

BNL contributions to ENDF/B-VIII.0

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National Nuclear Data Center, BNL



ENDF B-VIII.0

Release coordination

Fe

TENDL+EMPIRE

Atlas

GForge

ADVANCE

Hackathon

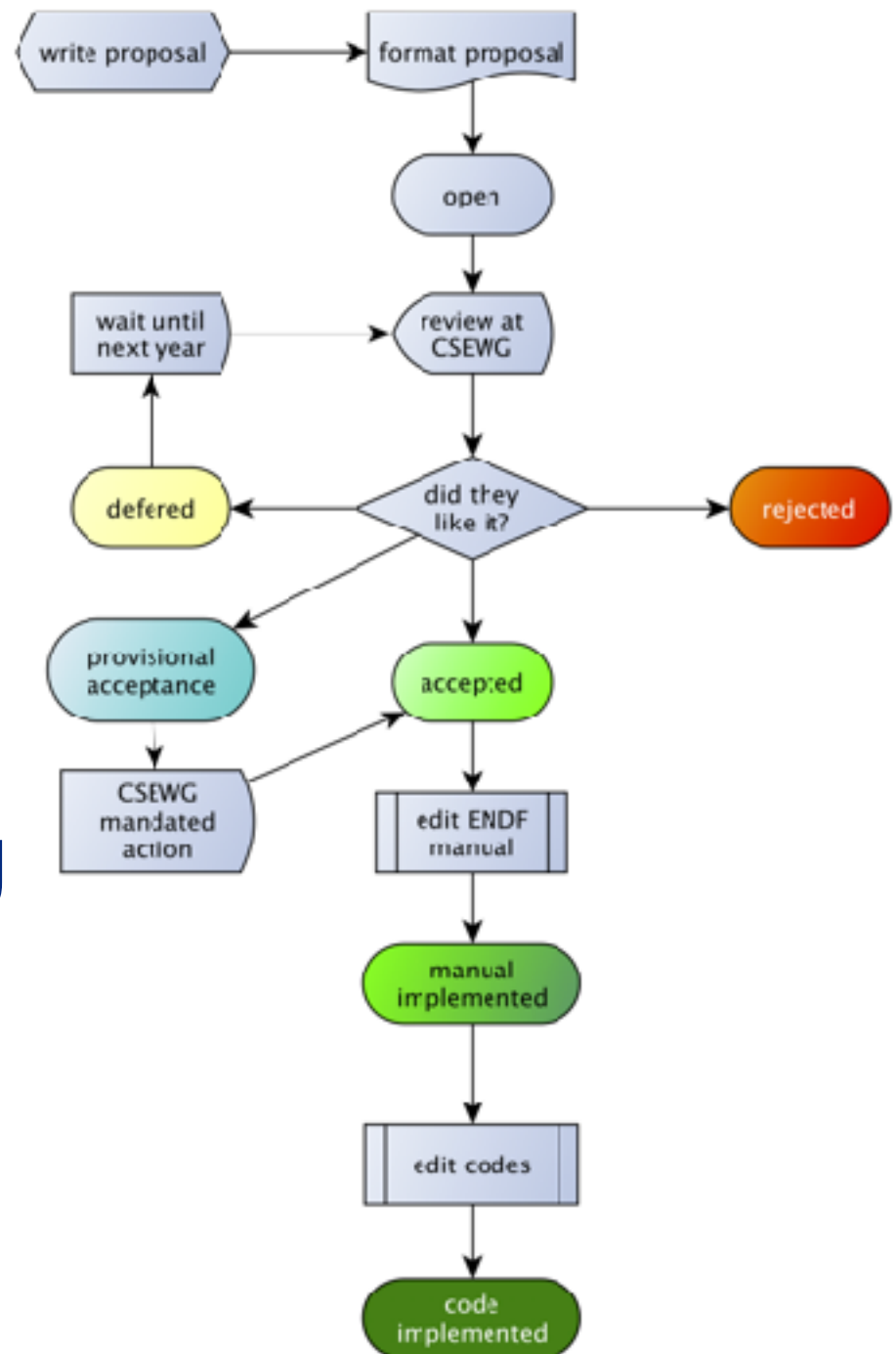
ENDF-6 Format Manual

EMPIRE

ENDF-6 Format Manual

Each ENDF/B release is
accompanied by an ENDF-6 formats
manual revision

We work with the ENDF Formats Committee to shepherd formats from proposals to the manual and checking/processing codes



ENDF-6 Formats Manual

Data Formats and Procedures for the Evaluated Nuclear Data Files
ENDF/B-VI, ENDF/B-VII and ENDF/B-VIII

Written by the Members of the Cross Sections Evaluation Working Group

Edited by
A. Trkov, M. Herman and D. A. Brown

With contributions from
N. Holden and G. Hedstrom

October 26, 2017

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No major development on
EMPIRE in FY17 beyond bug
fixes needed to get evaluation
work done

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EMPIRE

Discussed by Tim Johnson

GForge

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Where to find the link to ADVANCE

The image shows a screenshot of the National Nuclear Data Center (NNDC) website. A red arrow points to the URL www.nndc.bnl.gov in the browser's address bar. Another red arrow points to the "Reactions" tab in the navigation menu. A third red arrow points to the "ADVANCE ENDF continuous integration system" link in the "Reactions" section. A fourth red arrow points to the "Reactions" tab again.

www.nndc.bnl.gov

Reactions tab

The link

Reactions

- Experimental data
 - EXFOR Experimental nuclear reaction data
 - The EXFOR project
 - EXFOR Basics: Short guide
- Codes
 - Checking & utility codes
 - Reaction codes
 - EMPIRE Nuclear Reaction Model Code
- Evaluated ENDF data
 - ENDFB-VI.1 Current ENDF release
 - ENDFB-VIII.0 In-development ENDF library
 - The ENDF project
 - Sigma ENDF Retrieval & Plotting
 - Current ENDF-6 Format Manual
 - In-development ENDF-6 Format Manual
 - Introduction to ENDF Formats
 - ADVANCE ENDF continuous integration system
- Other evaluated data
 - Atlas of Neutron Resonances Parameters & thermal values
 - Atomic Mass Evaluation
 - IRDF International Reactor Dosimetry File
 - Monitor Reactions IAEA recommended charged-particle cross sections
 - RIPL-3 Reference Input Parameter Library
- Tools
 - CapGam Thermal neutron capture γ rays
 - Gamma Ray Atlas Following Inelastic Scattering of Fast Neutrons Downloadable software platform
 - EXFOR/ENDF Plotting
 - NucRates MACS and astrophysical reaction rates
 - MyENDF Integrated web tool for evaluators
 - Q-value Calculator
 - USNDPICSEWG GForge Collaboration server

www.nndc.bnl.gov

Reactions tab

The link

Reactions

Evaluated ENDF data

- ▶ ENDFB-VI.1 Current ENDF release
- ▶ ENDFB-VIII.0 In-development ENDF library
- ▶ The ENDF project
- ▶ Sigma ENDF Retrieval & Plotting
- ▶ Current ENDF-6 Format Manual
- ▶ In-development ENDF-6 Format Manual
- ▶ Introduction to ENDF Formats
- ▶ ADVANCE ENDF continuous integration system

Other evaluated data

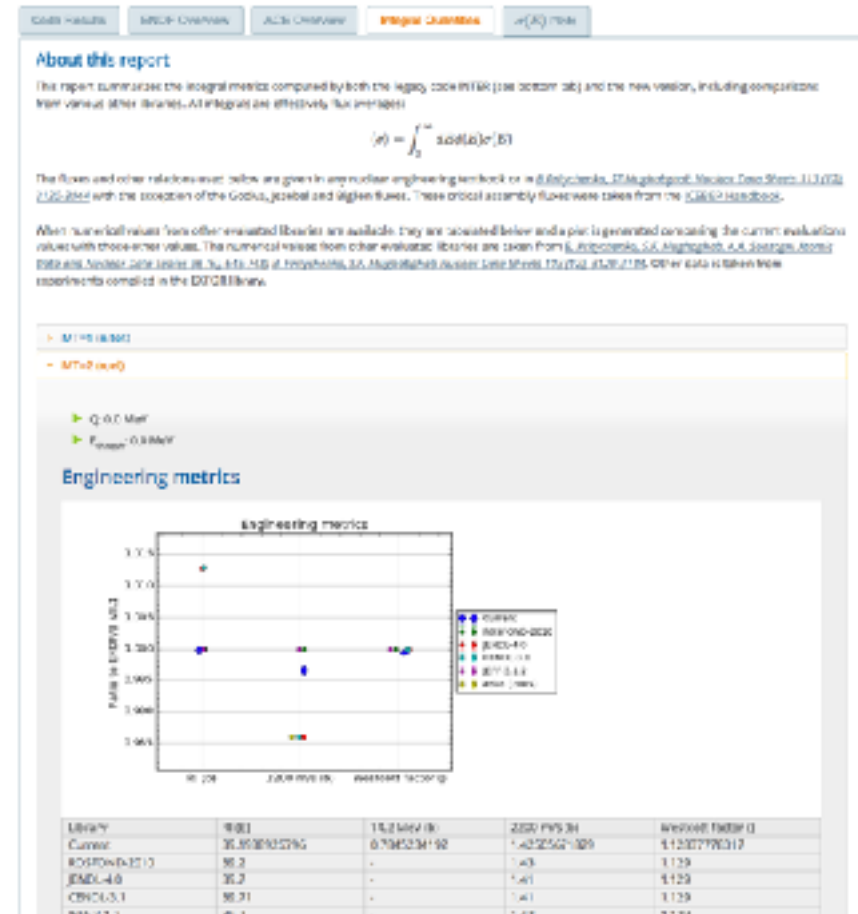
- ▶ Atlas of Neutron Resonances Parameters & thermal values
- ▶ Atomic Mass Evaluation
- ▶ IRDF International Reactor Dosimetry File
- ▶ Monitor Reactions IAEA recommended charged-particle cross sections
- ▶ RIPL-3 Reference Input Parameter Library

Tools

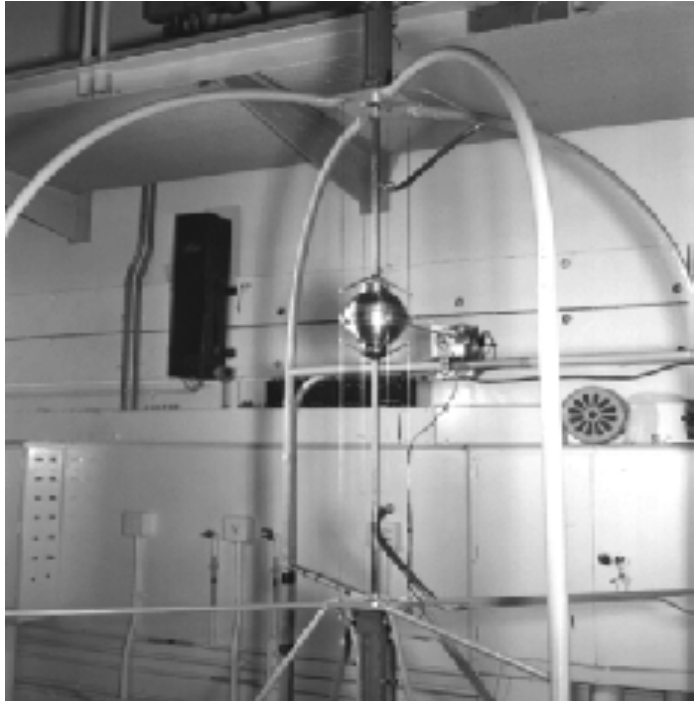
- ▶ CapGam Thermal neutron capture γ rays
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- ▶ NucRates MACS and astrophysical reaction rates
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ADVANCE quality assurance system for ENDF

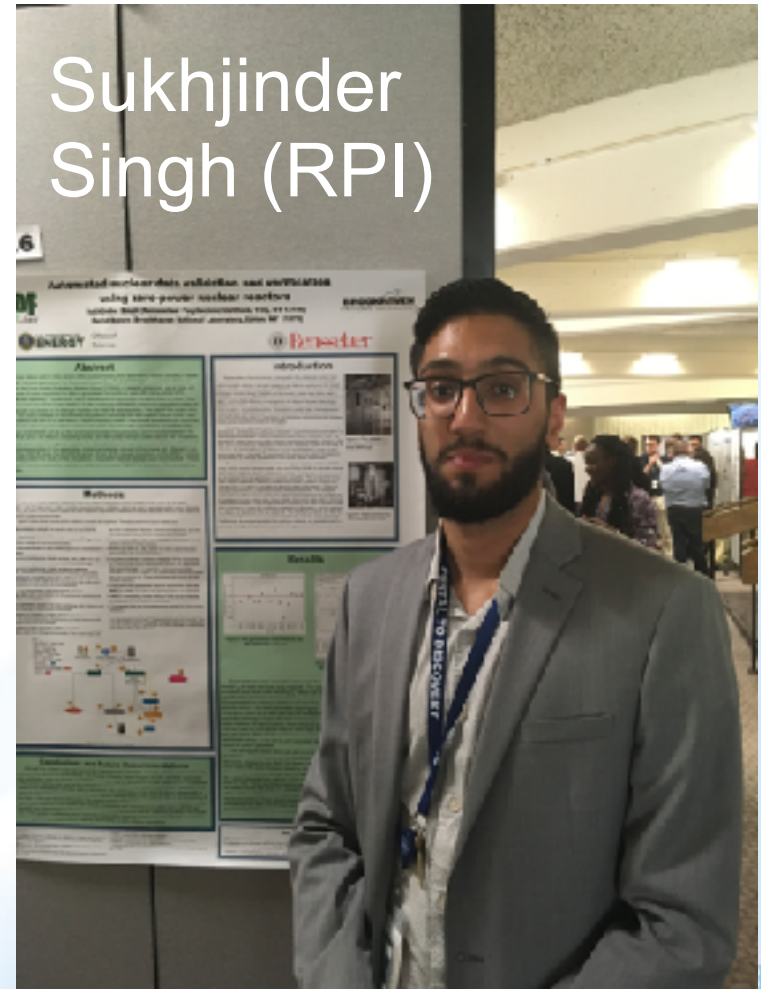
- On every commit of every evaluation automatically:
 - Run it through a battery of tests, including customer codes
 - Generate comparison plots
 - Generate HTML report
- New in FY17:
 - Update Fudge-4.2.1 add PREPRO/ GROUPIE
 - Aesthetic improvements (AJAX & MathJax)
 - Full library ACE file tarballs
 - Per-isotope error reports
 - Covariance and ACE overview
 - Rewrote INTER using FUDGE



SULI student progress toward adding automated benchmarking



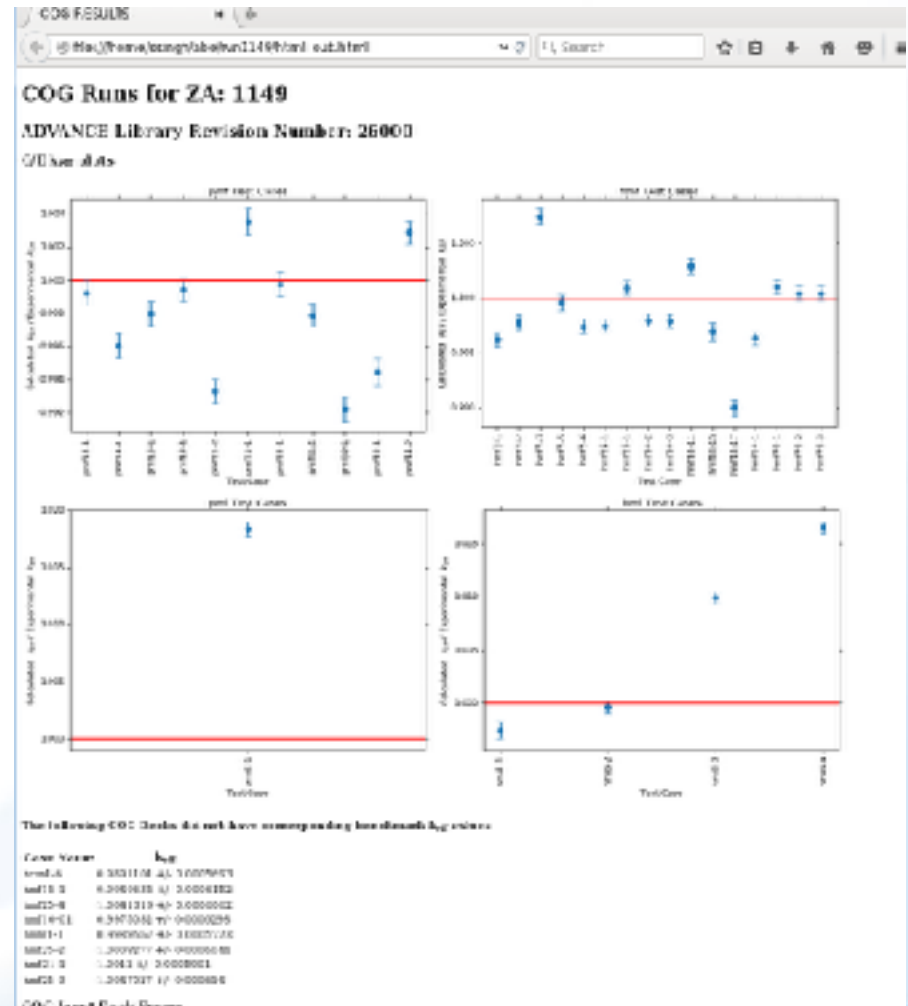
JEZEBEL—A bare sphere of Plutonium-239 Metal (PMF001)



Sukhjinder Singh (RPI)

SULI student progress toward adding automated benchmarking

- COG “wrapped” by Python script
 - Problem setup and teardown
 - Input file generation
 - Output file parsing
- Automatic COG library setup
- Interacts with BNL batch queue system
- Builds HTML report upon completion
- Need to integrate into main ADVANCE



GForge

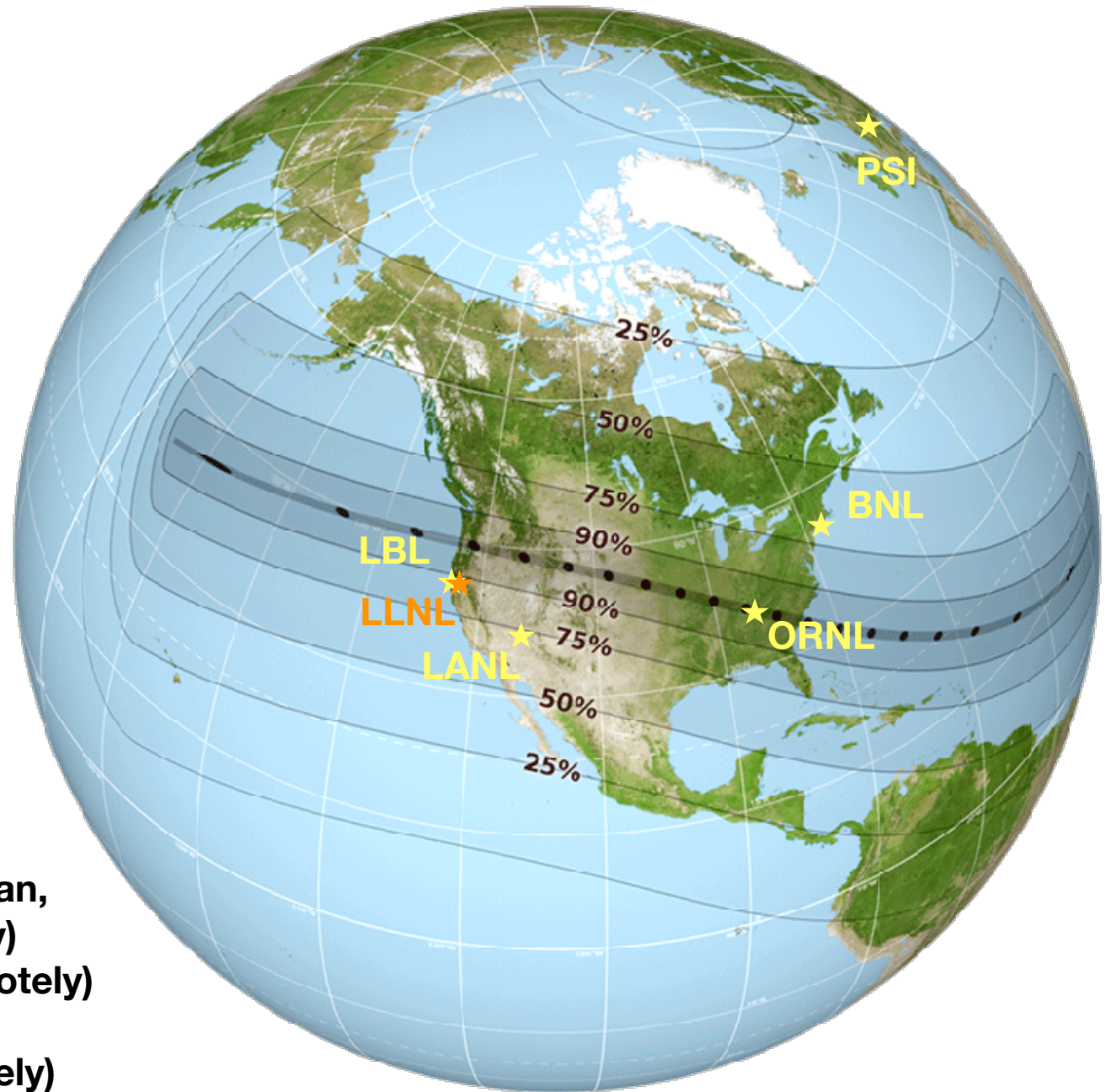
ADVANCE

Hackathon

ENDF-6 Format Manual

EMPIRE

**Held at
LLNL,
79% of
totality**



ENDF hackers:

LLNL: Ian, Caleb, Sofia

LBL: Amanda

LANL: Toshihiko, Morgan,
Denise (remotely)

ORNL: Doro, Vlad (remotely)

BNL: Dave

PSI: Dmitri (very remotely)

Committer	No. Commits	No. Files Changed	Focus
Mattoon	20	154	Isomers
Thompson	17	88	Charged particles
Conlin	1	1	NJOY formatting
Brown	45	149	New files (esp. TENDL+EMPIRE)
Kawano	7	12	Elastic cross sections >0
Quaglioni	1	6	Photonuclear
Lewis	36	342	Header issues
Wiarda	11	31	Covariance
White	0	0	Fission energy release
Neudecker	0	0	PFNS
Sobes	0	0	Covariance
Rochman	0	0	Platinum



“Alternative Metrics”

- Checking and processing codes don't have uniform criteria for errors (either what triggers them or what the message is), so meaningful regressions impossible...
- Banned from GForge twice!
- Overloaded ADVANCE, took ~ 1 week to catch up
- Page count in neutron release notes dropped ~15% while sublibrary size grew ~25%

See Gustavo Nobre's talk

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Atlas of Neutron Resonances

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National Nuclear Data Center
Brookhaven National Laboratory
Upton, NY 11973-5000

Elsevier
Amsterdam
The Netherlands

Submitted
to Elsevier
in July

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Discussed by D. Brown in AM session

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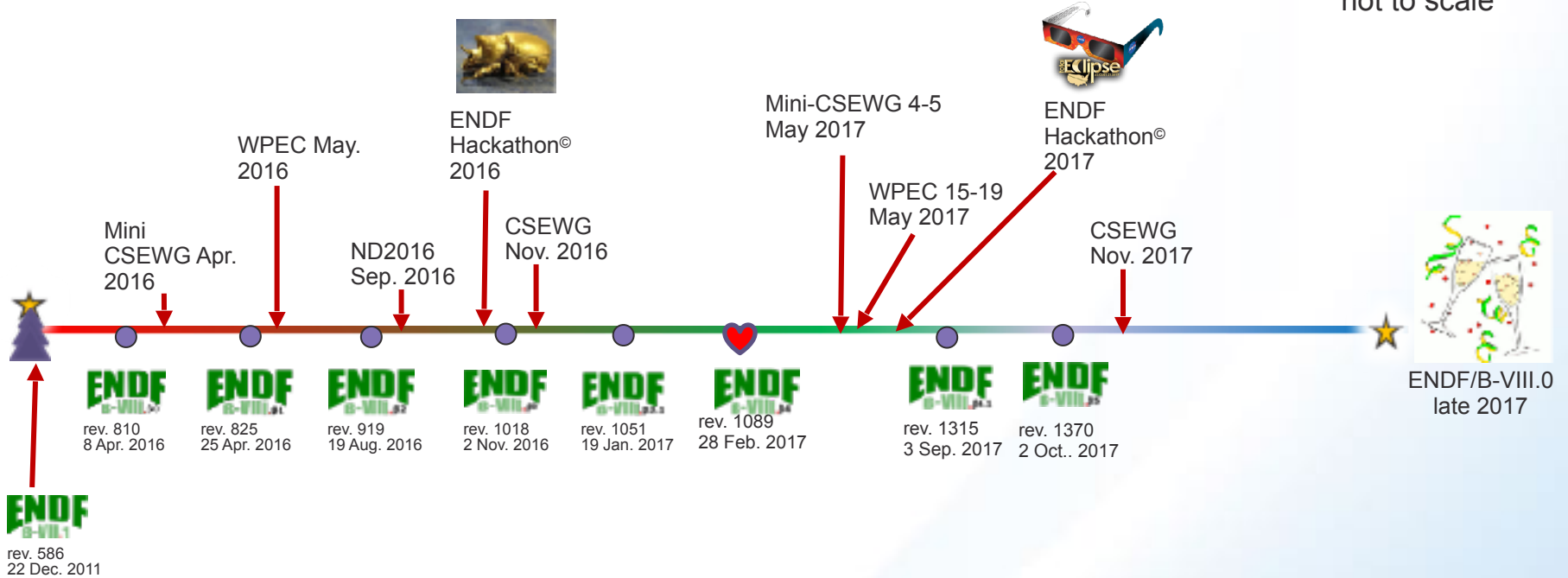
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ENDF/B-VIII on track for late FY17

6 year timeline
not to scale



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EMPIRE

ENDF/B-VIII.0 is biggest library yet

