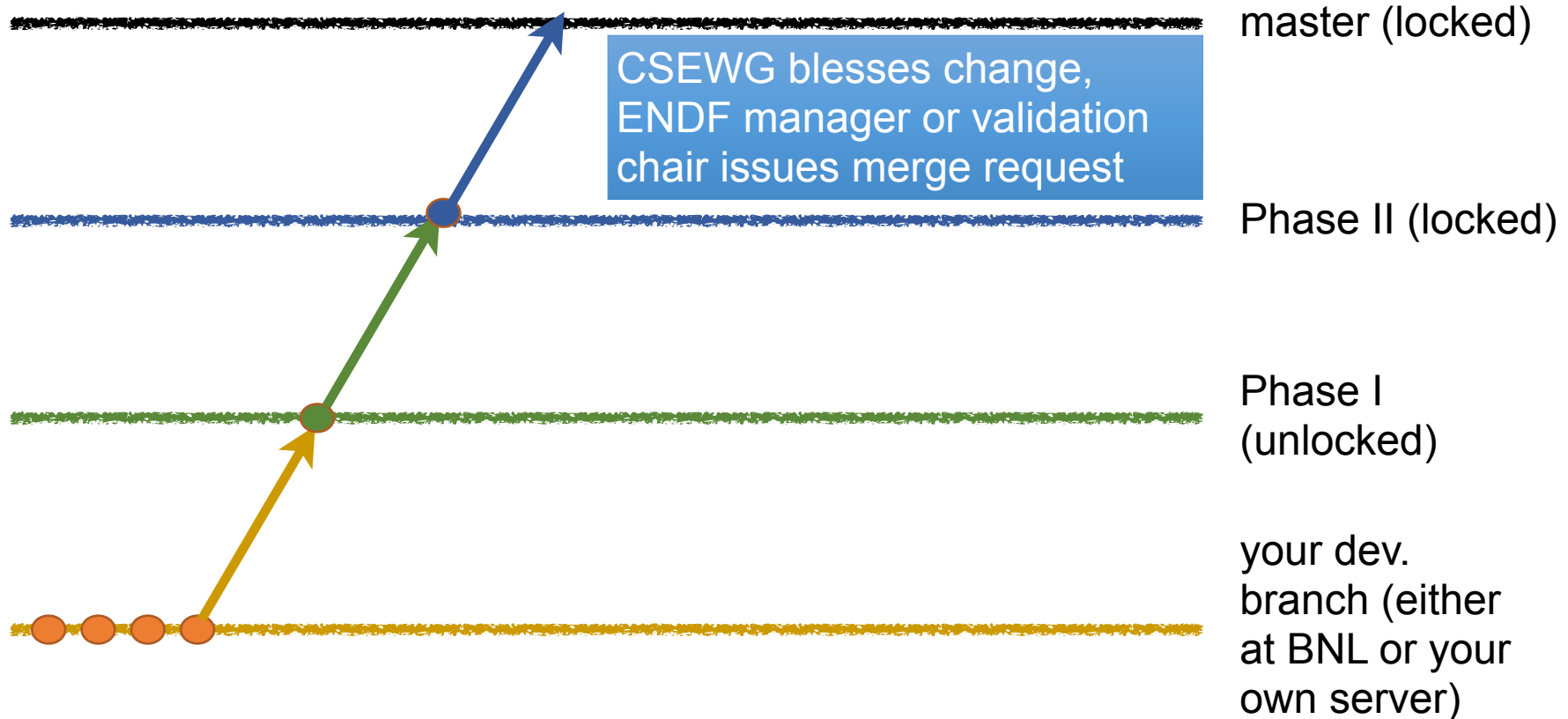


# ENDF project branches & workflow (names subject to change)

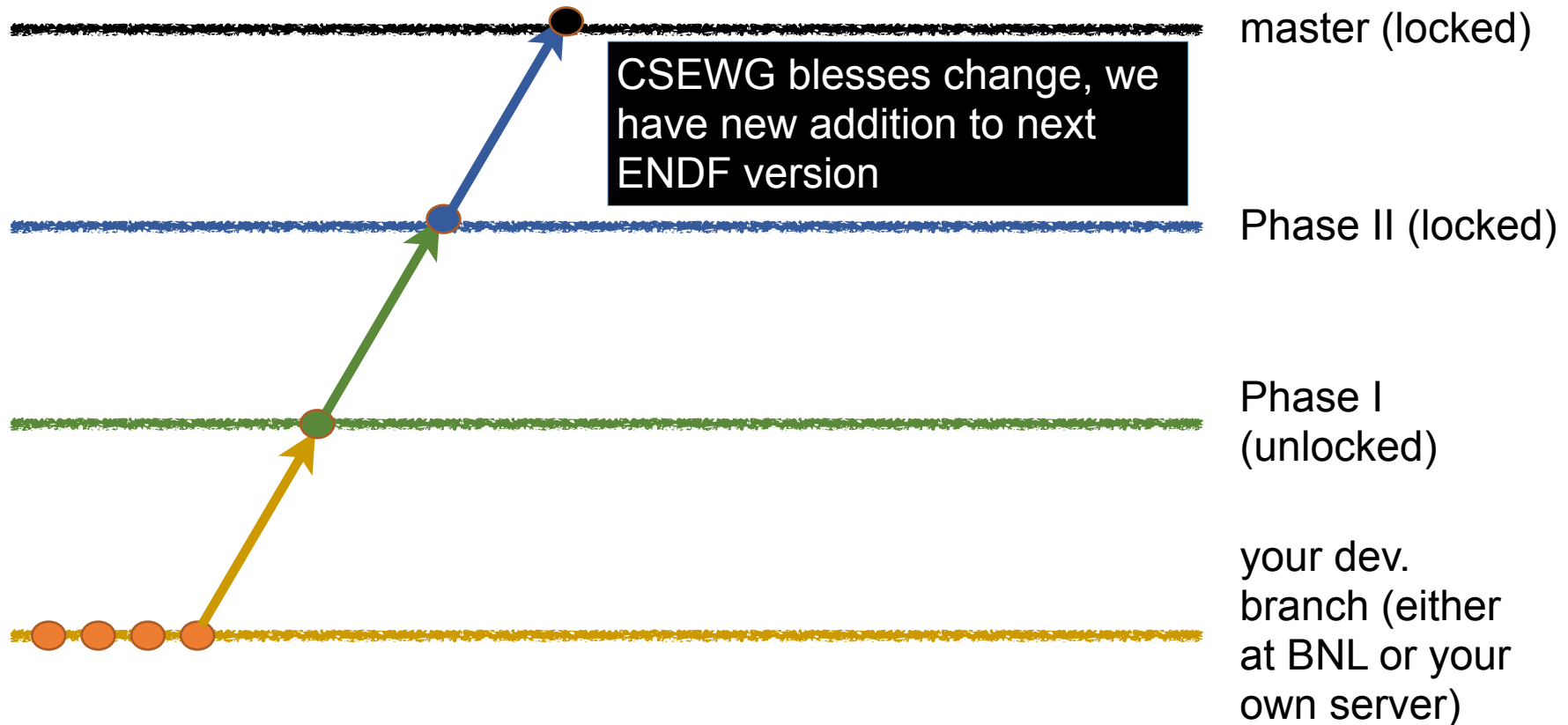




# ENDF project branches & workflow (names subject to change)

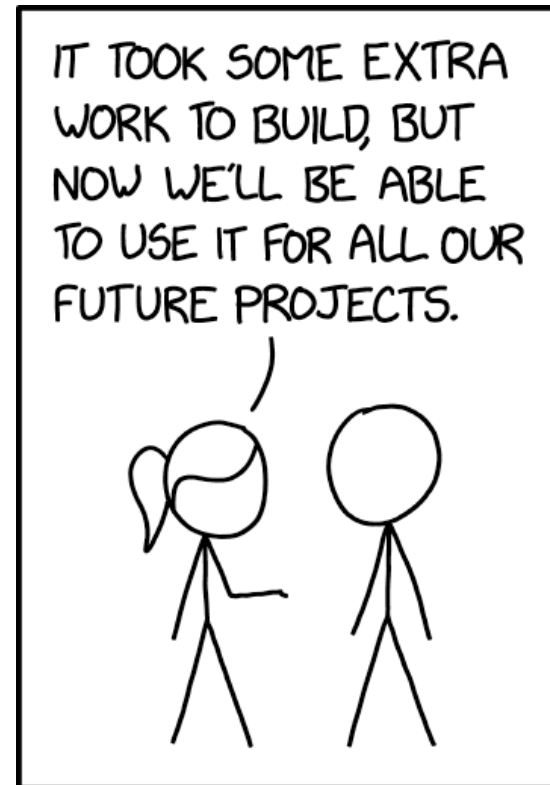


# ENDF project branches & workflow (names subject to change)

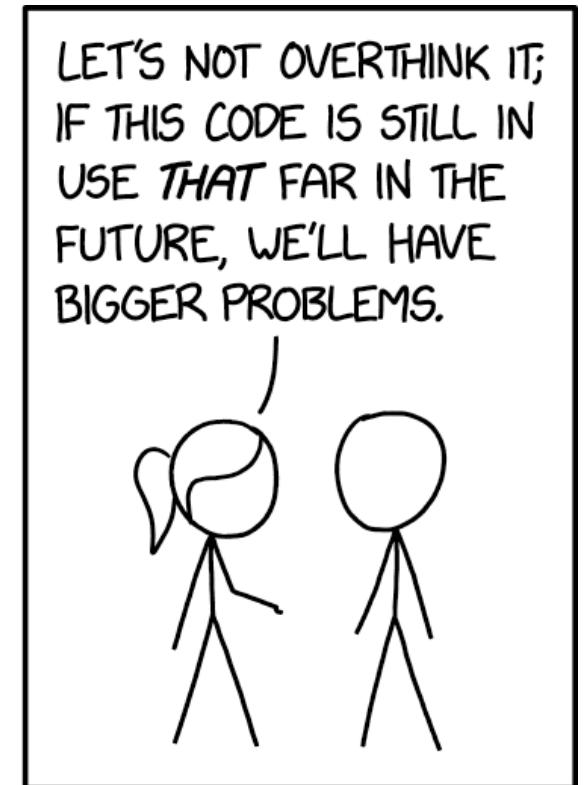


# ADVANCE is the ENDF continuous integration system

- Stood up as quick-n-dirty hack to get ENDF/B-VII.1 out the door  
... in 2011
- Faithfully (if at times erratically) serving CSEWG since
- All ENDF files ran through variety of physics & format checks as well as processing codes



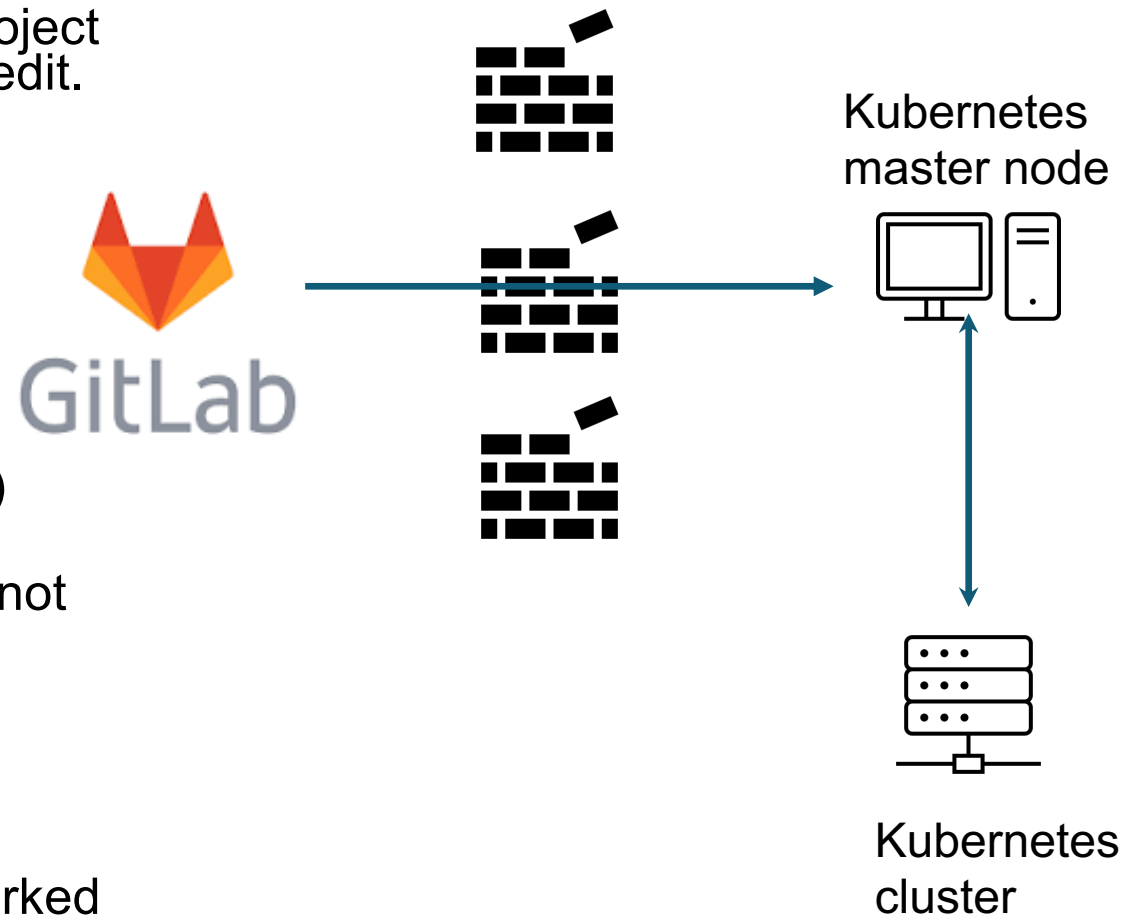
HOW TO ENSURE YOUR CODE IS NEVER REUSED



HOW TO ENSURE YOUR CODE LIVES FOREVER

# Major reworking of ADVANCE innards

- Gitlab's Ci/CD configuration controlled by per-project YAML file anyone who is part of the project can edit.
- To prevent accidental (or intentional?) troubles, must execute checking codes in container
- Gitlab, the Kubernetes master node (development2) and the Kubernetes worker node (ADVANCE2 server) are all behind the BNL FireWall
- Reverse proxy server (outside the BNL FireWall) secures access from the Internet to GitLab.
- Two configuration requirements Gitlab.com had not anticipated:
  - Our cluster must live behind firewall
  - Legacy checking codes need temp space
- Gitlab and BNL/ITD cyber security engineers worked with us to resolve issues.



# Output is in markdown and can be viewed in many text editors and web browsers

Lightweight reports generated in a per-commit basis, on any branch

Feedback/suggestions/requests:  
[dbrown@bnl.gov](mailto:dbrown@bnl.gov)  
[gnoBRE@bnl.gov](mailto:gnoBRE@bnl.gov)

Full\_Output\_20230130-14... x

```
1 |!-- Header -->
2 
3 
4 <br><br>
5 <hr />
6
7 <!-- Style -->
8 <style>
9   table th:first-of-type {
10     width: 10%;
11   }
12 </style>
13
14 <h2>Comparison between data in this ENDF file and data retrieved from EXFOR</h2>
15 The EXFOR data is taken from the [EXFOR library] (https://www-nds.iaea.org/exfor/). Note:
16 - number of available EXFOR sets is large, they will not be listed in a plot legend.
17 <br>
18
19 <h3>Aggregate Channels Including Total</h3>
20
21
22
23 <img alt="Plot of Pu239(n,tot) cross-sections vs incident energy (MeV) on a log-log scale. The plot shows multiple data series for different EXFOR sets and ENDF data. The x-axis ranges from 10^-11 to 10^1 MeV, and the y-axis ranges from 10^-19 to 10^5. The plot shows a sharp resonance at approximately 10^-5 MeV and a broader resonance at approximately 10^-1 MeV." data-bbox="510 470 810 760"/>
24 </div>
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```

Full\_Output\_20230130... x

Brookhaven National Laboratory

Comparison between data in this ENDF file and data retrieved from EXFOR

The EXFOR data is taken from the EXFOR library. Note: if the number of available EXFOR sets is large, they will not be listed in a plot legend.

Aggregate Channels Including Total

Pu239(n,tot)

Incident energy (MeV)

Elastic

Pu239(r)

atomi.io does this!

ADVANCE CI/CD system is now fully live and operational!

# ENDF/B-VIII.1-Beta1

Released March 1, 2023



# Review panel - Resolving conflicts

239Pu

# Review panel - Resolving conflicts

**239Pu**

- Parallel evaluations:
  - 5 initial candidate files (INDEN, LANL, LLNL)
  - Updates to fission, nubar, PFNS, capture, URR, RRR, (n,2n)
  - Pilot effort led by M. Chadwick organized a review panel with many Subject Matter Experts (SBM) that went over all aspects of all files, providing reports
  - On-going collaborative process
  - Multiple evaluations began to converge: Multiple Beta0 releases
  - Converged to 3 improved files, then 2

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  - Multiple evaluations began to converge: Multiple Beta0 releases
  - Converged to 3 improved files, then 2
- CSEWG Executive Committee decided the appropriate course of action towards Beta1
  - Recommended evaluation in Beta1 should be better than when process started
  - The Beta1 file for <sup>239</sup>Pu should be a combined one built from Beta0a.2 (INDEN) and Beta0b.2 (LANL), leveraging the strengths of each of them
  - Assembly prescription was documented and archived in GitLab
  - Combined file was assembled by LLNL and independently cross-checked by IAEA and LANL

# Main updates for VIII.1 - neutron sub library

**ENDF/B**  
VIII.1-β1

## INDEN

- 235U
- 239Pu
- 238U
- 233U
- 54,56,57Fe
- 28,29,30Si
- 55Mn
- 50,52,53,54Cr
- 63,65Cu
- 18O - 16O
- 10B
- 11B
- 139La
- 19F

- = Submitted
- = Under review
- = Not submitted
- = Approved

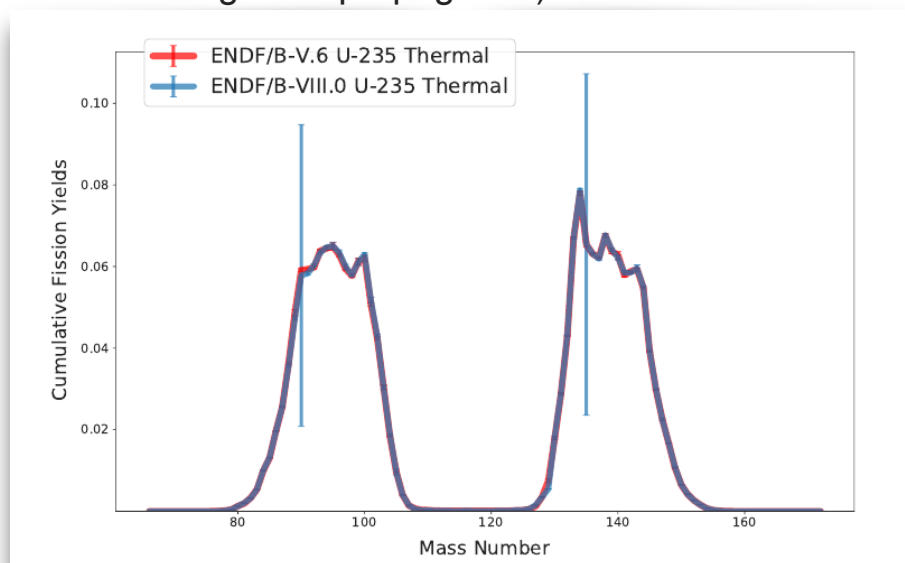


## Non-INDEN

- 140,142Ce (ORNL)
- 103Rh (RPI/IRSN)
- 86Kr (BNL)
- 6Li, 9Be (LANL)
- 234,236U (LANL)
- 181Ta (RPI/ORNL/LANL)
- 95Mo (IRSN/LANL)
- 206,208Pb (RPI)
- Fission products (RQW+BNL): 78Se, 84Kr, 85Rb, 97Mo, 99Tc, 102Pd, 109Ag, 113,115In, 115,119Sn, 127I, 122,124Te, 133,134Cs, 130,134,137Ba, 138La, 143Pr, 147Pm, 148,150Nd, 153Sm, 155Eu, 160Gd, 159Tb, 166,168,170Er, 175,176Lu, 168,176Yb, 174,176,177,178,179,180Hf
- Fixes/improvements: 2H, 23Na, 37Cl, 58Co, 58,60Ni, 107Ag, 106,108,110,111,112,114,116Cd (LANL scatt. rad. fix), 170Tm, 243Pu, 10B
- Other small fixes: 1H, 7Li, 12,13C, 17O, 20,21,22Ne, 26m1Al, 31,32Si, 35S, 36Cl, 37,38,39,41Ar, 41,45,47Ca, 49V, 54Mn, 55Fe, 58m1Co, 63Ni, 64Cu, 69Zn, 70Ga, 71,75Ge, 74As, 75,81Se, 80Br, 79,81Kr, 85Sr, 91,95Zr, 93Mo, 98Tc, 97,105Ru, 104Rh, 103,109Pd, 108,112,113,114,115,116,117,118m1Ag, 107,109Cd, 114In, 121m1,126Sn, 122Sb, 121,121m1,131,131m1Te, 128,132,132m1,133,134I, 125,127Xe, 131,139Ba, 137,137m1Ce, 143,149Nd, 143,144,145,146,150Pm, 145,146Sm, 159Gd, 158,161Tb, 155,156,157,158,160,161,162,163,164Dy, 163,165,167,169Er, 168,169,171Tm, 169,175Yb, 175Hf, 181,182,183,185,186W, 186m1,187Re, 185,191Os, 192,194m1Ir, 190,193,194,196,198Pt, 197,197m1,203Hg, 203,204Tl, 204,205,206Pb, 210m1Bi, 208,209,210Po, 223,226Ra, 225,226,227Ac, 227,228,229,230,231,232,233,234Th, 229,230,231,232,233Pa, 230,231,232,237,239,240,241U, 234,235,236,236m1,237,238,239Np, 236,237,238,240,241,242,244,245,246Pu, 240,241,242,242m1,243,244,244m1Am, 240,241,242,243,244,245,246,247,248,249,250Cm, 245,246,247,248,249,250Bk, 246,247,248,249,250,251,252,253,254Cf, 251,252,253,254,254m1,255Es
- Legacy changes: 10B (ENDF/B-VIII.0 errata), 156,158,160,161,162,163,164Dy (ORNL), 192Pt (tweaked first resonance), 240Pu (LANL unitarity fix)

# Spontaneous and Induced Fission Yields sub libraries

A. Mattera & A. Sonzogni noticed some cumulative yields had **huge** unphysical uncertainty (coming from wrong error propagation) and recalculated them and updated the values: **BNL-220804-2021-INRE**



## Spontaneous Fission Yields

- sfy-092\_U\_238.endf
- sfy-096\_Cm\_244.endf
- sfy-096\_Cm\_246.endf
- sfy-096\_Cm\_248.endf
- sfy-098\_Cf\_250.endf
- sfy-098\_Cf\_252.endf
- sfy-099\_Es\_253.endf
- sfy-100\_Fm\_254.endf
- sfy-100\_Fm\_256.endf

## n-induced Fission Yields

- nfy-090\_Th\_227.endf
- nfy-090\_Th\_229.endf
- nfy-090\_Th\_232.endf
- nfy-091\_Pa\_231.endf
- nfy-092\_U\_232.endf
- nfy-092\_U\_233.endf
- nfy-092\_U\_234.endf
- nfy-092\_U\_235.endf
- nfy-092\_U\_236.endf
- nfy-092\_U\_237.endf
- nfy-092\_U\_238.endf
- nfy-093\_Np\_237.endf
- nfy-093\_Np\_238.endf
- nfy-094\_Pu\_238.endf
- nfy-094\_Pu\_239.endf
- nfy-094\_Pu\_240.endf
- nfy-094\_Pu\_241.endf
- nfy-094\_Pu\_242.endf
- nfy-095\_Am\_241.endf
- nfy-095\_Am\_242m1.endf
- nfy-095\_Am\_243.endf
- nfy-096\_Cm\_242.endf
- nfy-096\_Cm\_243.endf
- nfy-096\_Cm\_244.endf
- nfy-096\_Cm\_245.endf
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- nfy-096\_Cm\_248.endf
- nfy-098\_Cf\_249.endf
- nfy-098\_Cf\_251.endf
- nfy-099\_Es\_254.endf
- nfy-100\_Fm\_255.endf

# Alphas sub library

## Alpha sub library

- $^9\text{Be}$ ,  $^{17}\text{O}$ ,  $^{18}\text{O}$
- Files existed before but many reactions are being described for the first time
- $^4\text{He}$  - minor fixes

**ENDF/B**  
**VIII.1- $\beta$ 1**



# ENDF/B-VIII.1-Beta1.1

Released April 18, 2023

# Updates from Beta1:

- TSL
  - 64 updated/new files from **NCSU, NNL, ORNL**
  - “Rock-paper-scissors” peer-review approach
- Fixes in neutrons sub library (which should **not** impact criticality):
  - **<sup>9</sup>Be**: Fixed low-energy interpolation flag
  - **<sup>54</sup>Cr**: Beta1 was crashing NJOY due to bug. Reassembled MF=32 with proper flag.
  - **<sup>235</sup>U**: Restored MF=35 MT=18 covariances that had been accidentally lost when updating INDEN versions of the file
  - **<sup>239</sup>Pu**: Restored MF=34/MT=2 after it had been accidentally omitted from Beta1

# Feedback on ENDF/B-VIII.1-Beta1/1.1

# Preliminary feedback from Beta1/1.1

- Mini-CSEWG Meeting held at LLNL on April 25-27
- Focused on needs for VIII.1 release
- Validation session:
  - Results from LANL, LLNL, ORNL, AWE...
  - Preliminary feedback is generally positive with some things in need of improvement
  - I will show some examples...

## Mini-CSEWG 2023

Apr 25 – 27, 2023  
Livermore Valley Open Campus  
US/Pacific timezone

Enter your search term

Overview

Timetable

Contribution List

Registration

Participant List

Directions to LVOC

Nearby Hotels

Local Organizing Committee

Code of Conduct

Contact

- ✉ [dbrown@bnl.gov](mailto:dbrown@bnl.gov)
- ✉ [gnobre@bnl.gov](mailto:gnobre@bnl.gov)
- ✉ [kravvaris1@llnl.gov](mailto:kravvaris1@llnl.gov)

## Timetable

< Tue 25/04 Wed 26/04 Thu 27/04 All days >

Print PDF Full screen Detailed view Filter

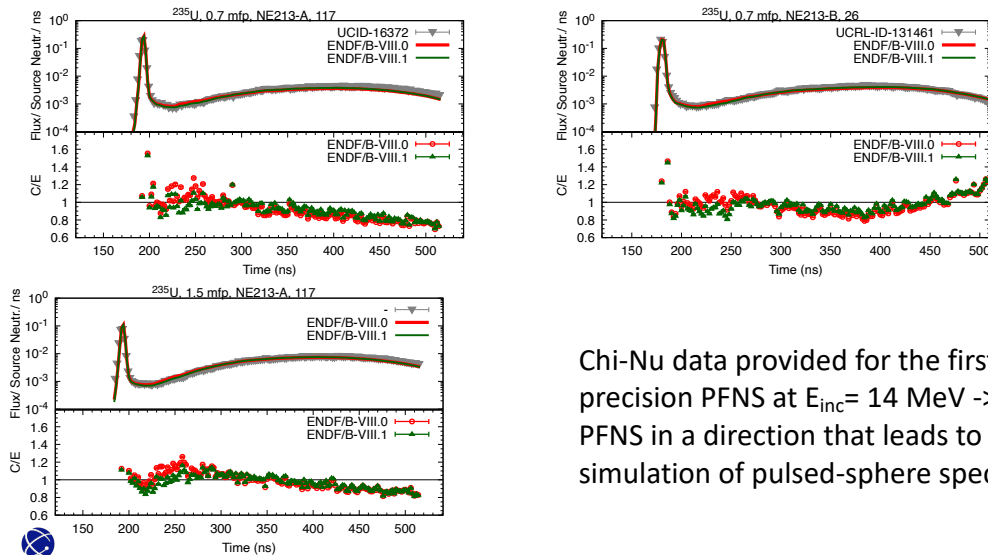
Session legend

Validation I Validation II

09:00	<b>Welcome</b> Livermore Valley Open Campus	Brown David et al.	09:00 - 09:10
	<b>Validation of Nuclear Data Files from the Third Preliminary Release of ENDF/B-VIII.1</b> Livermore Valley Open Campus	Noah Kleedtke	09:10 - 09:50
	<b>Validating ENDF/B-VIII.1beta1 with LLNL pulsed-sphere neutron-leakage spectra</b> Livermore Valley Open Campus	Denise Neudecker	09:50 - 10:00
10:00	<b>NNL Testing of ENDF/B-VIII.1(beta1)</b> Livermore Valley Open Campus	Jason Thompson	10:00 - 10:30
	<b>Break</b> Livermore Valley Open Campus		10:30 - 10:55
11:00	<b>Initial Assessment of ENDF/B-VIII.1β1 with VALID Criticality Benchmarks</b> Livermore Valley Open Campus	William Marshall	10:55 - 11:15
	<b>AWE Fast Crit Testing of beta1</b> Livermore Valley Open Campus	Mark Cornock	11:15 - 11:30
	<b>LLNL MERCURY ENDF/B-VIII.1(β1) testing results using GNDS processed by FUDGE</b> Livermore Valley Open Campus	Marie-Anne Descalle	11:30 - 11:45
	<b>Recent experimental benchmark results for TEX-Pu for TSL testing</b> Livermore Valley Open Campus	Catherine Percher	11:45 - 12:00

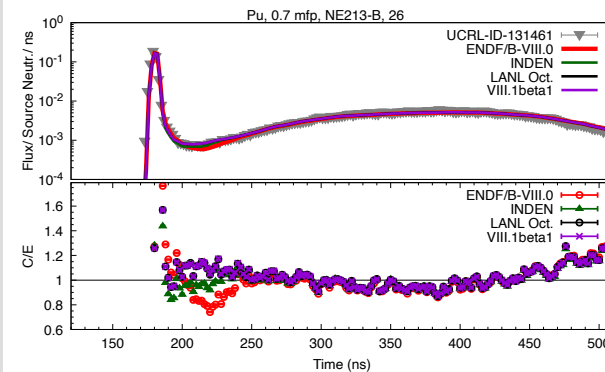
# Results from LLNL pulsed-sphere neutron leakage spectra

**$^{235}\text{U}$ : Improvements (seen in VIII.1beta0) are coming from new PFNS informed by Chi-Nu experimental data.**



Chi-Nu data provided for the first time high-precision PFNS at  $E_{inc} = 14$  MeV  $\rightarrow$  changed PFNS in a direction that leads to better simulation of pulsed-sphere spectra.

**$^{239}\text{Pu}$ : large changes coming from inelastic scattering.**



INDEN ... from ENDF/B-VIII.1beta0  
 LANL Oct ... in-house LANL version that provided inelastic cross sections and angular distributions now in ENDF/B-VIII.1beta1

VIII.1 Beta1:

- (n,2n), (n,gamma) ... INDEN
- (n,inl), (n,el) ... LANL Oct.
- Fission source term ... same as for ENDF/B-VIII.1beta0

The changes we see are coming from inelastic cross sections and angular distributions (MF={3,4,6}). The continuum spectrum could play a large role.

Slides taken from Denise Neudecker's talk at 2023 mini-CSEWG

- Improvements in  $^{235}\text{U}$ ,  $^{239}\text{Pu}$  and others
- Identified areas in need of additional work

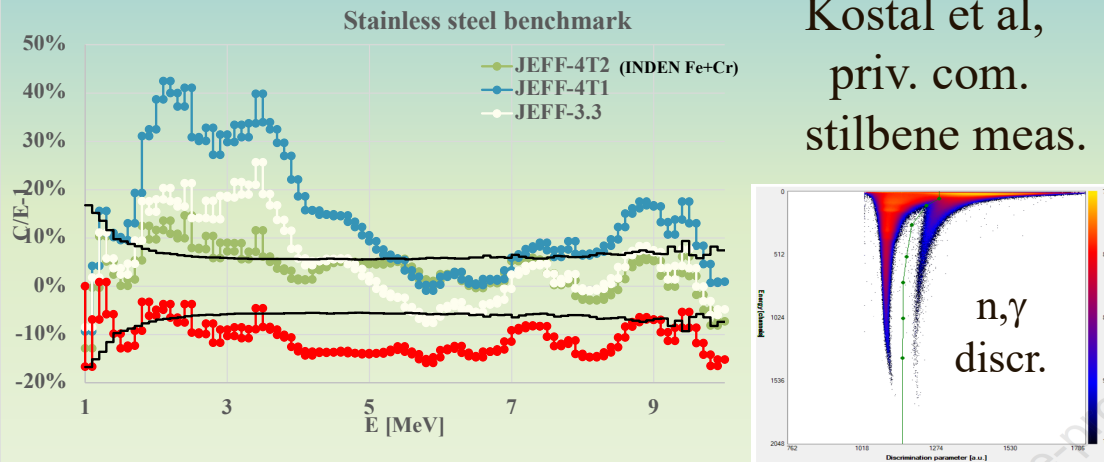
# Results sensitive to stainless steel

## INDEN updated “structural” evaluations:

see [nds.iaea.org/INDEN/](https://nds.iaea.org/INDEN/) - Validation

- ✓ Fe isotopes (IAEA/JSI), fe54e80o, fe56e80X29r41, fe54e80o
- ✓ Cr isotopes, BNL/ORNL/IAEA/JSI/CEA, v2.3.2

Kostal et al,  
priv. com.  
stilbene meas.



Stainless steel, neutron leakage (Rez, CZ, 11/2021)

The Pool Critical Assembly (PCA) Pressure Vessel Simulator experiment was performed in the early 1980s as part of the NRC’s LWR Pressure Vessel Surveillance Dosimetry Improvement Program (LWR-PV-SDIP)

Benchmark was recently re-analyzed with exact geometry by Dr. Kulesza (LANL/X-5), and MCNP inputs were published and available for use:  
 – NUCLEAR TECHNOLOGY · VOLUME 197 · 284–295 · MARCH 2017  
 – Paper: <https://doi.org/10.1080/00295450.2016.1273711>  
 – MCNP Inputs: <https://doi.org/10.2172/1601379>

### Pool Critical Assembly Benchmarking

- C/E Results (ENDF/B-VIII.1b1):  
 – MC uncertainty  $\approx 1\%$

**Depends on U-235, water & SS**

	al27a	ni48p	rh103n	in115n	u238f	np237f	avg	std dev
	0.97	0.96	1.04	1.00			0.99	3.9%
	1.02	0.98	1.08	1.01			1.02	4.3%
	1.05	1.01	1.07	1.06			1.05	2.5%
	1.03	0.96	1.00	1.01	0.98	1.03	1.00	2.7%
	1.03	0.96	0.95	1.00	0.98	1.05	0.99	4.0%
	1.04	1.02	0.93	1.03	0.98	1.03	1.00	4.1%
			0.96	0.99	0.99	1.13	1.02	7.6%
avg	1.02	0.98	1.01	1.01	0.98	1.06	1.01	
std dev	2.8%	2.9%	6.4%	2.1%	0.1%	1.0%		4.2%

Presented by Greg Fischer, Westinghouse @ miniCSWEG April 2023

4 Mini-CSWEG meeting (presented by video link)  
April 2023, Livermore Valley Open Campus, CA

Roberto Capote, IAEA Nuclear Data Section  
e-mail: [R.CapoteNoy@iaea.org](mailto:R.CapoteNoy@iaea.org)  
Web: <http://www-nds.iaea.org>



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Slides taken from Roberto Capotes’s talk at 2023 mini-CSEWG

- Significant performance improvements in SS (Fe and Cr)
- Users are happy with new files!



# Feedback from ORNL

## HEU Results

Category	Number of Cases	ENDF/B-VIII.0		ENDF/B-VIII.1β1	
		C/E	$\sigma$	C/E	$\sigma$
HMF	91	1.00016	0.00026	1.00026	0.00026
HMI	6	1.00079	0.00042	0.99956	0.00042
HMF/HMI (ZEUS)	8	1.00320	0.00101	1.00192	0.00101
HST ( <sup>1</sup> H)	57	0.99904	0.00075	0.99996	0.00075
HST/I ( <sup>2</sup> H)	6	0.98936	0.00182	0.99161	0.00183
HCT ( <sup>2</sup> H)	9	1.00184	0.00230	1.00282	0.00231
HST/HCT ( <sup>2</sup> H)	15	0.99685	0.00156	0.99834	0.00157

## LEU and IEU results

Category	Number of Cases	ENDF/B-VIII.0		ENDF/B-VIII.1β1	
		C/E	$\sigma$	C/E	$\sigma$
LCT	144	0.99911	0.00019	0.99868	0.00019
LST	19	0.99845	0.00083	0.99920	0.00083
IST	59	1.00120	0.00077	1.00060	0.00077

- LCT results may be degraded slightly ( $-0.00043 \pm 0.00027$ )
- LST results potentially improved ( $0.00075 \pm 0.00117$ )
- IST results may be slightly improved ( $-0.00060 \pm 0.00109$ )

Slides taken from B.J. Marshall's talk at 2023 mini-CSEWG

- Generally good performance
- Some need of improvements

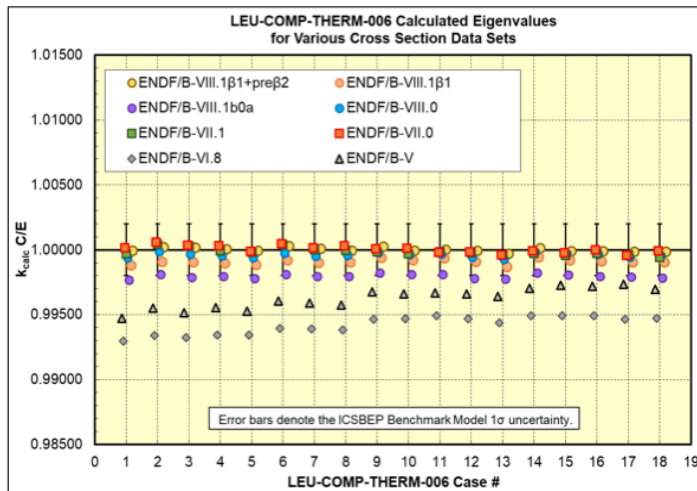
# LANL Validation results for VIII.1Beta1 seem encouraging...

## LCT – Various ENDF/B Generations

The LCT suite contains 509 assemblies.

The pattern shown by LCT6 is representative of the suite ...

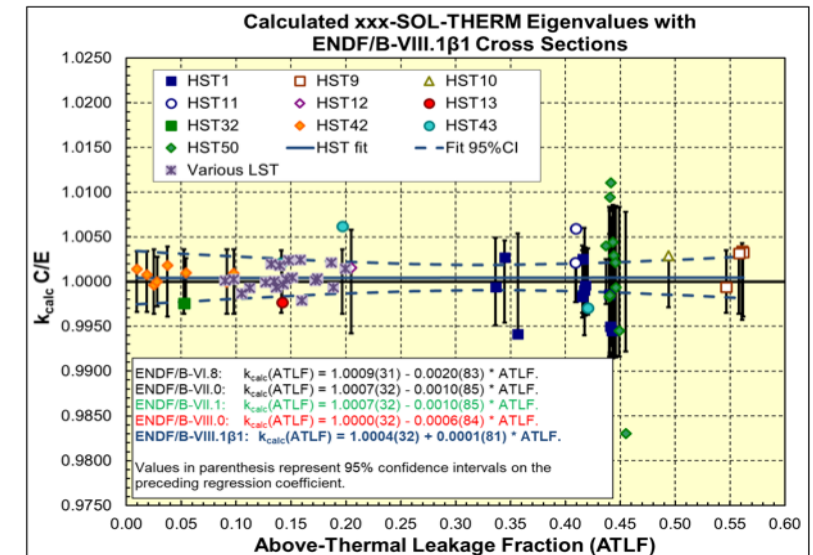
$k_{\text{calc}} \text{ C/E (e5)} = 0.99658 \pm 0.00498$   
 $k_{\text{calc}} \text{ C/E (e68)} = 0.99460 \pm 0.00367$   
 $k_{\text{calc}} \text{ C/E (e70)} = 0.99977 \pm 0.00290$   
 $k_{\text{calc}} \text{ C/E (e71)} = 0.99937 \pm 0.00273$   
 $k_{\text{calc}} \text{ C/E (e80)} = 0.99891 \pm 0.00279$   
 $k_{\text{calc}} \text{ C/E (e81}\beta\text{0a)} = 0.99770 \pm 0.00275$   
 $k_{\text{calc}} \text{ C/E (e81}\beta\text{1)} = 0.99871 \pm 0.00275$   
 $k_{\text{calc}} \text{ C/E (e81pre}\beta\text{2)} = 0.99953 \pm 0.00274$   
 - looking good, almost back to e70 level.



## HST vs ATLF - ENDF/B-VIII.1β1

Unity intercept and zero slope, seen for several generations of ENDF/B, are retained.

Modest concern with e81β0 results has been eliminated.



# LANL Validation results for VIII.1Beta1 seem encouraging...

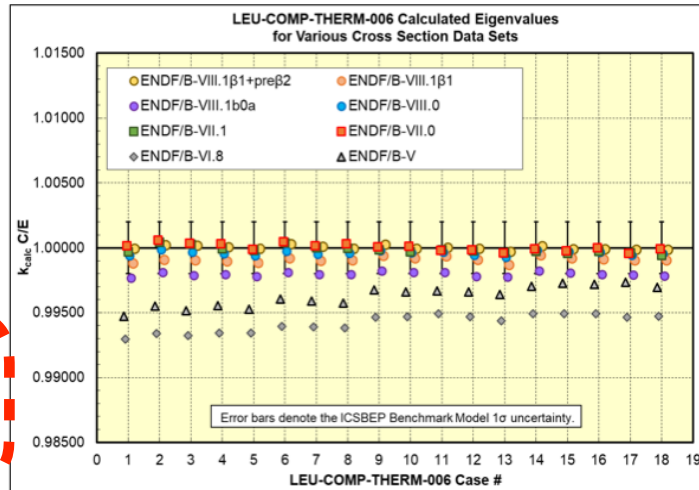
## LCT – Various ENDF/B Generations

The LCT suite contains 509 assemblies.

The pattern shown by LCT6 is representative of the suite ...

- $k_{calc}$  C/E (e5) =  $0.99658 \pm 0.00498$
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- $k_{calc}$  C/E (e70) =  **$0.99977 \pm 0.00290$**
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- $k_{calc}$  C/E (e81 $\beta$ 0a) =  $0.99770 \pm 0.00275$
- $k_{calc}$  C/E (e81 $\beta$ 1) =  $0.99671 \pm 0.00275$

**$k_{calc}$  C/E (e81pre $\beta$ 2) =  $0.99953 \pm 0.00274$**   
 - looking good, almost back to e70 level.

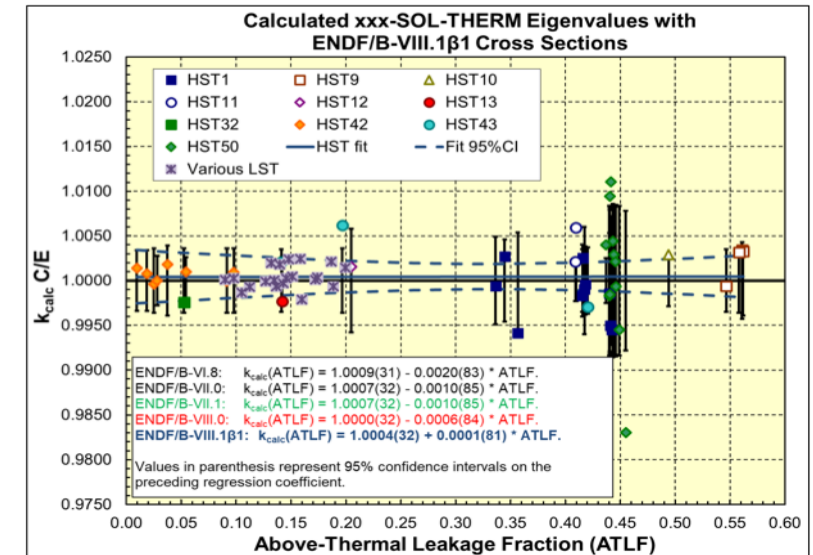


Skip also tested a post- $\beta_1$ , pre- $\beta_2$   $^{238}\text{U}$  (See R. Capote's talk)

## HST vs ATLF - ENDF/B-VIII.1β1

Unity intercept and zero slope, seen for several generations of ENDF/B, are retained.

Modest concern with e81 $\beta$ 0 results has been eliminated.



# However,...

## PST vs EALF – ENDF/B-VIII.0

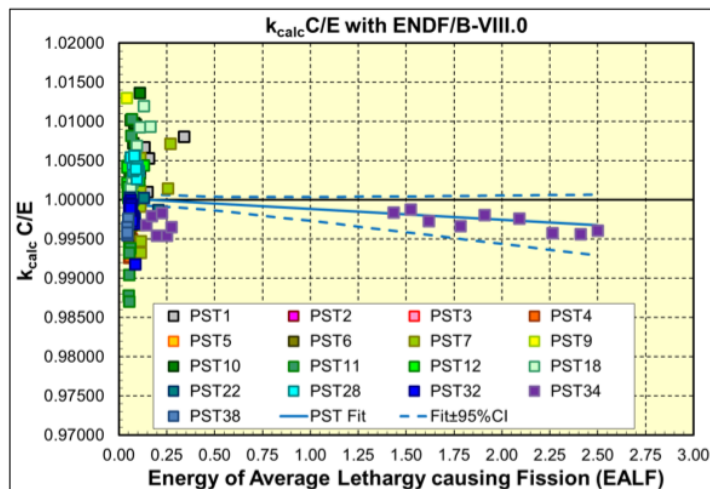
In a recent conversation with Marco Pigni he asked if we'd looked at the PST calculations correlated against EALF (Energy of Average Lethargy causing Fission).

- the short answer was "not closely".

So here's what we see ...

A cluster of points with EALF values below ~0.35 eV plus some PST34 configurations with much higher EALF values.

- As with ATLF the trend parameters are not statistically significant (95% CI).



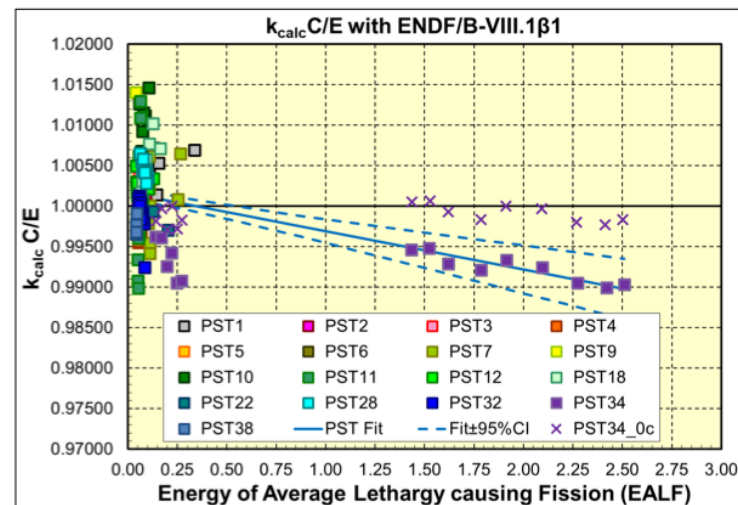
## PST vs EALF – ENDF/B-VIII.1β1

Have superimposed PST34 results with e81β0c on the previous, e81β1, chart.

Only a few of the remaining PST assemblies have been calculated with e81β0c.

- Aside from PST34 the e81β0c results are about 100 pcm higher than obtained with E80.

**Further review of the hybrid options in e81β1 <sup>239</sup>Pu seem warranted.**



# However,...

## PST vs EALF – ENDF/B-VIII.0

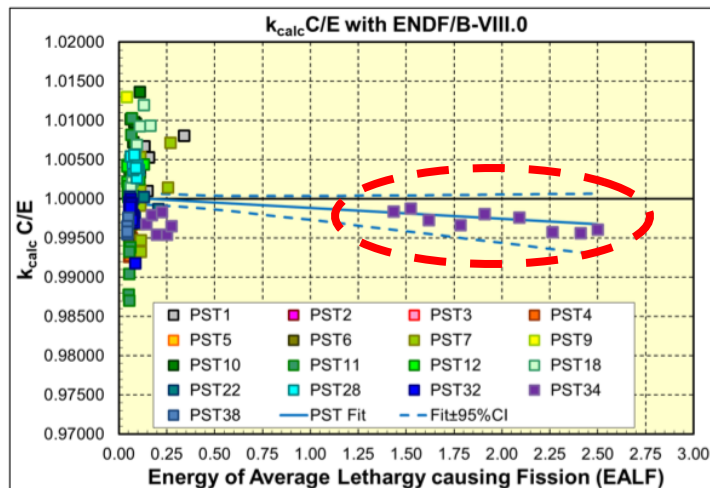
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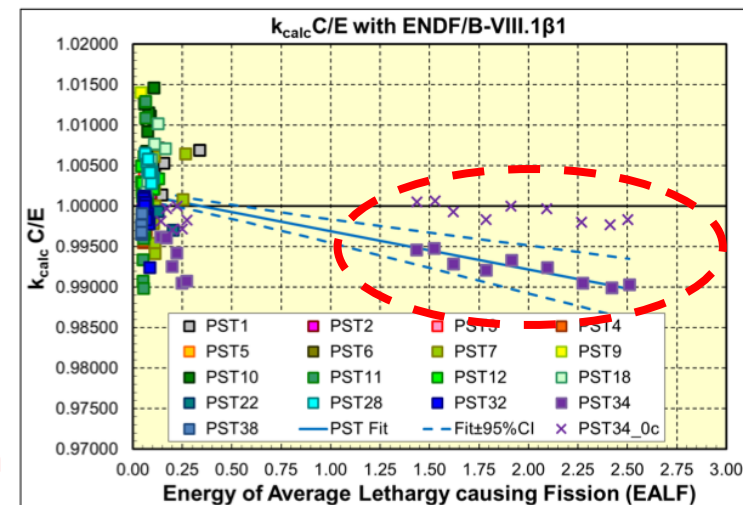
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# However,...

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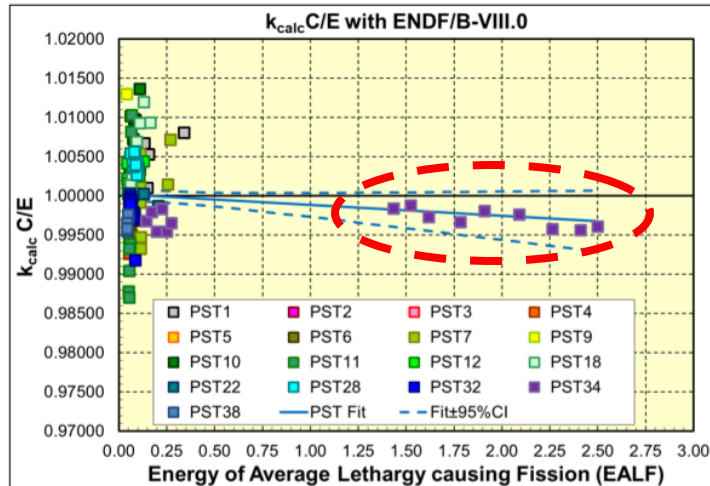
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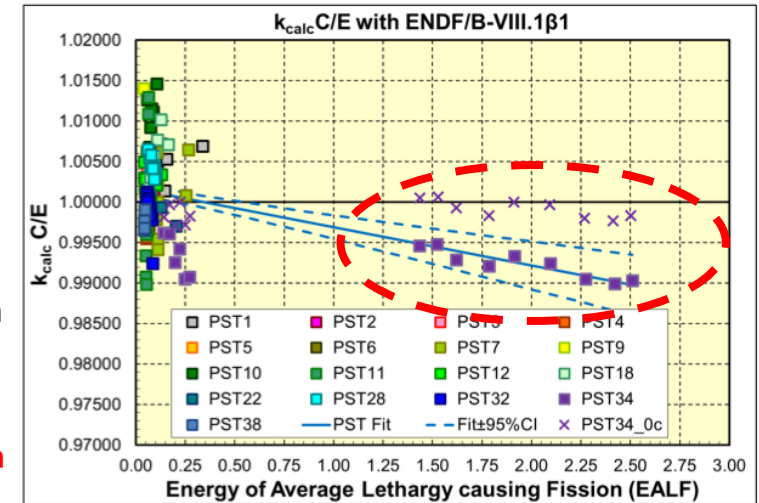
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- Aside from PST34 the e81β0c results are about 100 pcm higher than obtained with E80.

**Further review of the hybrid options in e81β1 <sup>239</sup>Pu seem warranted.**



*"It is a delicate balance among PFNS, nubar, and resonances"*

- M. Pigni (paraphrased from my memory so I apologize if I misquote)

This has already been fixed by INDEN!  
(See R. Capote's talk)

# Towards ENDF/B-VIII.1-Beta2

To be released in June

# Expected updates from Beta1/1.1 into Beta2:



# Expected updates from Beta1/1.1 into Beta2:

- All sub libraries:
  - Updates to [masses](#), [Q-values](#), [thresholds](#): consistency with latest AME

# Expected updates from Beta1/1.1 into Beta2:

- **All sub libraries:**
  - Updates to [masses](#), [Q-values](#), [thresholds](#): consistency with latest AME
- **Neutron:**
  - [Exit distributions](#) overhaul (LLNL/LANL/KAERI)
    - LLNL's changes are live in phase1 branch and LANL-KAERI ones should be so soon
  - Fixes or improvements based on Beta1 feedback:
    - [INDEN's  \$^{238}\text{U}\$](#) :
      - motivated by Skip Kahler report
      - updated RRR (JENDL: VIII.0 up to 100eV, increased capture 100eV-20keV), nubar, PFNS
      - Seems to work well with  $^{234,236}\text{U}$  LANL evaluation
    - [\$^6\text{Li}\$](#) : restored (n,t) cross-section below 1 MeV back to standards
    - [\$^{28,29,30}\text{Si}\$](#) : Files posted to INDEN and thus NNDC were "*missing the direct capture component, which destroys completely the performance in criticality benchmarks (e.g. "hmm005").*" Correct files were already uploaded to phase1 branch.
    - [\$^9\text{Be}\$](#) : "*revert mf3 mt24 (n,2n) to ENDF/B-VIII.0 mf3 mt16; mt1 unchanged, mt2 changed to satisfy mt1 sum rule*". **Also**, preliminary validation shows need of more changes
    - [\$^{235}\text{U}\$](#) : Fix due to "*confusing cross-material covariances inherited from standards sub-library*"
    - [\$^{239}\text{Pu}\$](#) : See previous slides
    - [Others?](#)
- All files that were **not reviewed** in time for **Beta1** ( [\$^{63,65}\text{Cu}\$](#) ,  [\$^{233}\text{U}\$](#) ,  [\$^{208,207,209}\text{Pb}\$](#) , *et al.*)

# Main updates for VIII.1 - neutron sub library

**ENDF/B**  
VIII.1-β1

## INDEN

- 235U
- 239Pu
- 238U
- 233U
- 54,56,57Fe
- 28,29,30Si
- 55Mn
- 50,52,53,54Cr
- 63,65Cu
- 18O - 16O
- 10B
- 11B
- 139La
- 19F

- = Submitted
- = Under review
- = Not submitted
- = Approved



## Non-INDEN

- 140,142Ce (ORNL)
- 103Rh (RPI/IRSN)
- 86Kr (BNL)
- 6Li, 9Be (LANL)
- 234,236U (LANL)
- 181Ta (RPI/ORNL/LANL)
- 95Mo (IRSN/LANL)
- 206,208Pb (RPI)
- Fission products (RQW+BNL): 78Se, 84Kr, 85Rb, 97Mo, 99Tc, 102Pd, 109Ag, 113,115In, 115,119Sn, 127I, 122,124Te, 133,134Cs, 130,134,137Ba, 138La, 143Pr, 147Pm, 148,150Nd, 153Sm, 155Eu, 160Gd, 159Tb, 166,168,170Er, 175,176Lu, 168,176Yb, 174,176,177,178,179,180Hf
- Fixes/improvements: 2H, 23Na, 37Cl, 58Co, 58,60Ni, 107Ag, 106,108,110,111,112,114,116Cd (LANL scatt. rad. fix), 170Tm, 243Pu, 10B
- Other small fixes: 1H, 7Li, 12,13C, 17O, 20,21,22Ne, 26m1Al, 31,32Si, 35S, 36Cl, 37,38,39,41Ar, 41,45,47Ca, 49V, 54Mn, 55Fe, 58m1Co, 63Ni, 64Cu, 69Zn, 70Ga, 71,75Ge, 74As, 75,81Se, 80Br, 79,81Kr, 85Sr, 91,95Zr, 93Mo, 98Tc, 97,105Ru, 104Rh, 103,109Pd, 108,112,113,114,115,116,117,118m1Ag, 107,109Cd, 114In, 121m1,126Sn, 122Sb, 121,121m1,131,131m1Te, 128,132,132m1,133,134I, 125,127Xe, 131,139Ba, 137,137m1Ce, 143,149Nd, 143,144,145,146,150Pm, 145,146Sm, 159Gd, 158,161Tb, 155,156,157,158,160,161,162,163,164Dy, 163,165,167,169Er, 168,169,171Tm, 169,175Yb, 175Hf, 181,182,183,185,186W, 186m1,187Re, 185,191Os, 192,194m1Ir, 190,193,194,196,198Pt, 197,197m1,203Hg, 203,204Tl, 204,205,206Pb, 210m1Bi, 208,209,210Po, 223,226Ra, 225,226,227Ac, 227,228,229,230,231,232,233,234Th, 229,230,231,232,233Pa, 230,231,232,237,239,240,241U, 234,235,236,236m1,237,238,239Np, 236,237,238,240,241,242,244,245,246Pu, 240,241,242,242m1,243,244,244m1Am, 240,241,242,243,244,245,246,247,248,249,250Cm, 245,246,247,248,249,250Bk, 246,247,248,249,250,251,252,253,254Cf, 251,252,253,254,254m1,255Es
- Legacy changes: 10B (ENDF/B-VIII.0 errata), 156,158,160,161,162,163,164Dy (ORNL), 192Pt (tweaked first resonance), 240Pu (LANL unitarity fix)

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- Other small fixes: 1H, 7Li, 12,13C, 17O, 20,21,22Ne, 26m1Al, 31,32Si, 35S, 36Cl, 37,38,39,41Ar, 41,45,47Ca, 49V, 54Mn, 55Fe, 58m1Co, 63Ni, 64Cu, 69Zn, 70Ga, 71,75Ge, 74As, 75,81Se,

Everything NOT green in these boxes need to either be (re-)submitted or reviewed!

- 93Zr, 93Mo, 98Tc, 97,105Ru, 104Rh, 105,116,117,118m1Ag, 107,109Cd, 114In, 115,116,117,118m1Ag, 121m1,131,131m1Te, 127Xe, 131,139Ba, 137,137m1Ce, 138,138m1Ce, 145,146Sm, 159Gd, 158,161Tb, 155,156,157,158,160,161,162,163,164Dy, 163,165,167,169Er, 168,169,171Tm, 169,175Yb, 175Hf, 181,182,183,185,186W, 186m1,187Re, 185,191Os, 192,194m1Ir, 190,193,194,196,198Pt, 197,197m1,203Hg, 203,204Tl, 204,205,206Pb, 210m1Bi, 208,209,210Po, 223,226Ra, 225,226,227Ac, 227,228,229,230,231,232,233,234Th, 229,230,231,232,233Pa, 230,231,232,237,239,240,241U, 234,235,236,236m1,237,238,239Np, 236,237,238,240,241,242,244,245,246Pu, 240,241,242,242m1,243,244,244m1Am, 240,241,242,243,244,245,246,247,248,249,250Cm, 245,246,247,248,249,250Bk, 246,247,248,249,250,251,252,253,254Cf, 251,252,253,254,254m1,255Es
- Legacy changes: 10B (ENDF/B-VIII.0 errata), 156,158,160,161,162,163,164Dy (ORNL), 192Pt (tweaked first resonance), 240Pu (LANL unitarity fix)

# Expected updates from Beta1/1.1 into Beta2:


- TSL:
  - **New MAT number** assignments aiming to solve overload
  - **Light water**: New file from ESS is available with interpolations from VIII.0 for different temperatures. There were questions about behavior around phase transition. Discussions are ongoing.
  - **Polystyrene (C<sub>8</sub>H<sub>8</sub>)**: Exchanges between evaluators and reviewers are ongoing
- Handling conflicts:
  - **HinC5O2H8**: Review panel à la <sup>239</sup>Pu for neutrons
  - Investigating validation for candidate evaluations:
    - RPI: pulsed-neutron-die-away experiments
    - LLNL: Criticality benchmarks
  - **Other materials**: ZrC, ...?

# Expected updates from Beta1/1.1 into Beta2:


- **Photonuclear:**

- IAEA CRP back in 2019 updated many files
- Currently, in phase1 branch:
  - **200** files taken directly from the IAEA CRP
  - **16** files taken from IAEA CRP, but with small format fixes
  - **3** originally taken from IAEA CRP, with small format fixes, but then superseded by Kawano's files
  - **2** minor format fixes from VIII.0
- *Initial plan* was to simply adopt these files. **However**, they may in principle overwrite important developments from earlier LANL evaluations
- CRP paper has plots comparing the 2019 evaluations with the previous IAEA photonuclear files from 1999, but not with ENDF/B.
- We need comparisons (2019 CRP vs VIII.0 vs data) of  $g, x_n$  and  $g_{1n}$ ,  $g_{2n}$  for some of the nuclides of highest importance:  $^{239}\text{Pu}$ ,  $^{235,238}\text{U}$ ,  $^{181}\text{Ta}$ , Be, C, N, O,  $^{241}\text{Am}$

Photo-nuclear  
Taken from IAEA CRP  
Nuclear Data Sheets 163 (2020) 109-162



ELSEVIER



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)  
**ScienceDirect**  
Nuclear Data Sheets 163 (2020) 109-162

**Nuclear Data Sheets**  
[www.elsevier.com/locate/nds](http://www.elsevier.com/locate/nds)

IAEA Photonuclear Data Library 2019

T. Kawano,<sup>1,\*</sup> Y. S. Cho,<sup>2</sup> P. Dimitriou,<sup>3</sup> D. Filipescu,<sup>4</sup> N. Iwamoto,<sup>5</sup> V. Plujko,<sup>6</sup> X. Tao,<sup>7</sup> H. Utsunomiya,<sup>8</sup>  
V. Varlamov,<sup>9</sup> R. Xu,<sup>7</sup> R. Capote,<sup>3</sup> I. Gheorghe,<sup>3</sup> O. Gorbachenko,<sup>6</sup> Y.L. Jin,<sup>7</sup> T. Renstrom,<sup>10</sup>  
M. Sin,<sup>11</sup> K. Stopani,<sup>9</sup> Y. Tian,<sup>7</sup> G.M. Tveten,<sup>10</sup> J.M. Wang,<sup>7</sup> T. Belgya,<sup>12</sup> R. Firestone,<sup>13</sup>  
S. Goriely,<sup>14</sup> J. Kopecky,<sup>15</sup> M. Krticka,<sup>16</sup> R. Schwengner,<sup>17</sup> S. Siem,<sup>10</sup> and M. Wiedeking<sup>18</sup>

<sup>1</sup>Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545, USA  
<sup>2</sup>Nuclear Data Center, Korea Atomic Energy Research Institute,  
Daejeon, Daejeon 305-380, Korea

*Original plan was to simply adopt IAEA CRP, but M. Chadwick brought up that some critical materials are warranted a longer, more careful look. We will review on a case-by-case basis the adoption of the IAEA CRP.*

<sup>3</sup>CRP Research, Kramatorska 4, Donetsk 147, Ukraine  
<sup>4</sup>Charles University, V Holesovickách 2, 18000 Prague, Czech Republic  
<sup>5</sup>Helmholtz Zentrum Dresden-Rossendorf, Bautzner Landstrasse 400, 01328 Dresden, Germany  
<sup>6</sup>Themba LABS, P.O. Box 722, Somerset West, 7129, South Africa  
<sup>7</sup>CRP Research, Kramatorska 4, Donetsk 147, Ukraine  
<sup>8</sup>CRP Research, Kramatorska 4, Donetsk 147, Ukraine  
<sup>9</sup>CRP Research, Kramatorska 4, Donetsk 147, Ukraine  
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<sup>18</sup>CRP Research, Kramatorska 4, Donetsk 147, Ukraine

(Received 16 July 2019; revised received 15 October 2019; accepted 31 October 2019)

We report our coordinated efforts to address these data needs and present the results of the new up-to-date evaluations included in the new updated IAEA Photonuclear Data Library consisting of 219 nuclides. The new library includes 188 new evaluations produced by the CRP evaluators, and one evaluation taken from the JENDL/PD-2016 library, while 20 evaluations were retained from the previous 1999 IAEA Photonuclear Data Library. In most of the cases, the photon energy goes up to 200 MeV. A total of 55 nuclides are new in this library reflecting the progress in measurements but also the developing data needs. In this paper we discuss the new assessment method and make recommendations to the user community in cases where the experimental data are discrepant




# Expected updates from Beta1/1.1 into Beta2:

## • Photonuclear:

- IAEA CRP back in 2019 updated many files
- Currently, in phase1 branch:
  - **200** files taken directly from the IAEA CRP
  - **16** files taken from IAEA CRP, but with small format fixes
  - **3** originally taken from IAEA CRP, with small format fixes, but then superseded by Kawano's files
  - **2** minor format fixes from VIII.0
- *Initial plan* was to simply adopt these files. **However**, they may in principle overwrite important developments from earlier LANL evaluations
- CRP paper has plots comparing the 2019 evaluations with the previous IAEA photonuclear files from 1999, but not with ENDF/B.
- We need comparisons (2019 CRP vs VIII.0 vs data) of  $g, x_n$  and  $g_{1n}$ ,  $g_{2n}$  for some of the nuclides of highest importance:  $^{239}\text{Pu}$ ,  $^{235,238}\text{U}$ ,  $^{181}\text{Ta}$ , Be, C, N, O,  $^{241}\text{Am}$

Photo-nuclear  
Taken from IAEA CRP  
Nuclear Data Sheets 163 (2020) 109-162

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)  
 ScienceDirect  
Nuclear Data Sheets 163 (2020) 109-162  
[www.elsevier.com/locate/nds](http://www.elsevier.com/locate/nds)

ELSEVIER

IAEA Photonuclear Data Library 2019

T. Kawano,<sup>1,\*</sup> Y. S. Cho,<sup>2</sup> P. Dimitriou,<sup>3</sup> D. Filipescu,<sup>4</sup> N. Iwamoto,<sup>5</sup> V. Plujko,<sup>6</sup> X. Tao,<sup>7</sup> H. Utsunomiya,<sup>8</sup>  
V. Varlamov,<sup>9</sup> R. Xu,<sup>7</sup> R. Capote,<sup>3</sup> I. Gheorghe,<sup>3</sup> O. Gorbachenko,<sup>6</sup> Y.L. Jin,<sup>7</sup> T. Renstrom,<sup>10</sup>  
M. Sin,<sup>11</sup> K. Stopani,<sup>9</sup> Y. Tian,<sup>7</sup> G.M. Tveten,<sup>10</sup> J.M. Wang,<sup>7</sup> T. Belgya,<sup>12</sup> R. Firestone,<sup>13</sup>  
S. Goriely,<sup>14</sup> J. Kopecky,<sup>15</sup> M. Krticka,<sup>16</sup> R. Schwengner,<sup>17</sup> S. Siem,<sup>10</sup> and M. Wiedeking<sup>18</sup>

<sup>1</sup>Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545, USA  
<sup>2</sup>Nuclear Data Center, Korea Atomic Energy Research Institute,  
Daejeon, Daejeon 305-380, Korea

*Original plan was to simply adopt IAEA CRP, but M. Chadwick brought up that some critical materials are warranted a longer, more careful look. We will review on a case-by-case basis the adoption of the IAEA CRP.*

<sup>3</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>4</sup>Charles University, V Holesovickách 2, 18000 Prague, Czech Republic  
<sup>5</sup>Helmholtz Zentrum Dresden-Rossendorf, Bautzner Landstrasse 400, 01328 Dresden, Germany  
<sup>6</sup>Themba LABS, P.O. Box 722, Somerset West, 7129, South Africa  
<sup>7</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>8</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>9</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>10</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>11</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>12</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>13</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>14</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>15</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>16</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>17</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands  
<sup>18</sup>CRP Research, Kalamazoo Road 4, Ann Arbor, MI, The Netherlands

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# Recommendation from M.Chadwick @ mini-CSEWG

Need more time to assess and review these files. So, for now, keeping them from VIII.0

- Consider  $^9\text{Be}$  from NNL
- Adopt evaluations from 2019 IAEA CRP for (almost) all nuclei: 200+ files
- Except for 16 select mission-critical materials:

• $^2\text{H}$	• $^{27}\text{Al}$	• $^{184}\text{W}$	• $^{237}\text{Np}$
• $^{12}\text{C}$	• $^{28}\text{Si}$	• $^{206}\text{Pb}$	• $^{235}\text{U}$
• $^{14}\text{N}$	• $^{40}\text{Ca}$	• $^{207}\text{Pb}$	• $^{238}\text{U}$
• $^{16}\text{O}$	• $^{63}\text{Cu}$	• $^{208}\text{Pb}$	• $^{239}\text{Pu}$

- For those, for now, keep older LANL evaluations present in ENDF/B-VIII.0

Starting point for next beta release!



# ENDF Format changes

# TSL MAT numbers

The large number of candidate TSL evaluations submitted since VIII.0 led to a MAT number overload.

ENDF-102, section 0.4, page 12:

NSUB=12: For mixtures, compounds, alloys, and molecules (evaluations using the thermal scattering law (TSL) formats in Chapter 7), all MAT numbers (1 - 9999) are assigned on a special basis (see Appendix C).

Appendix C has been updated with the new MAT assignments, and we're finalizing some details so it can be approved very soon!

We preserved the legacy MAT assignments from ENDF/B-VIII.0

# Pending format proposal (we expect passage this summer)

## 7.6 Generalized Information File

Moderator materials may contain several different isotopes in each material, and sometimes different concentrations of isotopes between different materials with identical atomic compositions (e.g., 5% U-UO<sub>2</sub> vs. 10% U-UO<sub>2</sub>). Additionally, in files containing a mixed  $S(\alpha, \beta)$  (e.g., SiO<sub>2</sub>-beta, or benzene), a machine-readable description should be provided explicitly detailing which atoms (and corresponding isotopes) were used. The distributions of the isotopes used in these files is described below.

This block partially resolves the RRR-TSL continuity issues and stoichiometry errors.

# Pending format proposal (we expect passage this summer)

## 7.6.1 Format for Generalized Information File

The parameters for this generalized information file are given in a section of File 7 with MT=451, to remain consistent with other ENDF files designating MT=451 as their generalized information block. The following quantities are defined:

**ZA,AWR** Standard charge and mass parameters.

**NA** Number of unique elements in the material.

**NAS** Number of atoms of NA type in the molecule or unit cell.

**NI** Number of unique isotopes in the element.

**IZA** ZA number corresponding to a specific isotope in the neutron sub-library.

**ILIS** LIS flag corresponding to a specific isomer of the isotope in the neutron sub-library.

**IFR** Isotopic fraction of isotope in the scattering system.

**ISF** Free atom scattering cross section of this isotope.

**IAWR** Atomic weight ratio of this isotope.

# Pending format proposal (we expect passage this summer)

The structure of the section is

```
[MAT, 7, 451 / ZA, AWR, NA, 0, 0, 0] HEAD  
[MAT, 7, 451 / 0, 0, NAS, 0, 6*NI, NI/  
    IZA1, ILIS1, IFR1, IAWR1, ISF1, 0,  
    IZA2, ILIS2, IFR2, IAWR2, ISF2, 0,  
    -----  
    IZANI, ILISNI, IFRNI, IAWRNI, ISFNI, 0,] LIST
```

The list record is repeated NA time until each element in the system is described.

Also, these tables obey sum rules for:

- isotope fractions (sum to 1)
- massess (sum to AWR)
- Free atom cross section

# Pending format proposal (we expect passage this summer)

The structure of the section is

```
[MAT, 7, 451 / ZA, AWR, NA, 0, 0, 0] HEAD  
[MAT, 7, 451 / 0, 0, NAS, 0, 6*NI, NI/  
    IZA1, ILIS1, IFR1, IAWR1, ISF1, 0,  
    IZA2, ILIS2, IFR2, IAWR2, ISF2, 0,  
-----  
    IZANI, ILISNI, IFRNI, IAWRNI, ISFNI, 0,] LIST
```

The list record is repeated NA time until each element in the system is described.

Also, these tables obey sum rules for:

- isotope fractions (sum to 1)
- massess (sum to AWR)
- Free atom cross section

Approved by  
Formats Committee  
two days ago!

# Conclusion

- Infrastructure development
  - Set up evaluation review process
  - Tracking issues
  - ADVANCE CI/CD system is live
- Process for the next ENDF/B release is moving along
  - Multiple Beta versions released
  - Preparing for the next one (Beta2)
  - Validation feedback is generally positive with specific improvement needs (that are already being addressed)
- Important dates:
  - June: Release of Beta2
  - August 1: Draft of Big Paper
  - August 7-9: Hackathon @ LANL
  - September: Release of Beta3 (freeze of benchmark results)
  - **November 13-17: CSEWG** - Beta4/ Candidate release; paper submission

# Acknowledgements

This work was supported by the Nuclear Criticality Safety Program, funded and managed by the National Nuclear Security Administration for the U.S. Department of Energy. Additionally, work at Brookhaven National Laboratory was sponsored by the Office of Nuclear Physics, Office of Science of the U.S. Department of Energy under Contract No. DE-SC0012704 with Brookhaven Science Associates, LLC.



# Backup slides

# Simpler reports

- Reports will be per-commit, on any git branch (but probably restricted to review branches for now)
- They must be light weight, but not compromise content
- Solution:
  - Summary markdown, per code, replacing website
  - Any important build artifacts made by code (xsdirc, ace files, ...)
  - Pictures & lists of bugs in summary markdown

## Thanks to:

- Ramon Arcilla (BNL-NNDC) for fighting the fight with GitLab and
- Rebecca Coles (BNL-NNP) for creating the simplified reports

# Executes on every commit on every branch

The screenshot shows a CI/CD interface for a project named 'alphas'. The left sidebar contains a navigation menu with 'Pipelines' highlighted. The main area displays a table of pipeline runs, all with a 'passed' status. The first row shows a pipeline for 'Alpha files added' with two stages, both marked with green checkmarks. A blue arrow points from the 'Pipelines' menu to the 'Pipelines' header. Another blue arrow points from the 'passed' status to the text 'Multiple ways to find build artifacts in addition to main project page'. A third blue arrow points from the stages to the text 'It passed!'. A fourth blue arrow points from the download button to a file icon labeled 'artifacts.zip'.

Status	Pipeline	Triggerer	Stages	Actions
passed	Alpha files added #2550	main - 0fdbb956	✓ ✓	Download
passed	He-4 and Li-6 files added #2548	main - a03a1fdf	✓ ✓	Download
passed	Rest of alphas added #2545	main - 37bed775	✓ ✓	Download






Multiple ways to find build artifacts in addition to main project page

It passed!

artifacts.zip

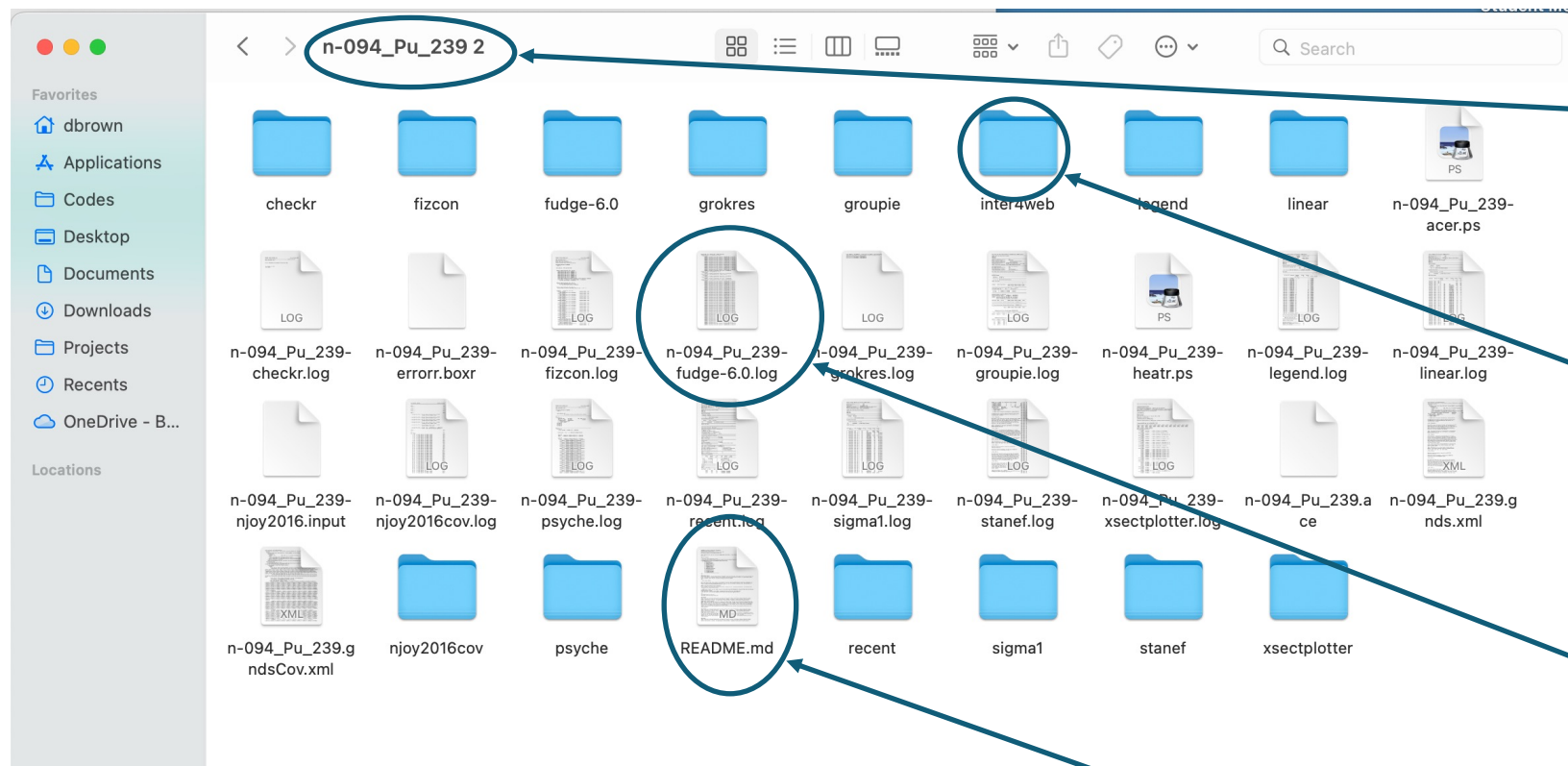
# Execution controlled by a YAML file

main ▾ alphas / .gitlab-ci.yml Find file Blame History Permalink

 **.gitlab-ci.yml**  2.18 KIB Edit in pipeline editor Lock Replace Delete   

```
1 variables:
2   OS_IMAGE: alpine:3.15.4
3   DOCKER_IMAGE: docker:19.03.12
4   #
5   # Set DOCKER_TLS_CERTDIR to "" to disable TLS use
6   # Otherwise, you get an error of 'client HTTP request to HTTPS server'
7   DOCKER_TLS_CERTDIR: ""
8   SHARED_PATH: /builds/${CI_PROJECT_PATH}/shared
9   ADVANCE_IMAGE: git.nndc.bnl.gov:5050/nndc/advance/advance-beta/advance:latest
10
11 stages:
12 - login
13 - verify
14
15 registry_login:
16   stage: login
17   image:
18     name: "${DOCKER_IMAGE}"
19   services:
20 - name: docker:19.03.12-dind
21   alias: docker
22   # THIS IS IMPORTANT!
23   command: ["--tls=false"]
24   script:
25 - export DOCKER_HOST=tcp://docker:2375
26 - echo ${DOCKER_HOST}
27 - docker login -u "${CI_REGISTRY_USER}" -p "${CI_REGISTRY_PASSWORD}" git.nndc.bnl.gov:5050
28   only:
29     changes:
30     - "*.endf"
31   except:
32     changes:
```

# An unpacked artifacts.zip file



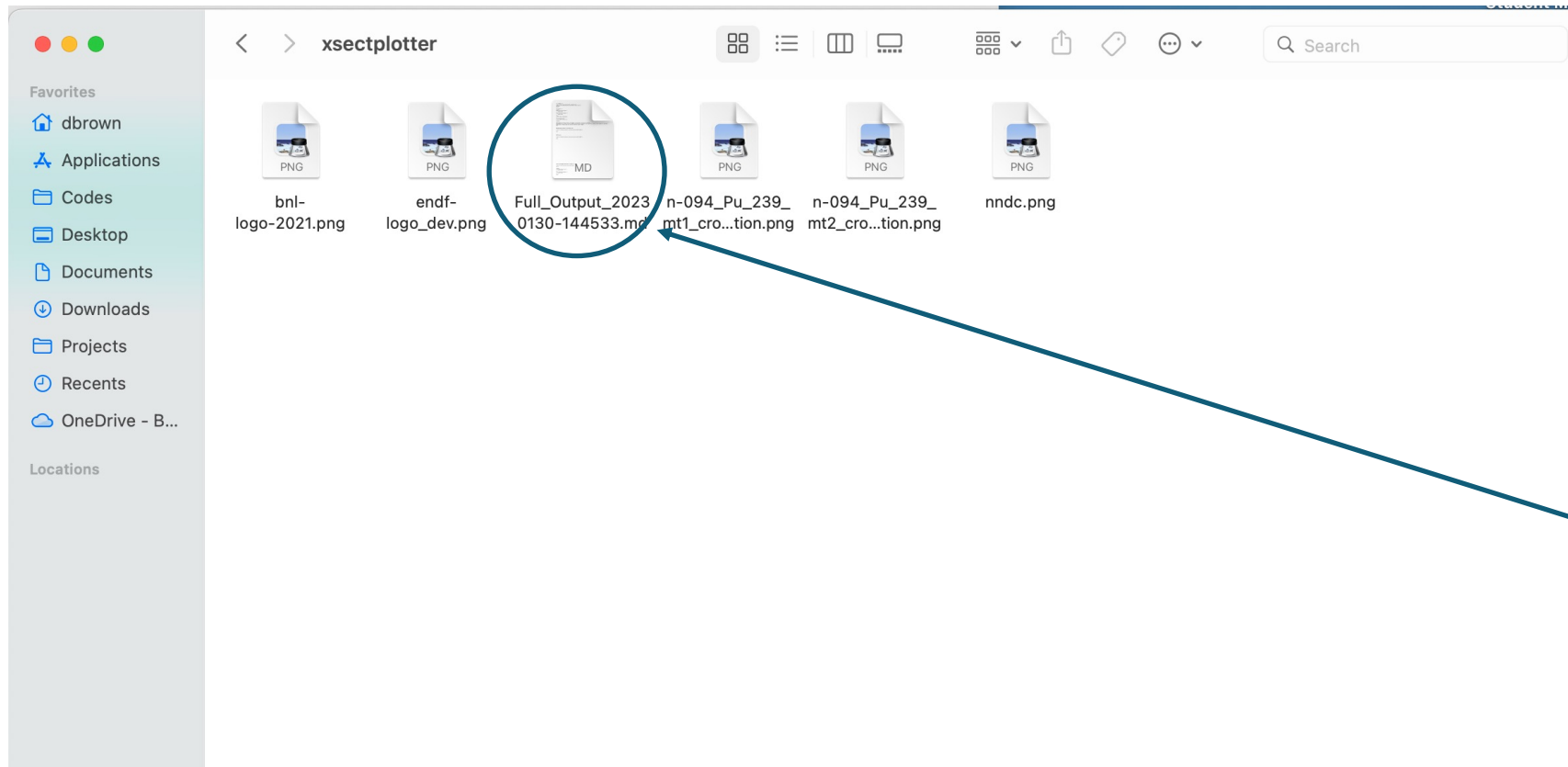
Each changed evaluation gets its own directory

Full build artifact for each code in own directory

stdout stream from code

Helpful instructions

# Sample directory



Open this. "Full\_output\_..."

# Main updates for VIII.1 - TSL sublibrary

• NCSU Phase1 branch:

- **tsl-AlinAl2O3.endf**
- **tsl-Be-metal+Sd.endf**
- **tsl-Be-metal.endf**
- **tsl-BeinBeO.endf**
- **tsl-BeinFLiBe.endf**
- **tsl-CainCaH2.endf**
- **tsl-CinSiC.endf**
- **tsl-CinUC-10P.endf**
- **tsl-CinUC-5P.endf**
- **tsl-CinUC-HEU.endf**
- **tsl-CinUC.endf**
- **tsl-FinFLiBe.endf**
- **tsl-FinHF.endf**
- **tsl-H1inCaH2.endf**

- **tsl-H2inCaH2.endf**
- **tsl-HinC5O2H8.endf**
- **tsl-HinCH2.endf** (VIII.0)
- **tsl-HinHF.endf**
- **tsl-HinParaffinicOil.endf**
- **tsl-LiinFLiBe.endf**
- **tsl-NinUN.endf**
- **tsl-NinUN-10P.endf**
- **tsl-NinUN-5P.endf**
- **tsl-NinUN-HEU.endf**
- **tsl-OinAl2O3.endf**
- **tsl-OinBeO.endf**
- **tsl-OinSiO2-alpha.endf**
- **tsl-OinUO2-10P.endf**

Only real conflict!

- **tsl-OinUO2-5P.endf**
- **tsl-OinUO2-HEU.endf**
- **tsl-OinUO2.endf**
- **tsl-SiinSiC.endf**
- **tsl-SiinSiO2-alpha.endf**
- **tsl-U-metal-10P.endf**
- **tsl-U-metal-5P.endf**
- **tsl-U-metal-HEU.endf**
- **tsl-U-metal.endf**
- **tsl-UinUC-10P.endf**
- **tsl-UinUC-5P.endf**
- **tsl-UinUC-HEU.endf**
- **tsl-UinUC.endf**
- **tsl-UinUN-10P.endf**

- **tsl-UinUN-5P.endf**
- **tsl-UinUN-HEU.endf**
- **tsl-UinUN.endf**
- **tsl-UinUO2-10P.endf**
- **tsl-UinUO2-5P.endf**
- **tsl-UinUO2-HEU.endf**
- **tsl-UinUO2.endf**
- **tsl-graphiteSd.endf**
- **tsl-reactor-graphite-20P.endf**

• ARCAB phase1 branch:

- **tsl-HinH2O.endf** (Damian)

■ = Submitted  
■ = Under review  
■ = Not submitted  
■ = Approved

BOLD = new evaluation  
RED = Conflict! (or so we thought)

□ = Reviewed by ORNL  
□ = Reviewed by NNL  
□ = Reviewed by NCSU

# Main updates for VIII.1 - TSL sublibrary

- ORNL\_TSL\_EVALUATIONS branch:

- **tsl-CinC5O2H8.endf**
- **tsl-CinC8H8.endf**
- **tsl-CinCF2.endf**
- **tsl-CinCH2.endf**
- **tsl-FinCF2.endf**

• **tsl-HinC5O2H8.endf**

(Review merge request already created)

• **tsl-HinC8H8.endf**

- tsl-HinCH2.endf (conflict with VIII.0)
- **tsl-OinC5O2H8.endf**

Only real conflict!

■ = Submitted

■ = Not submitted

■ = Under review

■ = Approved

**BOLD** = new evaluation

**RED** = Conflict! (or so we thought)

□ = Reviewed by ORNL

□ = Reviewed by NNL

□ = Reviewed by NCSU <sup>55</sup>






# Main updates for VIII.1 - TSL sublibrary

- NNL phase1 branch:

- **tsl-BeinBe2C.endf**
- **tsl-CinBe2C.endf**
- **tsl-7Liin7LiH-mixed.endf**
- **tsl-Hin7LiH-mixed.endf**
- **tsl-7Liin7LiD-mixed.endf**
- **tsl-Din7LiD-mixed.endf**
- **tsl-HinZrH2.endf**

- **tsl-HinZrHx.endf**
- **tsl-ZrinZrH2.endf**
- **tsl-ZrinZrHx.endf**
- tsl-HinUH3.endf (BAPL)

-  = Reviewed by ORNL
-  = Reviewed by NNL
-  = Reviewed by NCSU

Not really a conflict! Very minor fixes to VIII.0 header.

 = Submitted

 = Not submitted

 = Under review

 = Approved

**BOLD** = new evaluation

**RED** = Conflict! (or so we thought)

# Photo-nuclear sub library

■ = Submitted

■ = Not submitted

■ = Under review

■ = Approved

• ~~g-001\_H\_002.endf~~

• g-002\_He\_003.endf

• g-003\_Li\_006.endf

• g-003\_Li\_007.endf

• ~~g-004\_Be\_009.endf~~

• ~~g-006\_C\_012.endf~~

• g-006\_C\_013.endf

• g-006\_C\_014.endf

• ~~g-007\_N\_014.endf~~

• g-007\_N\_015.endf

• ~~g-008\_O\_016.endf~~

• g-008\_O\_017.endf

• g-008\_O\_018.endf

• g-009\_F\_019.endf

• g-011\_Na\_023.endf

• g-012\_Mg\_024.endf

• g-012\_Mg\_025.endf

• g-012\_Mg\_026.endf

• ~~g-013\_Al\_027.endf~~

• g-014\_Si\_027.endf

• ~~g-014\_Si\_028.endf~~

• g-014\_Si\_029.endf

• g-014\_Si\_030.endf

• g-016\_S\_032.endf

• g-016\_S\_033.endf

• g-016\_S\_034.endf

• g-016\_S\_036.endf

• g-017\_Cl\_035.endf

• g-017\_Cl\_037.endf

• g-018\_Ar\_036.endf

• g-018\_Ar\_038.endf

• g-018\_Ar\_040.endf

• g-019\_K\_039.endf

• g-019\_K\_040.endf

• g-019\_K\_041.endf

• ~~g-020\_Ca\_040.endf~~

• g-020\_Ca\_042.endf

• g-020\_Ca\_043.endf

• g-020\_Ca\_044.endf

• g-020\_Ca\_046.endf

• g-020\_Ca\_048.endf

• g-021\_Sc\_045.endf

• g-022\_Ti\_046.endf

• g-022\_Ti\_047.endf

• g-022\_Ti\_048.endf

• g-022\_Ti\_049.endf

• g-022\_Ti\_050.endf

• g-023\_V\_050.endf

• g-023\_V\_051.endf

• g-024\_Cr\_050.endf

• g-024\_Cr\_052.endf

• g-024\_Cr\_053.endf

• g-024\_Cr\_054.endf

• g-025\_Mn\_055.endf

• g-026\_Fe\_054.endf

• g-026\_Fe\_056.endf

• g-026\_Fe\_057.endf

• g-026\_Fe\_058.endf

• g-027\_Co\_059.endf

• g-028\_Ni\_058.endf

• g-028\_Ni\_060.endf

• g-028\_Ni\_061.endf

• g-028\_Ni\_062.endf

• g-028\_Ni\_064.endf

• ~~g-029\_Cu\_063.endf~~

• g-029\_Cu\_065.endf

• g-030\_Zn\_064.endf

• g-030\_Zn\_066.endf

• g-030\_Zn\_067.endf

• g-030\_Zn\_068.endf

• g-030\_Zn\_070.endf

• g-032\_Ge\_070.endf

• g-032\_Ge\_072.endf

• g-032\_Ge\_073.endf

• g-032\_Ge\_074.endf

• g-032\_Ge\_076.endf

• g-033\_As\_075.endf

• g-034\_Se\_076.endf

• g-034\_Se\_078.endf

• g-034\_Se\_080.endf

• g-034\_Se\_082.endf

• g-038\_Sr\_084.endf

• g-038\_Sr\_086.endf

• g-038\_Sr\_087.endf

• g-038\_Sr\_088.endf

• g-038\_Sr\_090.endf

• g-039\_Y\_089.endf

• g-040\_Zr\_090.endf

• g-040\_Zr\_091.endf

• g-040\_Zr\_092.endf

• g-040\_Zr\_093.endf

• g-040\_Zr\_094.endf

• g-040\_Zr\_096.endf

• g-041\_Nb\_093.endf

• g-041\_Nb\_094.endf

• g-042\_Mo\_092.endf

• g-042\_Mo\_094.endf

• g-042\_Mo\_095.endf

• g-042\_Mo\_096.endf

• g-042\_Mo\_097.endf

• g-042\_Mo\_098.endf

• g-042\_Mo\_100.endf

• g-044\_Ru\_098.endf

• ~~g-045\_Rh\_103.endf~~

• g-046\_Pd\_102.endf

• g-046\_Pd\_104.endf

• g-046\_Pd\_105.endf

• g-046\_Pd\_106.endf

• g-046\_Pd\_107.endf

• g-046\_Pd\_108.endf

• g-046\_Pd\_110.endf

● Typo/dictionary fix

● Kept from VIII.0

● Level index fix on isomeric production

● Not from CRP

●>NNL new eval.

# Photo-nuclear sub library

- g-047\_Ag\_107.endf
- g-047\_Ag\_108.endf
- g-047\_Ag\_109.endf
- g-048\_Cd\_106.endf
- g-048\_Cd\_108.endf
- g-048\_Cd\_110.endf
- g-048\_Cd\_111.endf
- g-048\_Cd\_112.endf
- g-048\_Cd\_113.endf
- g-048\_Cd\_114.endf
- g-048\_Cd\_116.endf
- g-049\_In\_115.endf
- g-050\_Sn\_112.endf
- g-050\_Sn\_114.endf
- g-050\_Sn\_115.endf
- g-050\_Sn\_116.endf
- g-050\_Sn\_117.endf
- g-050\_Sn\_118.endf
- g-050\_Sn\_119.endf
- g-050\_Sn\_120.endf
- g-050\_Sn\_122.endf
- g-050\_Sn\_124.endf
- g-051\_Sb\_121.endf
- g-051\_Sb\_123.endf
- g-052\_Te\_120.endf
- g-052\_Te\_122.endf
- g-052\_Te\_123.endf
- g-052\_Te\_124.endf
- g-052\_Te\_125.endf
- g-052\_Te\_126.endf
- g-052\_Te\_128.endf
- g-052\_Te\_130.endf
- g-053\_I\_127.endf
- g-053\_I\_129.endf
- g-054\_Xe\_132.endf
- g-055\_Cs\_133.endf
- g-055\_Cs\_135.endf
- g-055\_Cs\_137.endf
- g-056\_Ba\_138.endf
- g-057\_La\_139.endf
- g-058\_Ce\_140.endf
- g-058\_Ce\_142.endf
- g-059\_Pr\_141.endf
- g-060\_Nd\_142.endf
- g-060\_Nd\_143.endf
- g-060\_Nd\_144.endf
- g-060\_Nd\_145.endf
- g-060\_Nd\_146.endf
- g-060\_Nd\_148.endf
- g-060\_Nd\_150.endf
- g-062\_Sm\_144.endf
- g-062\_Sm\_147.endf
- g-062\_Sm\_148.endf
- g-062\_Sm\_149.endf
- g-062\_Sm\_150.endf
- g-062\_Sm\_151.endf
- g-062\_Sm\_152.endf
- g-062\_Sm\_154.endf
- g-063\_Eu\_153.endf
- g-064\_Gd\_156.endf
- g-064\_Gd\_157.endf
- g-064\_Gd\_158.endf
- g-064\_Gd\_160.endf
- g-065\_Tb\_158.endf
- g-065\_Tb\_159.endf
- g-066\_Dy\_162.endf
- g-066\_Dy\_163.endf
- g-067\_Ho\_165.endf
- g-068\_Er\_166.endf
- g-068\_Er\_170.endf
- g-069\_Tm\_169.endf
- g-071\_Lu\_175.endf
- g-072\_Hf\_174.endf
- g-072\_Hf\_176.endf
- g-072\_Hf\_177.endf
- g-072\_Hf\_178.endf
- g-072\_Hf\_179.endf
- g-072\_Hf\_180.endf
- g-073-Ta\_181.endf
- g-074\_W\_180.endf
- g-074\_W\_182.endf
- g-074\_W\_183.endf
- g-074\_W\_184.endf
- g-074\_W\_186.endf
- g-075\_Re\_185.endf
- g-075\_Re\_187.endf
- g-076\_Os\_186.endf
- g-076\_Os\_188.endf
- g-076\_Os\_189.endf
- g-076\_Os\_190.endf
- g-076\_Os\_192.endf
- g-078\_Pt\_194.endf
- g-079\_Au\_197.endf
- g-082\_Pb\_206.endf
- g-082\_Pb\_207.endf
- g-082\_Pb\_208.endf
- g-083\_Bi\_209.endf
- g-088\_Ra\_226.endf
- g-090\_Th\_232.endf
- g-092\_U\_233.endf
- g-092\_U\_234.endf
- g-092\_U\_235.endf
- g-092\_U\_236.endf
- g-092\_U\_238.endf
- g-093\_Np\_237.endf
- g-094\_Pu\_238.endf
- g-094\_Pu\_239.endf
- g-094\_Pu\_240.endf
- g-094\_Pu\_241.endf
- g-095\_Am\_241.endf

- Typo/dictionary fix
- Kept from VIII.0
- Level index fix on isomeric production
- Not from CRP