



ENDF Library Update

G.P.A. Nobre

January 6, 2026



@BrookhavenLab

2025 Nuclear Data Week
CSEWG Meeting
January 6-9, 2026

Outline

- ENDF/B-VIII.1
 - Data access
 - Big paper
- ENDF Library activities
 - ReGra workshop
 - Repository scheme
 - Status and plans

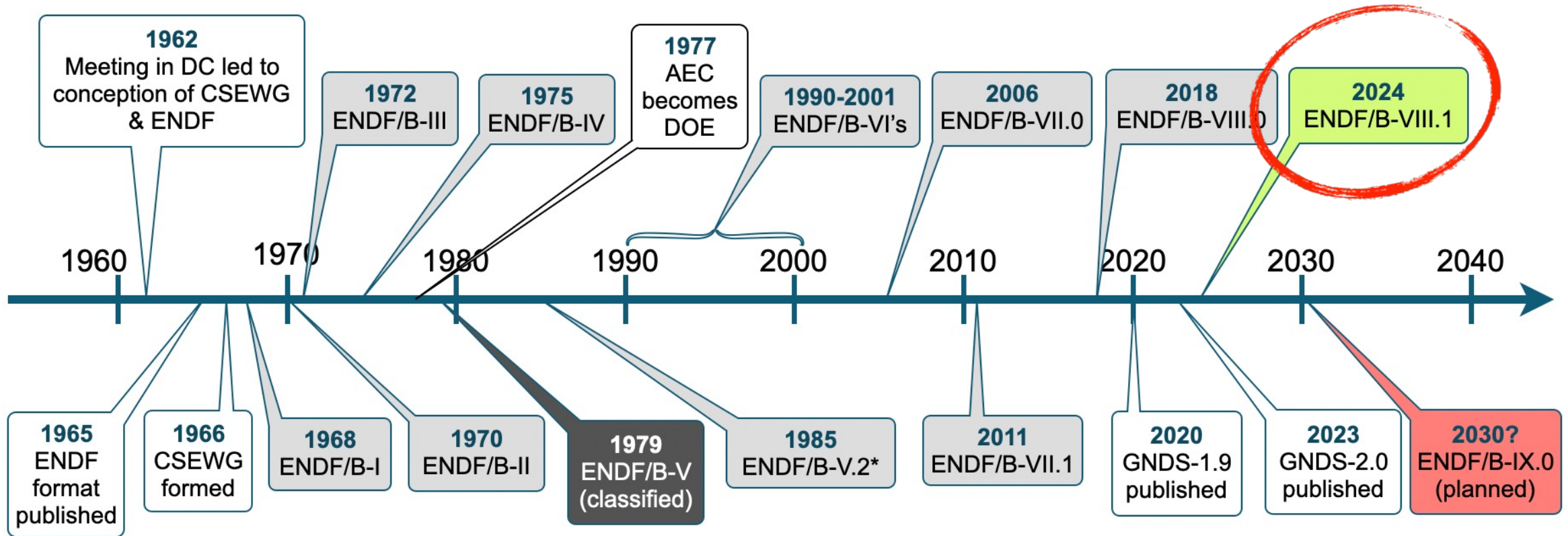
ENDF/B VIII.1



**National Nuclear
Data Center**

A DOE PuRe Data Resource Facility

ENDF Timeline



DOIs for ENDF/B-VIII.1 data

National Nuclear Data Center

Databases

Structure & Decay

Reactions

Resources

Brookhaven National Laboratory

Version:

B-VIII.1

Full Library

Neutrons

Neutron Standards

Thermal Scattering

Photonuclear

Protons

Deuterons

Tritons

Helium-3

Alpha

NFY

ENDF B-VIII.1 Full Library

The ENDF/B-VIII.1 release is the newest evaluated nuclear data library produced, distributed, and recommended by CSEWG for use in nuclear science and technology applications. Among the many key advances, relative to the previous version ENDF/B-VIII.0, are: re-evaluation of ^{239}Pu file by a joint international effort; updated 16,18O, 19F, $^{28-30}\text{Si}$, $^{50-54}\text{Cr}$, ^{55}Mn , $^{54,56,57}\text{Fe}$, $^{63,65}\text{Cu}$, ^{139}La , $^{233,235,238}\text{U}$, and $^{240,241}\text{Pu}$ neutron nuclear data by the IAEA-coordinated INDEN collaboration; significant changes for ^3He , ^6Li , ^9Be , ^{51}V , ^{88}Sr , ^{103}Rh , $^{140,142}\text{Ce}$, Dy, ^{181}Ta , Pt, $^{206-208}\text{Pb}$, and $^{234,236}\text{U}$ neutron data; new nuclear data for the photo-nuclear, being 196 adopted from the IAEA2019 Photonuclear Data Library and one new file from JENDL-5; and new evaluations for the charged-particle and atomic sublibraries.

Numerous thermal neutron scattering kernels were re-evaluated or provided for the very first time. Additionally, new covariance testing was implemented. ENDF/B-VIII.1 reduced bias in the simulations of many integral experiments with particular progress noted for fluorine, copper and stainless steel containing benchmarks. Data issues which had hindered the

ENDF/B
VIII.1

ENDF B-VIII.1 Full Library (907.934 MB)

Format:

ENDF-6

ENDF-6 Manual

GNDS Manual

Download Checksum:

MD5

9696a44db1aeb833502a3f128e1e957e

Download

Citation

TBD

Copy

Awaiting Publication...

Library Downloads

ENDF-6

Download

Collaboration Summary

File

Size

☐

ENDF B-VIII.1 Full Library

907.934 MB

Data Manager

National Nuclear Data Center (NNDC)

Data Curator

Gustavo Nobre

“ENDF/B-VIII.1 release.” <https://doi.org/10.11578/endl/2571019> (2024).

“ENDF/B-VIII.1 release – alphas sublibrary.” <https://doi.org/10.11578/endl/2571012> (2024).

“ENDF/B-VIII.1 release – atomic relaxation sublibrary.” <https://doi.org/10.11578/endl/2571013> (2024).

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“ENDF/B-VIII.1 release – electrons sublibrary.” <https://doi.org/10.11578/endl/2571016> (2024).

“ENDF/B-VIII.1 release – photonuclear sublibrary.” <https://doi.org/10.11578/endl/2571020> (2024).

“ENDF/B-VIII.1 release – helions sublibrary.” <https://doi.org/10.11578/endl/2571021> (2024).

“ENDF/B-VIII.1 release – neutrons sublibrary.” <https://doi.org/10.11578/endl/2571022> (2024).

“ENDF/B-VIII.1 release – neutron-induced fission product yields sublibrary.” <https://doi.org/10.11578/endl/2571023> (2024).

“ENDF/B-VIII.1 release – photo-atomic sublibrary.” <https://doi.org/10.11578/endl/2571024> (2024).

“ENDF/B-VIII.1 release – protons sublibrary.” <https://doi.org/10.11578/endl/2571025> (2024).

“ENDF/B-VIII.1 release – spontaneous fission product yields sublibrary.” <https://doi.org/10.11578/endl/2571026> (2024).

“ENDF/B-VIII.1 release – standards sublibrary.” <https://doi.org/10.11578/endl/2571027> (2024).

“ENDF/B-VIII.1 release – thermal scattering law sublibrary.” <https://doi.org/10.11578/endl/2571028> (2024).

“ENDF/B-VIII.1 release – tritons sublibrary.” <https://doi.org/10.11578/endl/2584305> (2024).

9

DOIs for ENDF/B-VIII.1 data

Library Downloads

ENDF-6

Download

File	Size
<input type="checkbox"/> ENDF B-VIII.1 Full Library	907.934 MB
<input type="checkbox"/> Alpha Reaction Sublibrary	181 KB
<input type="checkbox"/> Atomic Relaxation Reaction Sublibrary	1.397 MB
<input type="checkbox"/> Decay Reaction Sublibrary	10.358 MB
<input type="checkbox"/> Deuteron Reaction Sublibrary	208 KB
<input type="checkbox"/> Electron Reaction Sublibrary	7.544 MB
<input type="checkbox"/> Photonuclear Sublibrary	141.016 MB
<input type="checkbox"/> Helium-3 Reaction Sublibrary	203 KB
<input type="checkbox"/> Neutron Reaction Sublibrary	343.487 MB
<input type="checkbox"/> Neutron Induced Fission Product Yields Sublibrary	1.502 MB
<input type="checkbox"/> Photoatomic Reaction Sublibrary	33.635 MB

Resources

ENDF-6 Manual

GNDS Manual

Summary

GNDS

POINT

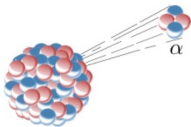
Criticality Validation

ENDF/B VIII.1

ENDF B-VIII.1 Full Library (907.934 MB)

Format: ENDF-6

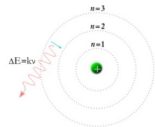
ENDF-6 Manual GNDS Manual



Alpha Reaction Sublibrary (181 KB)

Format: ENDF-6

Release Notes Changelog Material List



Atomic Relaxation Reaction Sublibrary (1.397 MB)

Format: ENDF-6

Release Notes Changelog Material List

Collaboration Summary

Data Manager

National Nuclear Data Center (NNDC)

Data Curator

Gustavo Nobre

Contact Person

Gustavo Nobre

Project Leader

David Brown

Hosting Institution

Brookhaven National Laboratory (BNL)

Producer

Cross Section Evaluation Working Group (CSEWG)

Deposition Summary

Depositor

Gustavo Nobre

Contact

gnobre@bnl.gov

Deposition Date

10/21/2024

Last Modified

10/21/2024

DOI

10.11578/endl/2571019

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ENDF/B-VIII.1: Updated Nuclear Reaction Data Library for Science and Applications

G.P.A. Nobre,^{1,*} R. Capote,² M.T. Pigni,³ A. Trkov,⁴ C.M. Mattoon,⁵ D. Neudecker,⁶ D.A. Brown,¹ M.B. Chadwick,⁶ A.C. Kahler,⁶ N.A. Kleedtke,⁶ M. Zerkle,⁷ A.L. Hawari,⁸ C.W. Chapman,³ N.C. Fleming,⁸ J.L. Wormald,⁷ K. Ramić,⁵ Y. Danon,⁹ N.A. Gibson,⁶ P. Brain,⁹ M.W. Paris,⁶ G.M. Hale,⁶ L.J. Thompson,⁵ D.P. Barry,¹⁰ I. Stetcu,⁶ W. Haack,⁶ A.E. Lovell,⁶ M.R. Mumpower,⁶ G. Potel,⁵ K. Kravvaris,⁵ G. Noguere,¹¹ J.D. McDonnell,³ A.D. Carlson,¹² M. Dunn,¹³ T. Kawano,⁶ D. Wiarda,³ I. Al-Qasir,^{14,3} G. Arbanas,³ R. Arcilla,¹ B. Beck,⁵ D. Bernard,¹¹ R. Beyer,¹⁵ J.M. Brown,³ O. Cabellos,¹⁶ R.J. Casperson,⁵ Y. Cheng,³ E.V. Chimanski,¹ R. Coles,¹ M. Cornock,¹⁷ J. Cotchen,⁷ J.P.W. Crozier,¹⁸ D.E. Cullen,^{2,1} A. Daskalakis,¹⁰ M.-A. Descalle,⁵ D.D. DiJulio,¹⁹ P. Dimitriou,² A.C. Dreyfuss,⁵ I. Durán,^{20,21} R. Ferrer,²² T. Gaines,¹⁷ V. Gillette,¹⁴ G. Gert,⁵ K.H. Guber,³ J.D. Haverkamp,¹⁰ M.W. Herman,⁶ J. Holmes,⁷ M. Hursin,²³ N. Jisrawi,¹⁴ A.R. Junghans,¹⁵ K.J. Kelly,⁶ H.I. Kim,²⁴ K.S. Kim,³ A.J. Koning,⁷ M. Košťál,²⁵ B.K. Laramée,¹⁸ A. Lauer-Coles,¹ L. Leal,^{3,26} H.Y. Lee,⁶ A.M. Lewis,¹⁰ J. Malec,⁴ J.I. Márquez Damián,¹⁹ W.J. Marshall,³ A. Mattera,¹ G. Muhrer,¹⁹ A. Ney,¹⁰ W.E. Ormand,⁵ D.K. Parsons,⁶ C.M. Percher,⁵ V.G. Pronyaev,²¹ A. Qteish,²⁷ S. Quaglioni,⁵ M. Rapp,¹⁰ J.J. Ressler,⁵ M. Rising,⁶ D. Rochman,²⁸ P.K. Romano,²⁹ D. Roubtsov,³⁰ G. Schnabel,² M. Schulz,²⁵ G.J. Siemers,⁹ A.A. Sonzogni,¹ P. Talou,⁶ J. Thompson,¹⁰ T.H. Trumbull,¹⁰ S.C. van der Marck,³¹ M. Vorabbi,^{1,32} C. Wemple,²² K.A. Wendt,⁵ M. White,⁶ and R.Q. Wright^{3,†}

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1



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<https://doi.org/10.48550/arXiv.2511.03564>

arXiv > physics > arXiv:2511.03564

Physics > Applied Physics

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The ENDF/B-VIII.1 library is the newest recommended evaluated nuclear data file by the Cross Section Evaluation Working Group (CSEWG) for use in nuclear science and technology applications, and incorporates advances made in the six years since the release of ENDF/B-VIII.0. Among key advances made are that the ^{239}Pu file was reevaluated by a joint international effort and that updated $^{16,18}\text{O}$, ^{19}F , $^{28-30}\text{Si}$, $^{50-54}\text{Cr}$, ^{55}Mn , $^{54,56,57}\text{Fe}$, $^{63,65}\text{Cu}$, ^{139}La , $^{233,235,238}\text{U}$, and $^{240,241}\text{Pu}$ neutron nuclear data from the IAEA coordinated INDEN collaboration were adopted. Over 60 neutron dosimetry cross sections were adopted from the IAEA's IRDFF-II library. In addition, the new library includes significant changes for ^3He , ^6Li , ^7Be , ^{51}V , ^{89}Sr , ^{103}Rh , $^{140,142}\text{Ce}$, ^{181}Ta , $^{206-208}\text{Pb}$, and $^{234,236}\text{U}$ neutron data, and new nuclear data for the photoneuclear, charged-particle and atomic sublibraries. Numerous thermal neutron scattering kernels were reevaluated or provided for the very first time. On the covariance side, work was undertaken to introduce better uncertainty quantification standards and testing for nuclear data covariances. The significant effort to reevaluate important nuclides has reduced bias in the simulations of many integral experiments with particular progress noted for fluorine, copper, and stainless steel containing benchmarks. Data issues hindered the successful deployment of the previous ENDF/B-VIII.0 for commercial nuclear power applications in high burnup situations. These issues were addressed by improving the ^{238}U and $^{239,240,241}\text{Pu}$ evaluated data in the resonance region. The new library performance as a function of burnup is similar to the reference ENDF/B-VII.1 library. The ENDF/B-VIII.1 data are available in ENDF-6 and GND5 format at [this https URL](https://www.oecd-nea.org/doc/workinggroup/2024/09/20240924-ENDF-B-VIII.1-data-availability/).

arXiv:2511.03564v1 [physics.app-ph] 5 Nov 2025



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Library activities beyond ENDF/B-VIII.1

1st Reactor Graphite Workshop (ReGra)

July 8-9 @ BNL

1st Reactor Graphite (ReGra) Workshop

Bringing together experts in the nuclear data community

Hosted by Brookhaven National Laboratory
July 8–9, 2025

Reactor Graphite Workshop

Jul 8–9, 2025
Berkner Hall (Bldg. 488)
US/Eastern timezone

[Homepage](#)[Overview](#)[Timetable](#)[Contribution List](#)[My Conference](#)[My Contributions](#)[Registration](#)[Contact](#)[✉ gnobre@bnl.gov](mailto:gnobre@bnl.gov)

Within the community, there were **different perspectives** on what should the thermal-neutron scattering law libraries associated with reactor graphite.

- This motivated the organization of an **in-person, highly-focused workshop**.
- Participants from BNL, RPI, ORNL, NCSU, TAMU, Kairos Power, BWXT Advanced Technologies, Foster & Associates, JAEA, INL, LLNL, U. Michigan, LANL, NNL, Studsvik Scandpower

Meeting minutes published

- Published meeting minutes as a BNL lab report:
 - <https://doi.org/10.2172/2998877>
 - Report is **NOT** a scientific paper
 - Report is a description of **what happened** at the meeting:
 - What was presented
 - What was discussed: Comments, objections, replies, agreements and disagreements; past, present, future on the topic
 - Key takeaways: discussed, edited in real time, and agreed upon by ALL participants in the last session, before meeting ended
- Feedback was **positive**:
 - There will likely be a follow-up edition (2027?)

Summary of the 1st Reactor Graphite Workshop, 8-9 July, 2025

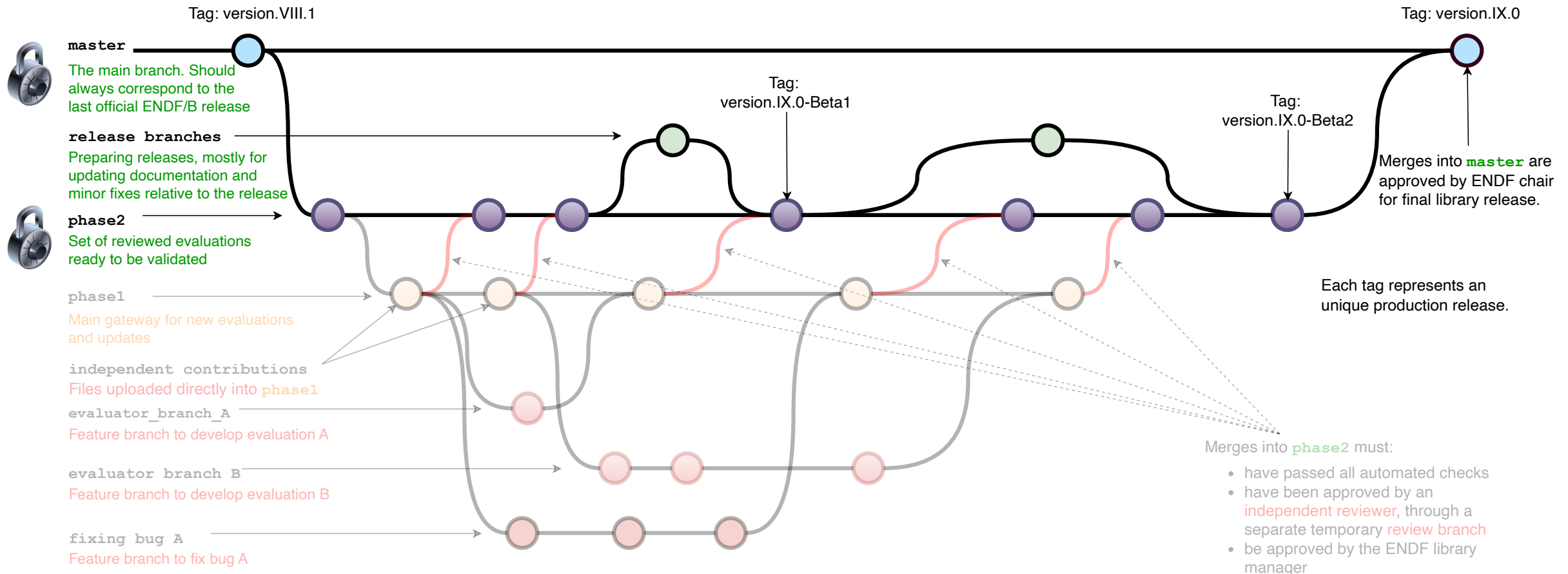
Gustavo P.A. Nobre¹, David A. Brown¹, Benjamin Wang², Iyad Al-Qasir³, John Bess⁴, Chris Chapman³, Arantxa Cuadra¹, Yaron Danon², Simerjeet Gill¹, Travis Greene³, Ayman Hawari^{5,6}, Richard Hernandez⁷, Chase Lawing⁸, Gabriel Lentchner⁸, Cihang Lu¹, Shinsuke Nakayama⁹, Matthew Nash⁸, Javier Ortensi¹⁰, Catherine Percher¹¹, Dominic Piedmont¹, Kemal Ramić³, Volkan Seker¹², Gregory Siemers^{2,13}, Jason Thompson¹⁴, Nicholas Thompson¹³, Charles Wemple¹⁵, Michael Zerkle¹⁴

¹Brookhaven National Laboratory, ²Rensselaer Polytechnic Institute, ³Oak Ridge National Laboratory, ⁴JFoster & Associates, LLC, ⁵North Carolina State University, ⁶Texas A&M University, ⁷Kairos Power, ⁸BWXT Advanced Technologies, LLC, ⁹Japan Atomic Energy Agency, ¹⁰Idaho National Laboratory, ¹¹Lawrence Livermore National Laboratory, ¹²University of Michigan, ¹³Los Alamos National Laboratory, ¹⁴Naval Nuclear Laboratory, ¹⁵Studsvik Scandpower, Inc.

The ENDF repository

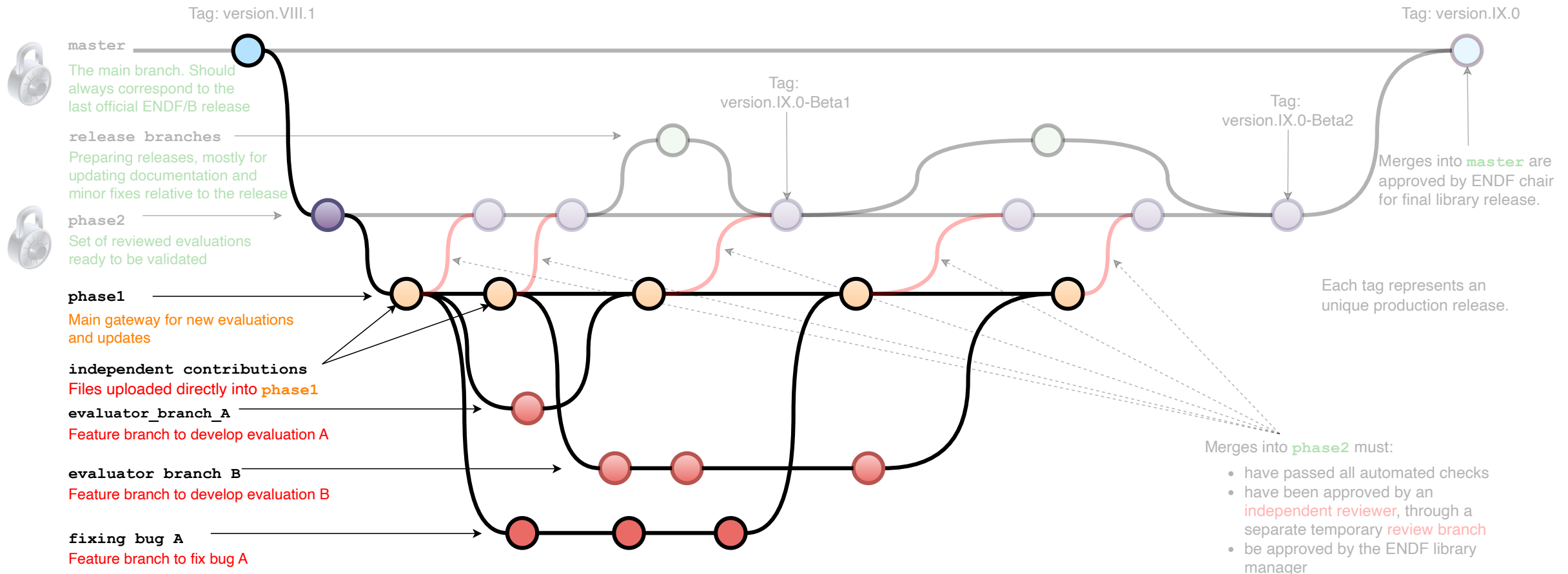
ENDF repository scheme

ENDF Library Repository Diagram



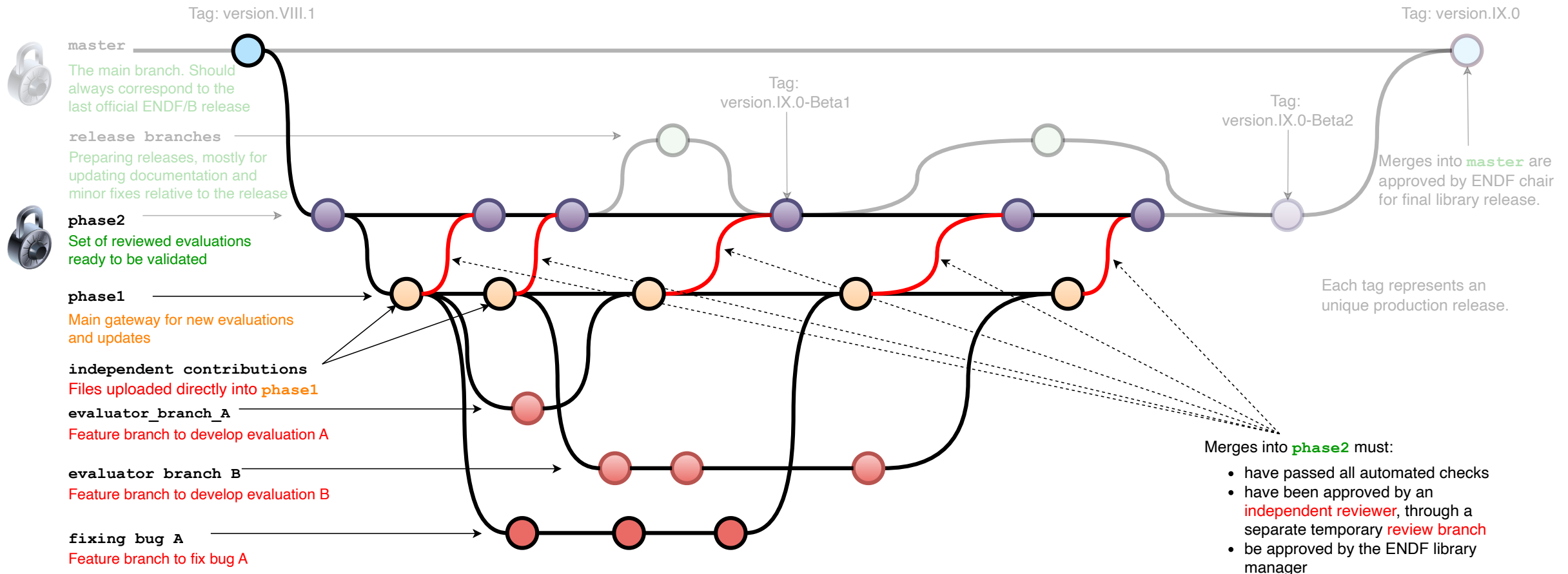
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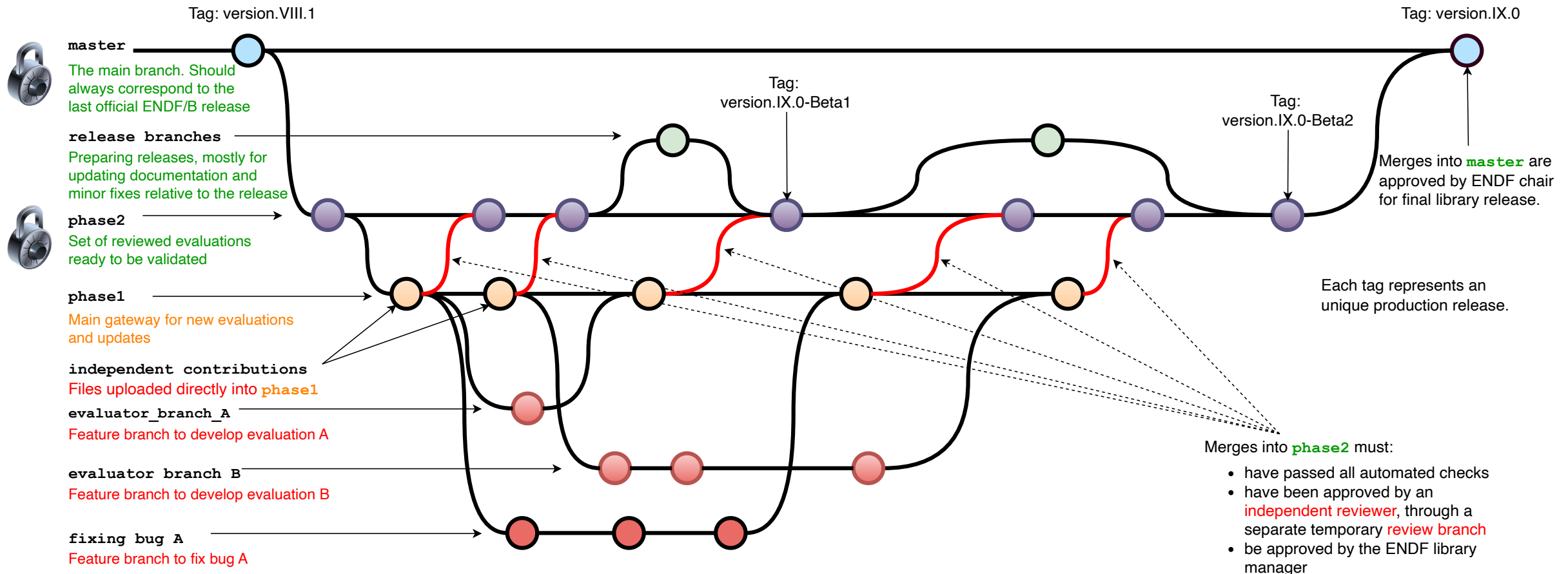
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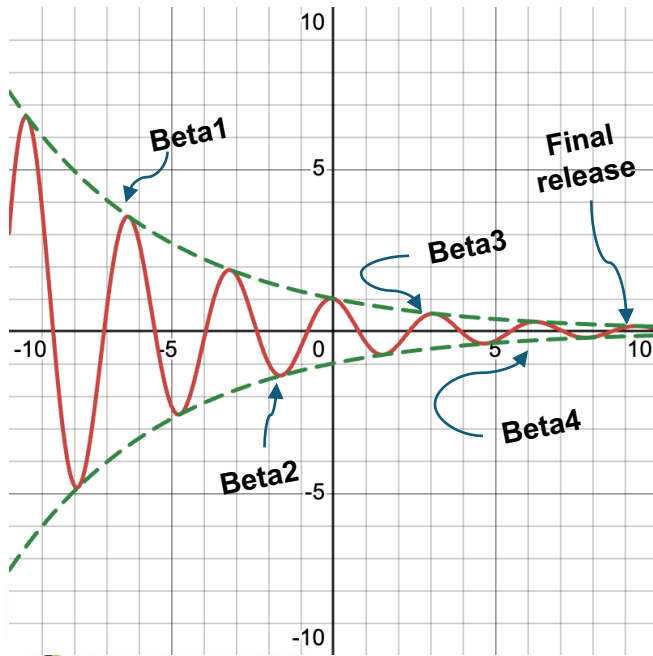


Importance of review process

- We learned many lessons from the VIII.1 review process:
 - Identified several issues:
 - Current **review form** is **not very useful**
 - Wiki page and **report tarballs** are **not very helpful** either
 - **Issues** with integration with **processing codes**
 - On the **positive side**:
 - GitLab's **merge request GUI environment** for review was **great** for discussions, documentation, tracking of updates, etc., **all integrated with commits and issue trackers**
- For the ENDF/B-IX.0 cycle, we are planning a **complete re-work** of the review process, aiming to make it more user-friendly
 - In the meantime, we will keep working as we have been doing...

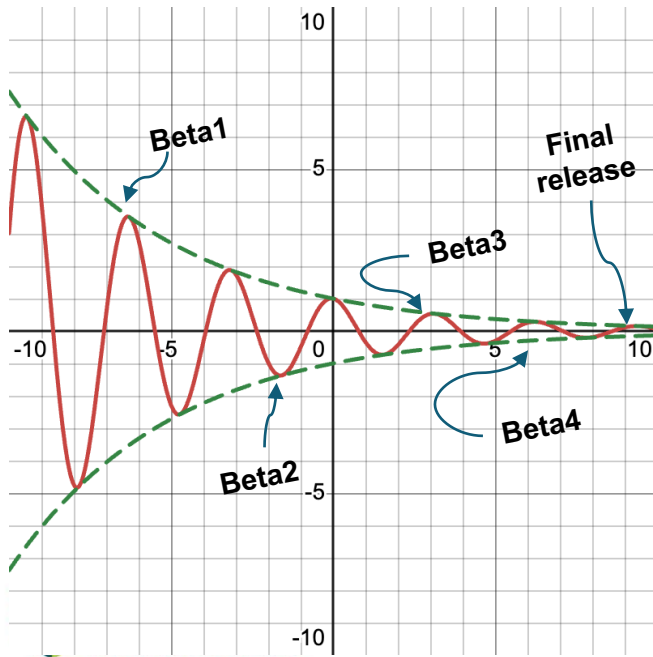
Importance of review process

- Still, reviews are essential!
- Allied with consistent validation, **review system** allows for a **predictable, progressively-convergent** path towards a **final ENDF release!**



Importance of review process

- Still, reviews are essential!
- Allied with consistent validation, **review system** allows for a **predictable, progressively-convergent** path towards a **final ENDF release!**
- **However**, we have been relying substantially on the good will of reviewers

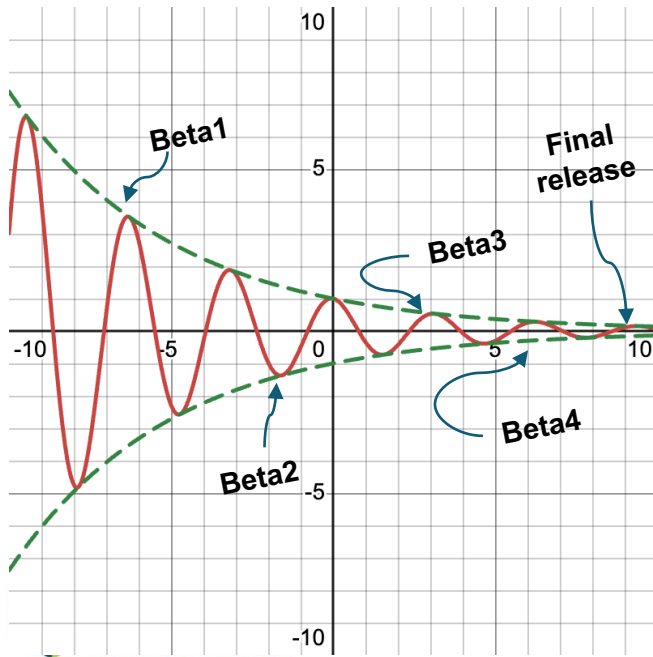


"Sure, I'd love to, but I need to find free time to do this because it's an unfunded activity..."

"I will be happy to review it, but I have to wait until I get home and do it in the evening because I can't do it during work hours."

Importance of review process

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- Allied with consistent validation, **review system** allows for a **predictable, progressively-convergent** path towards a **final ENDF release!**
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"I will be happy to review it, but I have to wait until I get home and do it in the evening because I can't do it during work hours."

I encourage everyone to bring up with their program manager the importance of the review effort as an efficient, cost-effective way to improve the quality of the final product.

A small-time allocation can really go a long way!

Status of the library

What has changed since ENDF/B-VIII.1

Neutrons sublibrary

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

n-004_Be_009.endf: GRIN capture gammas update
n-006_C_012.endf: GRIN updates to inelastic and capture gammas
n-007_N_014.endf: GRIN inelastic gamma updates
n-007_N_015.endf: GRIN inelastic gamma updates
n-008_O_016.endf: Fixes to elastic covariance issues introduced in Dec. 2022
n-008_O_017.endf: GRIN inelastic gamma updates
n-011_Na_022.endf: GRIN inelastic gamma updates
n-011_Na_023.endf: GRIN inelastic gamma updates
n-012_Mg_024.endf: GRIN updates to inelastic and capture gammas
n-012_Mg_025.endf: GRIN updates to inelastic and capture gammas
n-013_Al_027.endf: GRIN inclusion of branching ratios (needs to address a double-counting issue)
n-014_Si_028.endf: GRIN inclusion of branching ratios
n-014_Si_029.endf: GRIN inclusion of branching ratios (needs to fix an unintended change)
n-014_Si_030.endf: GRIN inclusion of branching ratios (needs to fix an unintended change)

n-014_Si_031.endf: GRIN inclusion of branching ratios
n-014_Si_032.endf: GRIN inclusion of branching ratios (There's a small change in MF/MT=6/800, was that intentional?)
n-016_S_032.endf: GRIN capture gammas update and interpolation flag fix in MT102 – Additional flag fix needs to be reviewed
n-017_Ci_035.endf:

- LANL/Terrapower
- ORNL

n-017_Ci_037.endf:

- LANL/Terrapower
- ORNL

n-025_Mn_055.endf: GRIN inclusion of branching ratios
n-026_Fe_054.endf: Patch to fix negative elastic cross sections
n-057_La_139.endf: ORNL/LANL evaluation
n-073-Ta_181.endf: Fix of URR covariances
n-092_U_234.endf: ORNL update to the two resonances & parameter transformation from MLBW to Reich-Moore
n-092_U_238.endf: LANL new PFNS eval. including Chi-Nu data

TSL sublibrary

[tsl-Cu.endf](#) - NJOY+NCrystal

[tsl-HinCH2.endf](#) - NCSU extension of VIII.0 evaluation (updated temperature grid and masses/free atom cross sections)

[tsl-Mo.endf](#) - NJOY+NCrystal

[tsl-Ni.endf](#) - NJOY+NCrystal

[tsl-Pb.endf](#) - NJOY+NCrystal

[tsl-V-metal.endf](#) - NJOY+NCrystal

[tsl-W-metal.endf](#) - NJOY+NCrystal

These bookkeeping slides may be boring, but they are a helpful tool to quickly visualize what's changing from one ENDF version to another

Photonuclear sublibrary

[g-004_Be_009.endf](#): Updated NNL evaluation

Additionally...



- There are many fixes from the 2025 Hackathon (ORNL) sitting on separate branches.
 - I'm slowly going through them, and they should be gradually incorporated into **phase1/phase2** branches.
- I'm searching for **reviewers** to speed up the acceptance of the already-submitted files
- Planning Beta1 release for the Spring, hopefully in sync with the Standards

ENDF/B
IX.0-β1

vs.

ENDF/B
VIII.2-β1

*will depend whether
standards will be
updated in time*

Conclusion

- **Wrapping up ENDF/B-VIII.1 business**
 - Big Paper:
 - Revised version submitted
 - Should be published in NDS early 2026
 - Manuscript is available at arXiv
 - DOIs and landing page for data are available now
- **Beginning of next ENDF cycle:**
 - Organized Reactor Graphite workshop
 - Sorting out the review of submitted files and Hackathon fixes: **NEED REVIEWERS!**
 - Working on next Beta release: aiming for Spring, hopefully in-sync with Standards

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